Urol Res (2005) 33: 125–183
DOI 10.1007/s00240-005-0472-8

ABSTRACTS

4th eULIS Symposium (11th European Symposium on Urolithiasis)

Coburg, Germany, June 16–18, 2005

Chairman: Walter Ludwig Strohmaier

Calcium and Oxalate

CaOx-1

Bone loss in idiopathic calcium nephrolithiasis

Dr. Cicerello E., Merlo F., Maccatrozzo L., Faggiano L.
Regional Hospital, Urology, Treviso, Italy

Patients with calcium nephrolithiasis are reported to have reduced bone mineral density. Bone loss could be related to dietary habits (low calcium diet, high animal protein and sodium intake).

The aim of this study is to evaluate the relation ship between bone loss and dietary habits. We studied 72 patients with idiopathic calcium nefrolithiasis (43 males and 29 females) while they ate their customer diet. Daily urinary excretion of calcium, nutrient intake values and urinary pH on morning urine sample were calculated. A blood sample was collected and was analyzed for creatinine, sodium, potassium,alkaline phosphatase, parathyroid hormone, calcium and phosphate. Bone mineral density (BMD) on the lumbar spine and neck was mesaured using dual–energy x-ray absorpiometry (Lunar DPX) and was expressed as Z score according WHO classification. Statistical analysis were evaluated using regression analyses. Our data show that loss bone mineral density in calcium nefrolithiasic patients is common (osteopenia and osteoporosis incidence was 44% and 12% respectively). without significant difference between males and females. A significant correlation was found between BMD and sodium, phosphate, urea and pH urinary excretion ($p<0.01$). No correlation was found between urinary excretion of calcium and BMD. Dietary calcium intake was significantly lower in patients with low then in those with normal bone mineral density ($p<0.01$). There was no difference in serum parathyroid hormone levels, phosphate and calcium between the 2 groups. On the contrary alkaline phosphatase was lower in the patients with loss bone (99+-23 vs. 117+/–25 U.I.). Our results confirm that bone loss is common in idiopathic calcium nephrolithiasis. Dietary habits seem to influence bone mineral density, confirming their role in the pathogenesisi of calculosis. Furthemore the present study suggest that a reduction in bone formation rate related to lack of mineral in patients with a low calcium diet could be the main factor contributing to the bone loss seen in patients with calcium nephrolithiasis.

CaOx-2

The ever-changing role of pth in the formation of idiopathic calcium stones: another episode in the saga

Prof. Jaeger P., Champenois I., Dewisme C., Bekri S., Robertson W.
University Hospital Nice, Nephrology, Nice, France

In the past, idiopathic hypercalciuria has been considered in some patients to be the result of a renal leak of calcium leading to negative calcium balance and secondary hyperparathyroidism. Bone densitometry performed by a variety of techniques has shown low bone mineral density in idiopathic calcium stone formers (ICSF) compared with that in a control population. More recently, the paradigm has been challenged after the introduction of first generation of immunometric assays of PTH which led to the view that idiopathic hypercalciuria originates through intestinal hyperabsorption of Ca related to putative hypersensitivity of the vitamin D receptor (or to an elevation of the serum concentration of 1,25 (OH)2 vitamin D itself), and consequent relative suppression of PTH secretion.

The recent development of second generation immunometric assays aiming at detection of whole (or bio-active or bio-intact or cyclase-activating) PTH has led us to re-address this issue. Forty-four male ICSF were evaluated at our renal stone clinic according to a standard protocol including two 24-h urine collections obtained on a free-choice diet followed by a 2-h fasting urine collection and a fasting blood sample. The patients were divided into 2 groups: Group A: (n=22), hypercalciuric (HCa) ICSF had UCa.V Ž300 mg (7.5 mol)/24 h on two occasions.

Group B: (n=22) normocalciuric (N) ICSF had UCa.V 220 mg (5.5 mmol)/24 h on two occasions. The results showed the following (mean±SEM):

1. The mean value of urinary calcium was significantly higher in the HCa-ICSF group (482±45 mg/24h) than in the N-ICSF group (176±11 mg/24h) ($P<0.0001$).
2. The alkaline phosphatase concentrations were not significantly different between the HCa-ICSF group (69±3 U/l) and the N-ICSF group 61±2 U/l.
3. The mean "intact" PTH concentration was significantly lower in the HCa-ICSF group (39±4 pg/ml) than in the N-ICSF group (47±3 pg/ml) ($P<0.02$).
4. There was no difference between the mean ionised calcium concentration of the HCa-ICSF group (1.21±0.03 mmol/l) and that of the N-ICSF group (1.22±0.02 mmol/l).

This study confirms the lower concentrations of "intact" PTH in the HCa-ICSF patients compared with those in the N-ICSF patients. It remains to be seen whether or not reassessment of all sera for the concentration of bio-intact PTH and subsequent estimation of (7–84) PTH concentration challenges the paradigm of idiopathic hypercalciuria for a second time.

CaOx-3

Bone mineral density measurement in patients with idiopathic recurrent normocalciuric calcium stone disease

Dr. Tu˘gcu V., Ozbek E., Aras B., Ozbay B., Isl¡m F., Taşç¡ A.
Bak¡rkoy Treaning and Research Hospital, Urology, Istanbul, Turkey

About 80% of idiopathic recurrent urinary system stone diseases have a calcium content. Calcium stones a recurrence rate of 20%. We have long emphasized that stone disease is often a multisystem disease, with spinal and femur bone loss being a common complication of idiopathic urinary system calcium stone. In our study ,we investigated the bone mineral densitometry findings in patients with normocalciuric urinary system stone disease We have studied on a group of 150 patients that have idiopathic recurrent urinary system calcium stone disease (Group-1). The patients had urinary system stone problems at least two times. Their age range is between 18 and 50 years old (mean aged 36 +/–12,79). They are 75 males and 75 females without irreguler menses. The others group is 60 healthy volunteers (Control group, Group-2). Their ages range is between 18 and 50 years old (mean aged 39,2 +/–6,53). They are 35 males and 25 females without irreguler menses and they don't have any urinary system stone disease in history of their families and themselves recruited. We compaired group one and group two about bone mineral content (BMC), bone area (BA), bone mineral density (BMD), t score and z score of femur neck, femur total and lumbar vertebra's total values by using dual energy absorbsiometry (DEXA). In statistical evaulation t-student test was used. We found

that the patients in group 1 that 21 of them have lower bone density (70%). In group 2 that is control group 6 of them have lower bone density (20%). In the first group, 10 of them had (6,6%) are osteoporosis and 95(63%) of them had osteopeni. In control group there are no osteoporosis, howewer 10 (16,5) of them had osteopeni. The age and gender differences between group 1 and group 2 were not significant. In group 1, BA and BMD were significant for femur total ($p<0.05$); on the other hand, for femur neck, BMC, BMD, z score, t score were substantially significant ($p<0.001$) compared with control group. Of L2-L4 vertebra total t score, z score and BMD were substantially significant ($p<0.001$) for group 1 compared to control group. Our results show the severe loss of bone mass in the patients with urinary system normocalciuric calcium stone disease. So, the necessary precautions regarding protection of bone mass should be taken and the patient should be informed.

CaOx-4

Oxalate – handling in a low stone risk versus a stone-prone population group

Sonja Lewandowski[1], Allen Rodgers[1], Norbert Laube[2], Albrecht Hesse[2], Valerie Abratt[3], Sharon Reid[3]
[1]Department of Chemistry, University of Cape Town, Cape Town, South Africa
[2]Department of Urology, University of Bonn, Bonn, Germany
[3]Department of Molecular and Cell Biology, University of Cape Town, Cape Town, South Africa

Dietary and urinary differences between a low stone risk and a stone-prone population group do not explain the low incidence of kidney stones in the former. Studies in South Africa have shown that a diet high in oxalate has no effect on urinary oxalate in the black population group which has low stone risk. This provides a unique opportunity to investigate the gastrointestinal handling of oxalate in this group.

Participants (n=15 for each subject) provided baseline 24-hour urine samples and a stool sample on their free selected diets. In addition the gastrointestinal oxalate absorption was measured using [$^{13}C_2$] absorption test. Subjects followed a strict standardized diet for 2 days and ingested a capsule containing [$^{13}C_2$] oxalate on the morning of the second day. 24-hr urines were collected on both days. Bacteria in stools were analysed by growth on oxalate enriched selective media plates. Despite black volunteers consuming a diet significantly higher in oxalate, lower in calcium, lower in magnesium and with the same amount of fibre compared to whites, there was no difference in the urinary oxalate excretion between the two groups.

Blacks had a significantly higher metastable limit, significantly lower free Ca^{++} and significantly lower BONN-Risk-Index. Preliminary data in 9 blacks and 5 whites suggest that there is no difference in the gastrointestinal absorption between the two population groups.

Semi quantitative analysis of culturable bacteria in the stool samples from each participant showed that blacks may have more oxalate-degrading bacteria. This will be confirmed by quantitative Real-time PCR DNA analysis.

These results confirm that the South African black population is able to handle dietary oxalate in a more efficacious way than the white population. If the gastrointestinal absorption of oxalate is the same in the two groups there might be some yet unidentified endogenous oxalate-handling mechanism in place in the former group. Further investigation of oxalate-degrading bacteria might provide meaningful insights into the factors contributing to the low frequency of stone formation in this race group.

Additional authors include Gerd von Unruh and Diana Zimmermann

CaOx-5

Endogenous oxalate synthesis after intravenous loading of glyoxylate in normal and vitamin b6-deficient rats

Prof. Ogawa Y., Hossain R., Yamakawa K., Morozumi M., Uchida A., Sugaya K.
University of the Ryukyus Faculty of Medicine,
Division of Urology, Okinawa, Japan

Glyoxylate, an immediate precursor of oxalate biosynthesis, is shown to increase endogenous oxalate production after the administration in normal rats. Vitamin B6 deficiency has been reported to increase urinary oxalate excretion. We, therefore, assessed whether glyoxylate administration augments endogenous oxalogenesis in vitamin B6-deficient rats. Male Wistar rats were divided into 2 groups of 6 animals each, and were fed a standard diet or a vitamin B6-deficient diet for 3 weeks. After inducing anesthesia the rats were intravenously given 2 mg of glyoxylate. Urine samples were collected just before glyoxylate administration and at hourly intervals until 5 hour afterwards. Urinary oxalate, glycolate, and citrate levels were measured by capillary electrophoresis. Urinary oxalate and glycolate excretion peaked at 2–3 hours after loading in both groups. However, baseline urinary oxalate excretion was higher and urinary glycolate excretion after glyoxylate loading was lower in vitamin B6-deficient rats than in controls. Urinary oxalate excretion accounted for 8.43% and 25.12% of the administered dose of glyoxylate, while urinary glycolate excretion accounted for 2.70% and 1.44% of the administered dose in controls and vitamin B6-deficient rats, respectively. Vitamin B6 deficiency augments endogenous oxalate production from glyoxylate (by impairing AGT activity). However, glycolate excretion was reduced after glyoxylate load in vitamin B6 deficient rats than in controls, suggesting that activity of glyoxylate reductase/hydroxypyruvate reductase (GRHPR) might also be affected by vitamin B6 deficiency, and thereby affecting the conversion of glyoxylate to glycolate.

CaOx-6

Effect of taurine on urinary oxalate excretion after intravenous loading of glycolic acid in rats

Dr. Hossain R., Yamakawa K., Nishijima S., Morozumi M., Sugaya K., Ogawa Y.
University of the Ryukyus Faculty of Medicine,
Division of Urology, Okinawa, Japan

Oxalate is an important constituent of urinary stones, and higher urinary oxalate excretion is one of the risk factors of calcium oxalate stone formation. Oxalate can be synthesized from endogenous metabolism of various precursors including glycolate, and is excreted in the urine. Taurine treatment has been shown to reduce urinary oxalate excretion after oral feeding of glycolate in rats (Talwar HS et al, 1985). In this study, we compared urinary oxalate, glycolate, and citrate excretion after intravenous loading of glycolic acid in taurine-treated and untreated rats. Male Wistar rats weighing 180–200 g were divided into two groups of 6 animals each. Rats in one group were given normal saline (2 mL/rat /day) while rats in other group were given taurine (100 mg in 2 mL/rat/day) via intraperitoneal injections for 10 days. At the end of 10 days treatment period, all rats were anesthetized and were intravenously administered 10 mg of glycolic acid. Urine samples were collected just prior to glycolic acid load and at hourly intervals until 5 hours afterwards. Urinary oxalate, glycolate, and citrate levels were measured by capillary electrophoresis. Urinary oxalate and glycolate excretion peaked within 1–2 hours after loading of glycolic acid in both groups. Urinary oxalate excretion was significantly lower in taurine-treated rats than in untreated rats ($p<0.01$).

Urinary oxalate accounted for 2.02% and 0.78% of the administered dose of glycolic acid in untreated group and taurine-treated group, respectively. Glycolic acid load increases urinary oxalate excretion, and turine reduces this effect of glycolic acid as urinary oxalate excretion significantly decreased in the taurine-treated rats.

CaOx-7

Influence of a low and a high oxalate vegetarian diet on intestinal oxalate absorption and urinary excretion

Mr. Thomas E., von Unruh G., Hesse A.
University of Bonn, Urology, Bonn, Germany

The urinary oxalate excretion is increased under a vegetarian diet [1] compared to a normal mixed diet. This study was performed in order to quantify the effect of a low and a high oxalate vegetarian diet on intestinal oxalate absorption and urinary excretion.

6 healthy volunteers participated in this study. The volunteers carried out the [13C2]oxalate absorption test thrice under standard conditions [2] on a low oxalate (63mg oxalate/d) mixed diet, thrice on a low oxalate (70 mg/d) vegetarian diet and thrice on a high oxalate (300 mg/d) vegetarian diet with constant nutritional intake. For each [13C2]oxalate absorption test, the volunteers had to adhere to an identical diet for two days and to collect their 24h urines. In the morning of the second day, a capsule containing [13C2]oxalate was ingested. The mean urinary oxalate excretion of all volunteers on low oxalate mixed diet was 0.314±0.044 mmol/d. The excretion increased on the high oxalate vegetarian diet to 0.347±0.051 mmol/d and on the low vegetarian diet significantly to 0.408±0.067 mmol/d. On the low oxalate mixed diet the mean intestinal oxalate absorption of all volunteers was 8.6±3.5%. On the two vegetarian diets the oxalate absorption increased significantly to 13.4±4.2% (high oxalate) and 15.6±2.9% (low oxalate). Both vegetarian diets resulted in a significant increase in oxalate absorption, but only on the low oxalate diet did oxalate excretion increase significantly, despite the fact that both vegetarian diets contained the same amounts of nutrients and fluids. The higher absorption and excretion of oxalate in vegetarians are not only due to a high oxalate intake. The extent of oxalate absorption depends on various other nutritional und physiological factors such as bioavailability of the dietary oxalate, gastrointestinal transit time or pH and calcium concentration in the chyme. However, oxalate absorption and urinary excretion increased on a high or low oxalate vegetarian diet and can not be recommend for calcium oxalate stone patients.

CaOx-8

Evaluation of urinary oxalate levels in patients receiving gastrointestinal lipase inhibitor

Prof. Sar¦ca K., Erturhan S., Akarsu E., Yag˘c¦ F., Aktaran
Gaziantep Univercity, Faculty of Medicine, Department of Urology, Gaziantep, Turkey

Aim: The purpose of the present investigation was to examine the possible effects of Orlistat (Xenical), a gastrointestinal lipase inhibitor, on the intestinal absorbtion of oxalate and thereby on the urinary levels of oxalate excretion in patients receiving this medication for obesity problems Material and methods : A total of 55 patients (42 females- 13 males) were included into the study program and evaluated. Apart from the reduced caloric intake diet, patients in the first group (study group, n: 35) were treated with gastrointestinal lipase inhibitor (Orlistat, Xenical) for obesity problems. A second group of patients (control group, n:20) consisting of age and weight- matched patients ingesting the same diet without any Orlistat therapy were also studied. Patients with UTI of any reason have been excluded from the study program. Urinary calcium, oxalate, citrate levels were detected in 24 h collected urine. Statistical significance of the results was determined by using Wilcoxon Signed Rank test. P values of less than 0.05 were considered significant. Results : Comparative evaluation of urinary oxalate levels was found to be significantly increased in 20/35 patients (58%) during 3. months follow-up ($p<0.05$).Of these patients 16/20 (80%), continued to have increased urinary oxalate excretion during 6 months and 12/20 (60%) during 12 months follow-up ($p<0.05$). Despite a profound effect of the medication on oxalate levels, with respect to the changes in urinary citrate as well as calcium levels ,there was no significant effect of this medication on these parameters during 3 as well as 12 months follow-up evaluation ($p>0.05$).On the other hand; hyperoxaluria was found in 4/20 (20%) patients in control group. During long-term evaluation only 1 patient (5%) did demonstrate elevated levels of urinary oxalate Conclusions : In the light of our results and the literature data it is clear that; oral intake of gastrointestinal lipase inhibitors may increase fat absorption and thereby decrease calcium fatty acid soap formation which could reveal oxalate hyperabsorption during long-term medication. Our results again suggest that increased intestinal absorption of dietary oxalate due to this type of medication in obese patients could make a substantial contribution to urinary oxalate excretion and may increase the risk of stone formation during long-term application.

CaOx-9

In vitro and in vivo study of effect of lemon juice on urinary lithogenecity

Abdelkhalek.OUSSAMA, M. TOUHAMI, M. MBARKI
Laboratoire de Spectrpchimie Appliquée et Environnement, Unité d'urolithiase, Faculty of Sciences and Technices of Béni-Mellal, Morocco

Morocco

SUMMARY
OBJECTIVES: The diversity of the experimental results obtained in the study of the effect of the citrus juice on urinary lithogenicity carried out us to study the effect of these substances in vitro and in-vivo. The in-vitro study is based on the turbidimetric method on calcium oxalate crystallization. In vivo, we studied the effect of lemon juice consumption on urinary chemistry and we tested it on calcium oxalate crystallization in natural urine. METHODS: The formation of the crystals is induced by the addition of the oxalate and calcium solution. Optical density (OD) is measured in closed system at physiological conditions. The effects of the various juices of lemon, was evaluated by the addition of 50 µl of juice. A male volunteer with no history of kidney stone participated in this study, by lemon juice ingestion. The pH, concentration of oxalate, calcium and citrate were determined before and after ingestion and urine was freshly analyzed by microscopy. RESULTS AND CONCLUSIONS: In synthetic urine, the inhibition percentage of calcium oxalate crystallization increase gradually with the lemon juice concentration. In natural urine, we noted that the kinetics of crystallization of calcium oxalate, before and after ingestion of lemon juice, are comparable.

In vivo, after ingestion, a small increase in mean urinary pH (from 6.7±0.1 to 6.9±0.1) was noted. Indeed, oxalate calcium means and citrate excretion increased during this period with 33. 41%, 6. 85% and 3. 53% respectively. This increase in the oxalate excretion is probably explained by the conversion of the exogenous ascorbic acid contained in the lemon juice.

These various results show that the lemon juice presents an important inhibitory effect in vitro. The ingestion of the lemon juice seems to dissipate a effect of great quantity of citrates which has their turn, increases the excretion of oxalates. The presence of

these two elements simultaneous: citrate and oxalate compensate for their opposite effect.

KEY WORD: Urinary lithiasis – Epidemiology – lemon juice – in vitro – in vivo

CaOx-10

The effect of storage on the ascorbate and oxalate content of orange juice

Mrs. Seidler A., Hönow R., Hesse A., Siener R.
University of Bonn, Department of Urology, Bonn, Germany

Hyperoxaluria can result from a high dietary oxalate intake, an enhanced intestinal absorption or an increased endogenous production of oxalate, mainly from glyoxylate and ascorbic acid. Wabner & Pak (J Urol 149 (1993) 1405-08) found an increased urinary oxalate excretion during consumption of 1.2 l of orange juice. The aim of the present study was to examine the effect of storage on the oxalate and ascorbate content of orange juice. The oxalate content of the orange juice was analyzed using a recently developed HPLC-enzyme reactor method. Ascorbic acid was determined by a colorimetric method. Ascorbic acid, oxalate and pH value were determined hourly during the first 5 hours after squeezing of juice and again after 24 hours. Moreover, ascorbic acid, oxalate and pH were measured in two commercially available orange juices immediately and daily until 3 days after opening the packages. The orange juice was stored in the refrigerator until analysis. Mean ascorbic acid content was 57.2 mg/100 ml at baseline and decreased slightly to 54.4 mg/100 ml after 24 h of storage. The analysis of the oxalate content revealed a constantly low oxalate content of 0.10 mg/100 ml. The pH value of the orange juice was 3.55 at baseline and increased slightly up to 3.59 after 24 h. The mean ascorbic acid content of the commercially available orange juices decreased slightly from 34.8 mg/100 ml at baseline to 32.7 mg/100 ml three days after storage. Mean oxalate content and pH value remained unchanged at 0.16 mg/100 ml and 3.69, respectively. The oxalate content of orange juice can be considered as neglectible. Further studies are necessary to clarify the possible role of ascorbic acid in endogenous oxalate production.

CaOx-11

Oxalate-rich plants

[1]A.L. Seidler, [2]R. Hönow, [1]A. Hesse, [1]R. Siener
[1]Department of Urology, University of Bonn, Bonn
[2]Federal Institute for Drugs and Medical Devices, Bonn, Germany

Hyperoxaluria is a primary risk factor for calcium oxalate stone formation. Dietary oxalate may contribute up to 50% of urinary oxalate excretion. The aim of the present study was to examine the oxalate content of plants suggested to be rich in oxalate. The total and soluble oxalate content in plants was determined by a recently developed HPLC-enzyme-reactor method. This method combines enzymatic conversion and chromatographic separation of oxalate with amperometrical detection.

The highest total oxalate contents were found in Licorice root *Glycyrrhiza glabra* and blue-white clover *Trigonella coerula*. Licorice root is one of the most frequently employed herbes in traditional medicines and is used as flavouring agent in confectionery products, whereas blue-white clover is known as spice predominantly in Alpine countries, Southern and Eastern Europe. Total oxalate content of the oxalate-rich foods is given in the table:

Plant	N	Oxalate content (mg/100 g)	
		soluble	total
Fabaceae			
Peanut *Arachis hypogaea* (roasted)	2	77.3	247.5
Soy bean *Glycine max* (seed, dry)	2	38.0	276.8
Bean *Phaseolus vulgaris L.* (seed, white, dry)	2	38.8	546.9
Blue-white clover *Trigonella coerula* (powder)	1	72.3	1245.9
Licorice *Glycyrrhiza glabra* (root, dry)	2	165.0	3569.3
Malvaceae			
Lady's finger *Abdelmoschus esculentus* (fresh)	1	56.3	317.2
Convolvulaceae			
Sweet potato *Ipomoea batatas* (fresh)	2	76.7	495.6

Conclusions: Patients with calcium oxalate stone disease should to avoid the ingestion of these oxalate-rich foods and herbes. be advised.

Diagnosis and Colic

D-1

Does a negative u/s exclude the diagnosis of acute urinary lithiasis in patients presenting to the emergency room with flank pain

Dr. Stathouros G., Papadopoulos G., Gkialas I., Lykourinas M.
Athens General Hospital, Urology, Athens, Greece

To determine the incidence of negative U/S in patients with acute urinary lithiasis presenting to the emergency room with flank pain. We reviewed all 80 patients who presented with flank pain and demonstrated a negative U/S at the initial evaluation. The mean time between the onset of the pain and the U/S study was 1.5 hour. A second U/S study was performed in all of them 2 hours after the first one. In all 80 patients the second U/S demonstrated hydronephrosis to some extent despite they had undergone pain management or not. A negative U/S does not exclude the diagnosis of acute urinary lithiasis especially if this is performed within the first 2 hours by the onset of pain.

D-2

Preoperative evaluation for E.S.W.L. treatment. When can we renounce performing urography?

Dr. Chira I., Ambert V., Budau M., Pascu M., Radu T.
Prof. Dr. Th. Burgele Hospital, Clinic of Urology, Bucharest, Romania

The usual preoperative imagistic evaluation for E.S.W.L. treatment is composed of: plain radiography of kidney ureter and bladder, standard ultrasound examination and intravenous urography. These examinations have to indicate for the pelvic and ureteral stones the following seven criteria: 1. the presence of the stone into urinary tract 2. stone size 3. radiological aspect of the stone 4. the degree of dilatation 5. number of stones 6. position of stone into the urinary tract 7. the presence of the renal function. Useing these seven factors weare able to formulate a realistic prognosis of E.S.W.L. treatment. All the information needed from the criteria one to criteria six are covered by standard ultrasound examination and plain radiography. Can we certify the presence of the renal function with something else than urography? In our prospective study we have compared the presence of the ureteral flux determined by ultrasound Doppler colour in patients with a normal renal function on urography. 58 patients with renal pelvic and 21 with ureteral stones were included in the study. The position of the stone (renal pelvic or ureteral), the degree of dilatation (without dilatation, hydro or ureterohydronephrossis gr. I-II) were connected with the presence of ureteral flux. The stones diameter was between 5mm–12mm. Ureteral flux was determined in 2–5 minutes examination time. In the group of renal pelvic stones without dilatation (43cases) we determined the presence of the ureteral flux in all the cases meaning a sensibility of 100%. In the presence of hydronephrosis the sensibility decrease to 73%. For ureteral stones the ureteral flux was certified in only 10 patients, meaning a sensibility of only 65%. Ureteral flux determined by echo-Doppler colour for renal pelvic stones without dilation of pyelocaliceal system has a very good sensibility in detecting a normal renal function. Therefore in small renal pelvic stones, 5–12mm in our study the presence of ureteral flux can substitute the urography in the preoperative evaluation for E.S.W.L. treatment.

D-3

Value of helical ct-scan for the evaluation of ureteral and renal stones

Dr. Rau O., Reiher F., Lindenmeir T., Nelius T., Allhoff E., Effenberger O.
Med. Fakultät d. Otto v. Guericke Universität Magdeburg, Urologische Universitätsklinik, Magdebrug, Germany

Differential diagnostic procedures in patients (pats.) with symptoms of urolithiasis especially in pats. without evidence of stones in conventional x-ray examination is challenging. The value of helical ct-scan in this group of pats. is discussed controversely. Data for sensitivity and specifity vary between 80–100%. Between 04/99 and 11/04 we conducted an 16 yrs.) with symptoms of ureteral±unenhanced helical ct-scan in 103 pats. (54 colic but no evidence of stones in plain radiography (intravenous urography, IVP). We also evaluated the corresponding ultrasound and urine analysis. Endpoints of analysis were (A) the macroscopically evidence of stone, either spontaneous stone passage or ureteroscopic stone removal, or (B) no evidence of a stone. These pats. were free of ureteral colic at the endpoint or other causes for flank pain were found. In 55/103 pats. a stone was evident. Of the 55 pats., 41 were confirmed in helical ct-scan as having an ureteral stone corresponding to a specifity of 75%. 49/55 pats. had an erythrocyturia and 49/55 pats. showed a calyceal dilatation as well.

48/103 pats. had no macroscopically evidence of stone at the endpoint of analysis. In 39 pats. in this group helical ct-scan was also negative corresponding to a sensitivity of 82%. In the 9 pats. with false positive results, a retrospective review of the scans revealed mostly calcifications of surrounding structures. In 34/48 pats. was an erythrocyturia, and in 32/48 pats. a dilatation of the upper tract detectable. Retrospectively, these findings were signs of an infectious disease in the retroperitoneum. Additional we've found one liver tumor, one tumor in the proximal femur and three colon tumors. In our series helical ct-scan in pats. with no evidence of stones in IVP had a specifity of 75% and a sensitivity of 82%, respectively. This is less accurate when compared to the literature but displays clinical reality, because not all of the pats. undergo helical ct-scan in first place. At the time there is no other imaging procedure with higher sensitivity or specifity than helical ct-scan. False positive and negative results as well as the experience of the radiologists have to be considered.

D-4

Helical computer tomography vs intravenous urography in patients with suspected urinary tract colic

Dr. Platanas M. Kalantzis A., Doumas K., Gkialas I., Fragoulis A., Lycourinas M.
General Hospital of "Georgios Gennimatas", Athens, Greece, Department of Urology, Athens, Greece

The purpose of our study was to compare the two most popular methods in establishing the diagnosis of urinary colic, helical computed tomography (CT) and intravenous urography. 236 patients with acute urinary tract colic were examined in the emergency room of our hospital. After the initial assessment, the radiographic findings were compared to the ones of the helical computed tomography. Hydronephrosis, hydroureter, perinephric edema and periureteral edema were taken under consideration. 112 patients were found to suffer from renal calculi, 82 from ureteral cal-

culi and in 42 patients no calculi was found. Out of the 82 patients, the calculi were located in the proximal ureter in 31 patients, in the mid ureter in 12 patients and in the distal ureter including the ureterovesical junction in 39 patients. Additionally, hydroureter and periuretic edema was noticed in 78% of these 82 patients. In the 42 patients with no calculi in the urinary tract, 14 were found to suffer from extraurinary lesions. The sensitivity and specificity of the helical CT was evaluated in 100% and 92%, respectively. Furthermore, the gain of examination time with the latter method should not be overseen. The helical CT is a method that could lead us to the diagnosis of urinary colic with accuracy in considerably less time, which is especially valuable in the emergency room.

D-5

The digital ct scan radiography as a follow – up method in already diagnosed ureterolithiasis

Dr. Platanas M., Kalantzis A., Aristas O., Gkialas I., Doumas K., Lycourinas M.
General Hospital of "Georgios Gennimatas", Athens, Greece, Department of Urology, Athens, Greece

We studied patients with known ureterolithiasis through CT scans trying to understand whether the CT scout radiography could be of value in their follow – up, as the routine method is conventional radiography. The CT scout radiographs of 178 patients with known ureterolithiasis were collected. The stones were classified in three major groups: the definitely visible ones, the non – visible ones and, finally, the intermediate ones. We also studied how the voltage of the scanning made a difference in the appearance of stones depending on their size and fragments of kidney stones in the scout radiographs. In 51.7% of the studied radiographs the stones were definitely visible, in 44.94% of the radiographs the stones were definitely not visible and in 3.36% the stones belonged to the intermediate group. Fragments of kidney stones and stones smaller than 3mm required 80–100 kVp to be visible, whereas the ones that were larger than 3mm were visible at all kilo voltage. There were 5 stones made of uric acid and 1 made of xanthine, all of them larger than 10 mm, which were not visible in the scout radiographs. Using the digital CT scout radiography could probably become of use as a follow – up method in patients with known ureterolithiasis. What we should keep in mind in order not to misdiagnose is that some stones and kidney fragments could require specific range of kilo voltage (80–100 kVp) and that some stones which cannot be visible could be made of uric acid or xanthine.

D-6

A novel approach in evaluation of spontaneous stone passage: use of statistical learning methods

Mr. Abate A., Dal Moro F., Lanckriet G., Arandjelovic G., Gasparella P., Pagano F.
University Of California, at Berkeley, Electrical Engineering and Computer Sciences, Berkeley, California, United States of America

In some cases, the therapeutic decision for renal calculi appears hard to be taken just on the basis of clinical factors. In fact, this decision hinges on the previous clinical experience of the physician. Thus far, some of the methods employed to ease this problem, for instance Artificial Neural Networks (ANN), have given preliminary results, although never enough reliable to be actually applied in clinics.

This study has tried to apply, first time in a clinical setting, the newest statistical learning techniques of Support Vector Machine (SVM) and Kernel Methods (KM), to optimise the prediction of spontaneous stone passage. The ultimate goal was to define a methodology to be efficiently used in every day clinics. A dataset of 1163 patients affected by renal colic has been analysed and restricted to single out a statistically coherent cohort, which eventually tallied up to 402 patients. Nine clinical factors have been used as inputs for the adaptive network, while one binary output (spontaneous versus non-spontaneous passage) has been considered. The network has undergone training and testing. Moreover, the inputs have been statistically ranked. The results obtained showed 86.9% for specificity and 84.5% for sensitivity in predicting the spontaneous stone passage. Within the complete ranking of the symptoms, the stone size appeared to be the most influential, as expected. After an attentive comparison with the results in literature, we claim to have improved the prediction efficiency of spontaneous stone passage. These new methods have shown intriguing clinical motivations for their applicability. This yields to the future realization of applicative software for practical clinical usage.

D-7

Expression of pain in renal colic depends on the educational and social status of the patient

Dr. Papadopoulos G., Stathouros G., Kalantzis A., Gialas I., Doumas K., Lykourinas M.
Athens General Hospital "G. Gennimatas", Urology, Athens, Greece

In this study we aim at showing that patients of different financial status, education and social level do not express their pain in the same way when they are referred to the emergency room for renal colic. During the period 2003-2004 1561 patients were referred to the emergency room with flank pain in whom renal colic was diagnosed by using physical examination, complete urinalysis, a plain film of the abdomen, renal ultrasonography and noncontrast spiral Computed Tomography in selected cases. They were asked to characterize their pain using a scale from 1 to 5 (grade 1: minimal, grade 2: mild, grade 3: moderate, grade 4: severe, grade 5: intolerable). The only available criterion for assessing the severity of the pain was the degree of pyelocaliceal dilatation as this was delineated by Ultrasonography and/or Computed Tomography. One hundred and three patients were excluded because there were not any objective radiographic findings, while 95 were not enrolled in the study because they did not respond to the analgesic agents and, thus, could not think and communicate adequately. From the remaining 1363, 176 characterized the intensity of their pain with grade 1, 278 with grade 2, 412 with grade 3, 343 with grade 4 and 154 patients with grade 5. Furthermore, they were kindly requested to complete a questionnaire concerning their educational level, their profession, their social, family and financial status. Patients were divided into two cohorts according to their answers. It was revealed that among the 454 individuals of grades 1 and 2, 288 (63.4%) belonged to the "high level" group, while the remaining 166 (36.6%) belonged to the "low level" one ($p<0.01$). On the contrary, 281 (56.5%) patients from the "low level" cohort characterized their pain as severe or intolerable (grades 4 and 5), while this was the case for 216 (43.5%) patients from the "high level" group ($p<0.01$). As concerns grade 3 pain, there was no statistically significant difference between the two groups. It can be deduced that people with low educational, financial and social level manifest their pain in a more intense manner than patients with a higher one.

D-8

Flank pain as a first symptom of colorectal adenocarcinoma

Dr. Papadopoulos G., Vassilakis G., Stathouros G., Fragoulis A., Aristas O., Lykourinas M.
Athens General Hospital "G. Gennimatas", Urology, Athens, Greece

We present a case of a 68-year old man with a solitary kidney and flank pain as a first symptom of colorectal adenocarcinoma. A 68-year old man was referred in the emergency room of our Hospital with a left side flank pain, gradually worsened during the last month. On the right side he had been offered a nephrectomy, 32 years before, because of Tuberculosis. No other symptoms or chronic diseases were referred. The renal ultrasonography showed a middle-grade pyelocaliceal dilatation. The non-enhanced helical Computed Tomography study did not add any other information. As regards the biochemical assay, the serum creatinine concentration was 5.1 mg/dl, the urea level was 142 mg/dl, while electrolytes, glucose and hepatic enzymes did not show any abnormalities. The blood count showed slight anemia (Hct 36.7%). The diagnostic procedure began with a ureteroscopy which could not be continued beyond 5 cm from the ureteral orifice because of a strcture. As a consequence, the patient underwent an open surgery. A small, fibrotic area of the ureter was removed and an end-to-end anastomosis was made. The histological diagnosis revealed colon adenocarcinoma which was confirmed by colonoscopy and biopsies. The patient died four months later. Flank pain may be due to a variety of reasons concerning extra-urogenital causes even in the absence of other, more specific, symptoms.

D-9

The efficacy of lornoxicam on acute renal colic

Dr. Temeltaş G., Asan Ç., Müezzinoğlu T., Lekili M., Büyüksu C.
Celal Bayar University, Urology, Manisa, Turkey

To determine the effectiveness of lornoxicam in comparison with diclofenac sodium for the relief of acute renal colic. 213 patients with renal colic presenting to the Department of Emergency Medicine were enrolled. They were all diagnosed by phsical examination, urinanlysis, KUB and USG. All the patients included in the study divided in 2 groups.A visual analogue pain scale was used to quantify the degree of pain before the treatment. The patients in Group 1 treated with intramusculer lornoxicam (8mg) and patients in Group 2 treated with intramuscular diclofenac sodium (75mg). The patients were asked to mark the degree of pain using this analogue scoring system at 15th, 30th and 60th minutes. 129 of 213 patients were evaluated, the others were excluded the study, because of their individual exclusion criterias such as hepatic, renal disfunctions, hypersensitivities, pregnancy etc. Mean pretreatment pain scores (S0) in Group 1 and Group 2 were 6,04 and 6,10 respectively (p=0,868). Mean pain scores at 15th, 30th and 60th minutes after treatment (S15, S30, S60) in Group 1 were 1,46; 0,84 and 0,63 respectively and in Group 2 were 3,75; 1,96 and 1,50 and there was a statistical significant difference in pain scores between Group 1 and Group 2 at 15th, 30th and 60th minutes (S15: p<0,001, S30: p=0,001, S60: p=0,01). The use of intramusculer lornoxicam was effective in relieving of renal colic in a short period of time and well tolerated. Lornoxicam will be a good choice for the treatment of acute renal colic.

D-10

Combination of nsaids with paracetamol in the treatment of patients with renal colic

Dr. Papadopoulos G., Stathouros G., Kalantzis A., Galanakis I., Liakatas I., Lykourinas M.
Athens General Hospital "G. Gennimatas", Urology, Athens, Greece

Non-steroidal anti-inflammatory drugs (NSAIDs) represent the most commonly used medication for the treatment of patients with renal colic. In this study we aim at enhancing their analgesic effect by adding paracetamol to the treatment schedule. During the period 2001-2004, 2665 patients, between 16 and 72 years old (mean age 39 years) were referred for renal colic to the emergency room of our Hospital, which was diagnosed by physical examination, complete urinalysis, a plain film of the abdomen (KUB), renal U/S and spiral CT in selected cases. They were asked to rate their pain using a range from 1 to 5. They were divided in two groups: the first one included 1745 individuals with mild and moderate pain (grades 1 to 3), while the second comprised 920 patients with severe pain (grades 4 and 5). These two cohorts were randomly offered, intramuscularly, an NSAID agent, either alone (856 from the first group and 466 from the second) or combined with paracetamol (889 and 454 patients, respectively). Among the individuals with mild and moderate pain, 784 (91.6%) from the first subgroup and 796 (89.5%) from the second one were relieved of their pain. The difference was statistically insignificant (p>0.1). On the contrary, 328 (70%) of the patients with severe pain responded to the treatment with the NSAID, while the respective percentage was 82.8% (376 patients) as for the combination with paracetamol (p<0.001). It can be supported that in cases of renal colic with severe pain, the combination of NSAIDs with paracetamol is superior to the treatment with NSAIDs alone. It seems that paracetamol enhances the therapeutic effect of NSAIDs and the combination is recommended in such patients, since paracetamol is an agent without particular side effects.

D-11

Comparison of diclofenac sodium and intracutane sterile water injections in renal colic: a randomized trial

Dr. Sığırcı A., Seymen T., Özbay B., Karadağ S., Kemahlı E., Taşçı A.
Bakırköy Dr. Sadi Konuk Research And Training Hospital, Dpt. of urology, İstanbul, Turkey

We evaluate the pain relief in renal colic with Diclofenac Sodium intramuscularly and intracutane sterile water injections, compared with placebo (NaCl 0.9%). 119 patients with renal colic, who did not receive any analgesic therapy 6 hours prior, were investigated. They were randomly assessed into 3 groups.: 39 of them received 75 mg Diclofenac Sodium intramuscularly (i.m.) (Group 1); 40 received intracutane 4x0.2 ml sterile water at the trigger points of the affected flank (Group 2) wherein the 3rd group (placebo) received 4x0.2 ml of saline (0.9% NaCl) intracutaneous at the same points. The pain relief was measured using the visual analogue scale (VAS) before treatment and at minutes 1,5,15,30,60,120, and 360 after the injections The pain scores in all groups measured with the median visual analogue scale before treatment were similar. (Group 1: 8.7 cm; Group 2: 8.8 cm and Group 3: 8.8 cm). But starting from 1st minute in all checking minutes (incl. 360.min) there were (except min. 120) significantly differences in favour of the sterile water group :1st minute 8.8 cm vs. 5.7 cm (p<0.01); 5th min. 8.3 cm vs. 2.1 cm (p<0.001); 15th min. 6.0 cm vs. 2.1 cm (p<0.001); 30th min. 3.0 cm vs. 1.1 cm (p<0.001); 60.th min 1.1 cm vs. 0.5 cm (p<0.001); 120.th min.

0.7 cm vs 0.6 cm ($p>0.5$) and 360. min. 1.2 cm vs. 0.6 cm $p<0.001$). Wherein in the placebo group (Group 3) only in the 1. minute with 4.5 cm a reduction in pain was observed; the pain expressed in VAS was 5.1 cm; in min. 5; 6.2cm in min.15 and 6.9 in minute 30. We stopped to evaluate these patients due to ethical reasons after the 30. minute and applied Diclofenac Sodium 75 mg im (n=20) or intracutane sterile water (n=20). The analgesic effect of intracutaneous applied sterile water is superior to the classical therapy modality with nonsteroidal anti inflammatory drugs (NSAID) in amount to rapid and long acting pain relief in renal colic. The placebo group showed except in the initial period no effect in pain relief in renal colic.

Crystallization

C-1

The influence of variations in calcium and oxalate concentrations on stone growth in vitro

Dr.Saw NK. Gilpin S., Dixon J., Kavanagh J., Rao N.,
South Manchester University Hospitals Trust,
Minimally Invasive Urology and Stone Management, Manchester, United Kingdom

Vermeulen showed that growth of oxalate stones in rat kidneys could be initiated by a short period of hyperoxaluria and this growth could be sustained by a modest urinary oxalate concentration [1]. This led to the suggestion that stone formation may be triggered by brief episodes of acute hyperoxaluria. Our aim was to perform a similar investigation using an in vitro model of stone growth and to test the effect of variations in calcium and oxalate concentrations Series of twelve calcium stones were grown in a stone farm [2] for periods of up to 1000 hours. The standard media was artificial urine with 6 mM calcium and 1.2 mM oxalate.

At various time periods the calcium or oxalate or both were reduced by one half in the media being fed to six of the stones. Stone growth was measured by periodic weighing. With half calcium and half oxalate present, growth was minimal. Increasing both to the standard conditions caused the stones to double in weight from 100 to 200mg in about 21 days. Returning the input media to half calcium and oxalate increased this doubling time to more than 100 days. Normal growth could be obtained with half the oxalate concentration and standard calcium but very little growth was obtained with half calcium and standard oxalate. Stone growth in the stone farm can be triggered by raising the calcium and oxalate in the feed solutions, but this growth can not be sustained under low calcium and oxalate conditions. In our system the effect of calcium was more apparent than that of oxalate.

Acknowledgement: This work was supported by the Oxalosis and Hyperoxaluria Foundation and the National Kidney Research Fund.

References: 1. Vermeulen et al., J Urol 1967; 97:573-582 2. Chow et al., Urol Res 2004; 32:55-60

C-2

The relationship between crystals in suspension and stone growth in a stone farm

Dr. Saw NK., Gilpin S., Dixon J., Kavanagh J., Rao N.
South Manchester University Hospitals Trust, Minimally Invasive Urology and Stone Management, Manchester, United Kingdom

Accretion of material into a developing stone could occur by aggregation of crystals from the suspension around the stone or by direct precipitation onto the stone surface, or both. Here we investigate these mechanisms by studying the relationship between the crystals surrounding the stone and the stone growth rate in an in vitro model. Series of twelve calcium stones were grown in a stone farm [1] for periods of up to 1000 hours. The standard media was artificial urine supersaturated with calcium and oxalate. At various time periods the calcium or oxalate or both were varied in the media being fed to six of the stones. Stone growth was measured by periodic weighing and growth rates calculated assuming a surface area dependent model. The crystal size distribution was measured in the surrounding suspension and growth and nucleation rates were calculated using the principles of mixed suspension mixed particle removal crystallisation. Through 22 experimental growth periods, the stone growth rate was correlated to the number of crystals in suspension around the stone ($R=0.84$, $p<0.001$) and to their nucleation rate ($R=0.77$, $p<0.001$ respectively). The relationship between stone growth rate and crystal growth rate was not significant ($R=0.17$, $p=0.06$). These results indicate that the primary means of stone enlargement in our in vitro model is through aggregation of crystals from the surrounding suspension and that direct precipitation at the surface is not a quantitatively significant contributor. Acknowledgement This work was supported by the Oxalosis and Hyperoxaluria Foundation and the National Kidney Research Fund. Reference 1. Chow et al., Urol Res 2004; 32:55-60

C-3

The discriminatory power of the bonn risk index – theoretical considerations

Dr. Kavanagh J., Laube N.
South Manchester University Hospitals Trust, Minimally Invasive Urology and Stone Management, Manchester, United Kingdom

The Bonn Risk Index (BRI) has been proposed as a useful tool in the diagnosis and management of calcium stone formers. This is based on its proven success in distinguishing such stone formers from healthy subjects but it is not immediately obvious why this should be so. The index is based on the ratio of two measurements, the ionised calcium concentration in the native urine [Ca] and the amount of oxalate required to induce crystallization in a 200 ml sample of urine ((Ox)). While each of these parameters might be expected to provide useful information and a combination of the two might be expected to be more helpful than either alone, it is difficult to produce a coherent argument based on thermodynamic principles which can fully account for the discriminatory value of BRI. The particular problems to be addressed here are (1) is there a special significance to a BRI value of 1? (2) Because of the relationship between [Ca] and (Ox), does measurement of (Ox) add any new information? (3) as a given value of BRI can arise through a series of different [Ca] and (Ox) values, why should these share a common likelihood of belonging to a stone forming population? Based on data from 195 urine samples taken from CaOx stone-formers (SF) and healthy subjects (H), we address these problems through analysis of the distributions of the variables involved and their interrelationships. (1) When discriminating between stone former (SF) and healthy (H) populations, the best discriminatory BRI value is found to be very close to 1.0 but this is simply a coincidence. As (Ox) is an amount and [Ca] is a concentration, the ratio [Ca]/(Ox) could be varied simply by changing the volume of urine used during the measurement procedure.

(2) Assume the formation product, k=[Ca] x (Ox), then BRI is equivalent to [Ca]2. If k is a constant and does not vary between samples then BRI would be no better at discriminating between SF and H than [Ca]. Empirically, k in whole urine is not constant and in particular the average value for k in SF urine is different from that in H urine. The measured BRI therefore takes into account not only the individual [Ca] but also the particular formation product for that urine.

(3) As BRI=[Ca]/(Ox) then BRI also=[Ca]2/[Ca]x(Ox)= [Ca]^2/k. The advantage of this expression is that it combines the two variables which differ between SF and NSF. In the plot of [Ca] versus (Ox), BRI of a particular sample is the slope of the line between the origin and the point for that sample in the [Ca] versus (Ox) plot and the same is true for the plot of [Ca]^2 versus k. If we consider the bivariate distribution of these latter two vari-

ables from SF and H urines we find that all points on lines passing through the origin have approximately equal probabilities of coming from SF or H populations. Furthermore, this feature can be shown to be dependent on there being a correlation between [Ca] and (Ox). BRI is a simple expression relating two variables which intuitively might be expected to influence the risk of oxalate stone disease. In practical terms, BRI is an effective discriminator between SF and H populations because both [Ca] and {[Ca] x (Ox)} differ between SF and H groups and because [Ca] and (Ox) are also correlated to each other.

C-4

Can the bonn-risk-index be replaced by a simple measurement of the urinary concentration of free calcium ions? – results obtained from empirical studies

Dr. Laube N., Hergarten S., Pullmann M., Kavanagh J.
University of Bonn, Experimental Urology, Bonn, Germany

Calcium oxalate, CaOx, urolithiasis is a common disease in industrialized countries. Prevalence rates between 5% and 20% are observed; epidemiological data reflect increasing tendencies. Regular risk evaluation and risk monitoring during stone therapy are recommended measures to ensure reduction of recurrence of crystal formation. A strong hyperbolic relationship has been shown to exist between urinary concentration of unbound Ca-ions, [Ca2+], and the amount of ammonium oxalate, (Ox2–) to be titrated to a urine sample in order to induce calcium oxalate, CaOx, crystallization. The ratio of [Ca2+] and (Ox2–) is termed the BONN-Risk-Index, BRI. The data plot around a hyperbola given by [Ca2+](Ox2–) =0.169. Approx. 95% of the BRI values plot within a range covered by the hyperbolae [Ca2+](Ox2–)=0.1 and [Ca2+](Ox2–)=0.3. Due to the high relationship between [Ca2+] and (Ox2-) one may argue that determination of only one of both BRI parameters, preferably [Ca2+], is sufficient to describe a urine's crystallization risk. Based on 195 urine samples taken from CaOx stone-formers and healthy subjects, we compared the sensitivity and specifity of BRI and its corresponding [Ca2+] value by calculation of Receiver Operator Curves, ROC. Furthermore, the ROC-curves of the established risk indices RSCaOx, and APCaOx are presented. Our results clearly demonstrate that i) the BRI has the highest sensitivity and specifity of the tested indices, ii) (Ox2–) can be predicted from a measured [Ca2+] by an accuracy of only 33% leading to an inacceptably high difference between measured BRI and predicted BRI, and iii) determination of [Ca2+] alone reveals only a meaningful first estimate of a urine's CaOx crystallization risk according to the BONN-Risk-Index. BRI allows superior distinction between healthy subjects and CaOx stone-formers. Although RSCaOx and APCaOx require more analytical efforts for determination, these parameters are less reliable. Determination of [Ca2+] alone reveals only a rough estimate of BRI. To avail of the high quality of the BRI, determination of (Ox2–) is required.

C-5

Computation and modelling of the stone-growth related urinary depletion effect using "depletion v1.0"

Dr. Laube N., Pullmann M.
University of Bonn, Experimental Urology, Bonn, Germany

Stone patients often present with concrements in the urinary tract during metabolic evaluation. However, these concrements are presumably in a state of continuous growth. Consequently, the concentrations of the lithogenic components in the voided urine decrease systematically. Thus, treatment schemes inevitably fail to focus on the true pathogenic urinary composition. Instead, they focus on underestimated concentrations; this can gain high clinical relevance. In recent publications, we introduced a complex physical approach and provided mathematical equations which can be solved analytically. However, solving of the equations by use of a pocket calculator is extensive. Depletion V1.0 was developed to integrate the calculation of the depletion effect into the daily practice of treating stone patients. Minimum requirements for Depletion V1.0 is the Java 1.1.8 platform runtime environment, which is supported on nearly all operation systems including Linux, MacOS X, and Windows. The program can be used directly within a Java-compliant web browser (e.g. Firefox, Mozilla, Internet Explorer) or from the program's storage location (approx. 75kB). The implemented data base provides stone type relevant parameters. Data input is carried out via an easy-to-handle graphical user interface (GUI). Results are given as values and interactive plots; computation and update of plots are performed in real time. Result sheets can be exported to platform-independent EPS format or printed directly. Depletion V1.0 enables the medical practitioner to obtain an improved interpretation of the stone patient's health status. Only a set of easy to achieve clinical standard parameters is required as input. The program is scheduled to be available as freeware by mid 2005.

C-6

Investigation of the calcium oxalate crystallization effect of vitamin D on urinary calcium and on

Abel Mathopa, Allen Rodgers, Sonja Lewandowski, Dawn Webber
Department of Chemistry, University of Cape Town, Cape Town, South Africa.

Vitamin D has been reported to play a major role in calcium absorption in the gut of rats (1). Previous studies on urinary crystallization have shown that calcium oxalate is the main chemical component of kidney stones. Therefore, a decrease in urinary calcium excretion might contribute to reducing the risk of calcium-oxalate urine crystal formation (2). The present study was undertaken to investigate the effect on urinary calcium excretion and calcium oxalate crystallization in humans after ingestion of a vitamin D supplement. Three male candidates were recruited for the trial. They were given a three-day standardized diet and were restricted from sun exposure throughout the period. On the third day, a 24hr urine sample was collected and analyzed. After a four-day rest period the same candidates were provided with the same three-day standardized diet, but vitamin D supplementation (400IU/day, Solgar) was added. A 24hr urine sample was collected on the third day of vitamin D supplementation. Urinary calcium excretion, Bonn Risk Index (BRI), calcium oxalate metastable limit and crystal sedimentation and precipitation were determined in both urine samples. Sedimentation, precipitation and calcium oxalate metastable limit experiments were inconclusive. Urinary calcium excretion and BRI are presented in the table.

A. Urinary calcium excretion (mmol/L)

Subject number	Before vitamin D supplementation	After vitamin D supplementation
1	**0.52**	**0.35**
2	**0.62**	**0.45**
3	**0.67**	**0.74**
B. BRI		
1	**1.39**	**0.54**
2	**1.58**	**0.88**
3	**3.12**	**1.99**

It is noted that urinary calcium excretion decreased in two candidates while BRI decreased in all three.

The decrease in calcium excretion and BRI following administration of a vitamin D supplement supports the hypothesis that vitamin D may play a protective role in stone formation. However, the above protocol needs to be repeated in a major trial involving many candidates before any final conclusions can be drawn.

1. Iwamoto J, Yeh JK, Takeda T, Sato Y (2003) Effect of vitamin D supplementation on calcium balance and bone growth in young rats fed normal or low calcium diet. *Horm Res*. **61**:293-299.

2. Robertson WG, Peacock M, Marshall RW, Marshall DH, Nordin BEC (1976) Saturation-inhibition index as a measure of the risk of calcium oxalate stone formation in the urinary tract. *N Engl J Med*. **294**:249-252

C-7

Inhibitory effects of phytic acid on calcium oxalate crystallization and stone formation in vitro.

Mr. Saw N., Kavanagh J., Rao P.
South Manchester University Hospitals Trust, Department of Minimally Invasive Urology and Stone Management, Manchester, United Kingdom

A diet rich in phytic acid (also known as inositol hexaphosphate, IP6) might prevent renal calcium stones[1] and IP6 inhibits calcium oxalate (CaOx) crystallisation in vitro[2]. Here we investigate the effects of IP6 on Ca binding and CaOx crystallisation and relate these results to effects on CaOx stone growth in vitro. Ca binding by IP6 was studied using a Ca-ion electrode. CaOx crystallisation was investigated using a 96 well-plate method which measures metastable limit (ML) and turbidity rate index (TRI). CaOx stone growth was measured using an in vitro system, operated continuously for in excess of 500 hours. Using human urine, or artificial urine with 6mM total Ca, significant changes in ionised Ca required millimolar concentrations of IP6. ML was significantly increased and TRI decreased by 30 µM IP6 in artificial urine. Human urine required 120 µM IP6 to bring about significant effects. In the stone growth system, with artificial urine, effective inhibition occurred at 0.3 µM. Inclusion of urinary macromolecules required a higher concentration of IP6 (3 µM) for effective inhibition. IP6 in urine is reported to be present in micromolar concentrations where effects on solution Ca will be negligible and in our assay system, no effects could be observed on crystallisation. Nevertheless, significant inhibition of CaOx stone growth was found with physiological concentrations of IP6. The result suggests that the stone growth inhibition is achieved through surface effects rather than by modifying the solution or suspension surrounding the stone.

1. Modlin M.. Lancet 1980; 2 (8204): 1113.

2. Grases F, March P. J Crystal Growth 1989; 96: 993.

C-8

Effects of dietary phytate on urinary calcium oxalate crystallization

Ntlama Lesotho, Allen Rodgers, Sonja Lewandowski, Neil Ravenscroft
Department of Chemistry, University of Cape Town, Cape Town, South Africa

Phytic acid or myoinositol hexakisphosphate (IP_6) is a naturally occurring component in some edible foods. Its inhibitory capacity towards calcium oxalate crystallization in urine has been demonstrated (1). Taking into account the molecular structure of IP_6, its inhibitory capacity can be explained by the affinity of PO_4^{3-} groups to bind Ca^{2+}. The adsorption of IP_6 on the surface of CaOx crystals blocks further crystallization. The present study investigated whether phytate-containing diets have an effect on urinary phytate concentration and CaOx crystallization.

Subjects (n=10) were given dietary instructions to follow a phytate-free diet for 3 consecutive days. Thereafter they were given a phytate-rich diet consisting of 200 g of oats (taken with 100 ml of milk) and 2 slices of wholewheat bread. On the third day of both regimens, 24 h urines were collected and were analyzed for phytate using an anion exchange resin (2). Urines were then subjected to ^{14}C crystal deposition experiments to measure crystallization kinetics.

The average urinary phytate concentration in subjects following the phytate-free diet was 2.02+/–0.51 mg/l while that following the phytate-rich diet was 3.21+/–0.65 mg/l. ^{14}C-deposition experiments (fig.1) showed slower deposition kinetics and smaller quantities of deposited crystals in urine from subjects on the phytate-rich diet.

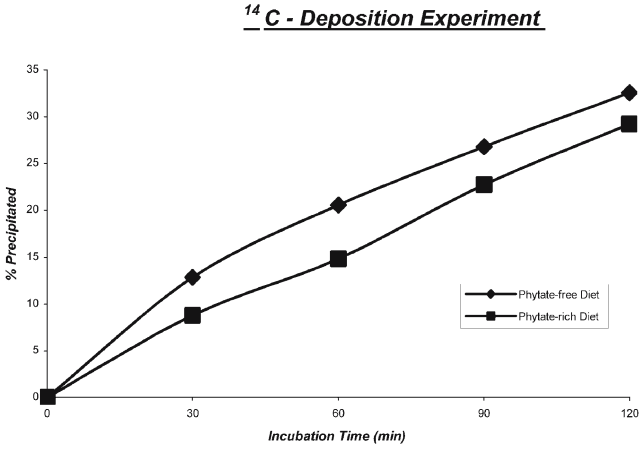

Fig.1: Consumption of a phytate-rich diet leads to an increase in urinary phytate concentration and a concomitant decrease in CaOx crystal deposition kinetics. In order to permit effective crystallization inhibition of calcium salts and consequent prevention of renal stone development, it is recommended to include high fiber foods in the diet to maintain adequate phytate urinary levels.

References

1. March JG, Simonet BM, Grases F, Salvador A. Indirect determination of phytic acid in urine. Analytica Chemica Acta 1998; 367:63-68

2. Grases F, March JG, Prieto RM, Simonet BM, Costa-Bauza A, Garcia-Raja A, Conte A. Urinary phytate in calcium oxalate stone formers and healthy people. Scand J Urol Nephrol 2000; 34:162-164

C-9

Stabilization of calcium oxalate suspension by urinary macromolecules, probably an efficient protection from stone formation

Prof. Baumann J., Affolter B., Caprez U., Clivaz C., Weber R.
Viollier Biel AG, Stone Research Center , Biel/Bienne, Switzerland

Evaluation of the effect of urinary macromolecules (UM) on calcium oxalate aggregation (AGN) being responsible for the destabilization of crystal suspensions and probably stone growth. UM of 6 healthy men were isolated by a haemofiltration procedure almost in the same concentration and composition as found in whole urine. CaOx suspensions were prepared in buffered UM of 100% and 30% and in aqueous solutions by addition of 1.5 mM calcium

and 1.0 mM oxalate at varying pH. Optical density (OD) was monitored by spectrophotometry. Stability of suspensions (SS) was defined as the time where no sedimentation (OD decrease) could be observed. AGN was visualized by REM and quantified measuring sedimentation time (ST=minutes for 0.05 OD decrease), which below 2.8 indicates AGN. As a measure of surface charge of crystals which prevents AGN, Zetapotential (ZP) was determined. From the collecting period, urine volume and known average volume of renal collecting system, urinary transit time (UT) through upper urinary tract was estimated. 100% UM compared to aqueous solution changed mean ZP from –0.5 to –17 mV ($p<0.001$) and inhibited AGN (absence of aggregates in REM and increase of mean ST from 1.23 to 3.75, $p<0.001$). Mean SS, being only 36 sec in aqueous solution increased to 15.8 min at an estimated UT of 11 min. UM dilution to 30% reduced SS and ST by 40% or 53% respectively, but the ratio of mean SS of 9.5 min and estimated UT of 3.3 min became more favourable. pH had no significant influence on crystallization parameters. Growth of calcium stones may be explained by instability of crystal suspensions during crystalluria. UM of healthy men inhibits AGN and therefore may stabilize crystal suspensions during kidney passage. Since this latter effect is favoured by dilution, increasing diuresis seems to be most important for stone pro- and metaphylaxis.

C-10

Inhibitory Effect of Urinary Proteins Associated with Calcium Oxalate Dihydrate Crystals in the Urine of Black and White South African Males

Ntsapo Deppa[1], Allen Rodgers[1], Shameez Allie-Hamdulay[1], Sylva Schwager[2], Edward Sturrock[2], Dawn Webber[1]
[1]Department of Chemistry, University of Cape Town, Cape Town, South Africa
[2]Division of Medical Biochemistry, University of Cape Town, Cape Town, South Africa

Comparison of the urine chemistry in black and white South African populations show that blacks have lower urinary citrate, higher urinary oxalate and lower urinary calcium compared to whites[1]. Urinary proteins are selectively included into calcium oxalate crystals[2] thereby yielding a crystal matrix extract (CME). Osteopontin (OPN) is the principal intracrystalline protein in calcium oxalate dihydrate (COD) crystals[3]. The main objective of the present study was to investigate the possible inhibitory role of COD-CME derived from the urine of both race groups.

24 hr urines were collected from 20 black and 20 white healthy males and pooled separately. Calcium chloride was added to each pool to reach a final concentration of 12 mmol/L to precipitate pure COD crystals. Proteins included in COD crystals were visualized by SDS-PAGE and analyzed by a western blot. The effect of COD-CME on ^{14}C calcium oxalate deposition, aggregation (sedimentation rates) and nucleation (OD_{620}) were determined.

From SDS-PAGE and the western blot, OPN was found to be one of the major proteins in COD-CME. Crystal matrix extract from black subjects (BCME) inhibited calcium oxalate aggregation and crystal deposition to a greater extent, and promoted nucleation to a lesser extent, than WCME (Table).

Experiment	BCME	WCME	BCME vs. WCME p-value
% Aggregation Inhibition	95	71	$p<0.05$
% Nucleation Promotion	52	61	$p<0.05$
% ^{14}C-Oxalate Deposition	33	73	$p<0.05$

These results demonstrate that BCME is a superior inhibitor of calcium oxalate aggregation, nucleation and deposition than WCME. Since OPN is known to be the main intracrystalline protein in COD-CME, we tentatively suggest that OPN may provide superior protection against calcium oxalate crystallization in the urine of black subjects compared to whites and thereby may contribute to the stone rarity in this race group.

References

1. S. Lewandowski, A. Rodgers and I. Schloss. The influence of a high-oxalate/low-calcium diet on calcium oxalate renal stone risk factors in non-stone-forming black and white South African subjects *Br J Urol*. 2001; 87:307

2. I. R. Doyle, R. L. Ryall, and V. R. Marshall. Inclusion of proteins into calcium oxalate crystals precipitated from human urine: A highly selective phenomenom, *Clin Chem*. 1991; 37:1589-1594.

3. F. Atmani, F. J. Opalko, S.R. Khan. Association of urinary macromolecules with calcium oxalate crystals induced in vitro in normal human and rat urine: *Urol Res*. 1996: 24:45-50.

C-11

Ureteral stents coated with diamond-like carbon – a novel strategy to reduce the extent of biofilm formation on the surfaces of ureteral stents

Dr. Laube N., Bradenahl J., Schmidt M., Meissner A., Kleinen L., Schenk K.
University of Bonn, Experimental Urology, Bonn, Germany

Blockage and encrustation of ureteral catheters and stents by crystalline bacterial biofilms remains a major complication in patient care. Approx. 30% of all nosocomial infections are related to bladder catheterization. Plasma-deposited diamond-like-carbon, DLC, coatings are well known for their excellent biocompatibility. In this study, we tested the usefulness of DLC-coating in the reduction of the encrustation tendency of ureteral stents in-vivo and in-vitro. To conduct in-vitro experiments, a "mixed suspension mixed product removal crystallizer" (MSMPR) was established. 12 stents per run can be tested under identical chemical and physical conditions. Each run consists of 8 DLC-coated and 4 uncoated reference stents. In order to test the different surface properties in respect to crystal adhesion, the test stents were incubated in synthetic urine under pH-conditions of an acute infection for 40 h. The salts obtained on the stent surface were HCl-dissolved and from their chemical analysis, a model mineral composition based on fixed stoichometric compositions of the salts struvite, carbonate hydroxylapatite, and brushite was computed. Furthermore, in the framework of treatment attempts, we tested a set of 18 DLC-coated ureteral stents in 7 patients severely suffering from terminal cancer. Previously, stent removal frequencies of less than 6 weeks were necessary for these patients. The in-vitro experiments revealed that the DLC-coated stents showed in the mean 35% less encrustation in comparison to the untreated reference stents. The DLC-coated ureteral stents were successfully tested in-vivo over periods of at least 2.5 months. During this period, no biofilm formation took place on the catheter surface. No other complications occured. In all cases, an exceptionally facile handling and a high tolerance was reported by patients and doctors. Diamond-like-carbon coating is a new strategy to improve the surface of ureteral stents. This novel, fully biocompatible, surface effectively reduces the biofilm formation and encrustation tendency.

Epidemiology

E-1

Stone composition in germany – evaluation of 110,000 stone analysis

Dr. G.Schubert
Vivantes Klinikum im Friedrichshain, Urinary Stone Laboratory, Landsberger Allee 149, 10249 Berlin, Germany

The increase of prevalence and incidence rates of urolithiasis in Germany as well requires furthermore the analysis of urinary stones and epidemiological evaluation of stone composition. In this study the development of occurrence frequency of stone components in the last decades was investigated. Moreover, a evaluation of stone analyses in dependence of sex and age of patients was performed. More than 110,000 urinary stones from patients in Berlin and other parts of Germany in the years from 1971 till 2003 were analyzed. The employed methods were polarization microscopy, X-ray diffraction and infrared spectroscopy.

The 110,000 analyses were evaluated relating to the occurrence frequency of stone components, 30,000 analyses relating to sex and 5,500 analyses relating to age of patients. The evaluation of 110,000 analyses resulted independent of sex in following percental frequencies of occurrence: whewellite 77,6%, weddellite 42,8%, apatite 32,5%, uric acid 10,0%, struvite 5,9%, uric acid dihydrate 5,5%, brushite 1,1%, ammonium urate 0,8%, cystine 0,3%, whitlockite 0,1%, octacalcium phosphate 0,1%, organic 0,6% artefacts 2,3%. Other urates, rare purine derivates and drug stones have frequencies less than 0,05%. Out of 29,582 concrements 21,267 stones were of male and 8,315 stones of female origin. The components uric acid, uric acid dihydrate and brushite occur 2–3 times more frequent in male patients than in female patients, whereas struvite and cystine occur three times more frequent in female than in male patients. The distribution of stone frequency depending on the age shows a pronounced peak in the age groups 51–60 and 61–70 years in male patients, whereas the female patients have a very broad peak plateau between the years 31–70. Both calcium oxalates show a remarkable decrease of the occurrence frequency in the years 1971-2003. The occurrence frequency of struvite and apatite has been decreasing since 1990/91. The frequency of brushite increases clearly in the last years, whereas the frequency of cystine is constant in all years. Clear differences appear between male and female patients in the age distribution and in the frequency of several stone components.

E-2

Stone composition of 360 urinary tract calculi from our region

Ass.Prof. A. Kosar, M.B. Hoscan, T.A. Serel, H. Perk, S. Soyupek, N. Delibas
Süleyman Demirel Universitty, Urology, Isparta, Turkey

Turkey is an endemic area for stone disease. The purpose of this retrospective study was to study the spectrum of stone composition of urinary tract calculi in patients managed at Suleyman Demirel University, Faculty of Medicine, Department of Urology. A total of 360 urinary calculi were analyzed. The stone fragments were collected after extracorporeal shock-wave lithotripsy, or retrieval by endoscopic (percutaneous nephrolithotomy, ureterorenoscopy), and various open surgical procedures. The structural analysis of the stones was done by chemical analysis Of the 360 stones analyzed, 279 (77.5%) were calcium oxalate stones, 45 were struvite (12.5%), 14 were uric acid stones (3.9%), 11 were calcium phosphate (3%), 4 were calcium oxalate + calcium phosphate (1.1%), 4 were cystine (1.1%) and the remaining 3 were xantine (0.9%). In our region larger percentage of patients had calcium oxalate stones. To prevent the formation of a new stone and to plan the medical therapy after stone therapy it is appropiate to analyze the stone composition.

E-3

Field survey of renal stone disease in rural, northeast Thailand

Prof. P. Sriboonlue, A. Premgamone
Khon Kaen University, Biochemistry, Khon Kaen, Thailand

Renal stone is a common health problem in Northeast Thailand. Hospital records indicate a moderate prevalence and that most stone patients are rural dwellers. To gain a fuller understanding of the extent of the stone problem, we undertook a field survey with the aid of a mobile ultrasound team. Free-of-charge ultrasound renal stone checking was announced through local health volunteers in 13 villages. Participants joining the study were interviewed for stone-related symptoms and underwent urinalysis (using a urine strip). The presence of stones in their kidneys was determined using an ultrasound (256 grey scale) multiple anatomical appro We enrolled 1 423 subjects (486 males) between 18 and 60 years of age; the largest age group comprised persons between 50 and 59 (27%). Ultrasound imaging detected renal stones in 606 subjects (43%) and stones averaged 5.22+4.7 mm in diameter. Most (66%) stones were <5 mm in diameter; while a minority (4%) were >10 mm. The primary clinical symptoms associated with abnormal urinalysis were: 1) muscle pain (75%); 2) back or abdominal pain (73%); 3) hematuria with pyuria (66%); 4) headache (58%); 5) dyspepsia (56%); 6) joint pain (50%); 7) hematuria (48%); 8) pyuria (47%); 9) positive fist-test (46%); and, 10) symptoms aggravated by eating purine-rich food or alcoholic beverages (37%) .ach. The prevalence of renal stone disease among rural Northeast Thais, based on hospital records, included a fraction of the true number of cases. Our village survey stone disease (including small stones with multiple clinical symptoms but less severity).

E-4

Does stone composition vary with demographic variables?

Prof. F. Marickar
Medical College, Surgery, Trivandrum, India

In this paper the stone analysis reports were classified into different groups based on demographic variables like age and sex of the patients to compare the type of stones produced by the demographically different groups of patients. 485 stone samples were analysed using qualitative analysis, optical microscopy and Fourier Transmission Infrared Analysis over a period of five years from 1998 to 2002. The stones were mainly mixed, calcium oxalate monohydrate, calcium oxalate dihydrate, uric acid, phosphorus and Cystine. The results were compared between different age and sex groups of the patients. It was found that out of 485 patients, 14.23% were Christians, 54.85% Hindus and 30.93% were Muslims. When considering Christians, maximum patients were en-

countered in the 4th, 5th and 6th decades; (4.34%, 4.34%, 7.24%, 24.64%, 23.19%, 23.19%, 8.69% and 1.44% were the values for first to eighth decades). 13.04 % of patients were females and 86.95% males. Regarding the stone composition COD – 13.04%, COM- 27.54%, Mixed –37.68%, Phosphates – 2.89% and Uric acid 11.54%. Among Hindus, maximum patients were encountered in the 4th and 5th decades only (4.51%, 3.00%, 15.79%, 38.34%, 23.31%, 12.41%, 0.75 and 0 were the values for first to eighth decades). 7.58% of patients were females and males constituted 92.48%. Regarding the stone composition COM was more and uric acid was lesser than the Christian patients. COD – 12.78%, COM – 29.32%, Mixed – 42.86, Phosphates – 1.5%, Uric acid – 9.4% and Cystine – 0.37%. Among Muslims, stone occurrence was spiking mainly in the 4th decade. (1.03%, 0.66%, 15.33%, 40.66%, 24.00%, 10.66%, 0.66% and 0% were the values for first to eighth decades). 12.20% of patients were females and males constitute 88%. Regarding the stone composition, COM was maximum and Uric acid was minimum compared to other religions COD – 11.33%, COM – 30.67%, Mixed – 44.67%, Phosphates – 1.33% and Uric acid – 9.33%. It is concluded that the religious and cultural background of the individual significantly affects the composition of stone formed. Hence control of stone disease has to be achieved by different modalities designed by the different demographic variables. Dietary variations in different religious groups may be responsible for the difference in stone pattern.

E-5

Correlation between composition of drinking water and patient biochemistry

Prof. F. Marickar
Medical College, Surgery, Trivandrum, India

This paper has attempted to identify whether the chemical constituents of the water consumed by the individuals during the twenty four-hour urine collection alters biochemical values of urine. From the observations obtained, the various controversies in the role of drinking water are discussed. Two hundred water samples that were used for drinking by proved urinary stone disease patients were collected and labeled as tap water or well water depending upon the source. The water samples were analysed using atomic absorption spectroscopy for its twenty-three elements. The urine and serum biochemical abnormalities were recorded and the values were compared with cross tabulation and linear regression coefficient. It was found that the all parameters under study were well within the desirable limit in both well and tap water drinkers. The promoter urine oxalate was having a statistically significant correlation with the silica content of water at 95 % confidence interval, with a negative correlation value of –0.142. The inhibitor urine citrate has statistically significant correlation with $p<0.05$. The serum Creatinine in the patient group showed significant correlation with the total hardness of water with a positive correlation value $p<0.05$. The chloride level in the water showed significant negative correlation with serum uric acid at $p<0.05$. The calcium content of the water had very high statistical correlation with serum Creatinine with a correlation value of 0.278 at $p<0.01$. The sulphate content of the water had very high statistical correlation with serum creatinine with a correlation value of 0.278 at It is concluded that along with other established promoters and inhibitors, the various elements and net mineral content in the drinking water affect the process of Urolithiasis.

E-6

Demographics of 2897 cases with uroltihiasis

Dr. A. Tefekli, M. Binbay, A. Tok, M. Akay, M. Barut
A. Muslumanoglu Haseki Teaching and Research Hospital, Dept. of Urology, Istanbul, Turkey

Climate, nutritional addiction, demographic factors, genetics and life style play significant roles in the etiology of urinary stone disease. In our study we analyzed demographic findings, and treatment options in cases with urinary tract stones using a standard questionnaired. During a 5-year period, 2897 patients with urinary stone disease were seen at our institution. Demographic factors, presenting symptoms, stone location and treatment options offered were retrospectively reviewed. There were 1653 (57%) men (mean age:42.7±12.1, range:1–79 years), 1244 (43%) women (mean age:39.5±18.3, range:1–84 years) and men/women ratio was 1.33/1. A total of 102 (3.5%) were identified the present under age 14. The presenting symptoms were pain in 2115 (73%), hematuria in 608 (21%) and other urinary symptoms in 174 (6%). There were 1357 (46.8%) patients with recurrent urinary stone disease and a positive family history in 1188 (41.0%). The stones were located in the kidney in 1451 (50.1%), ureter in 1237 (42.7%), bladder in 166 (5.7%), urethra in 43 (1.5%). The origin of patients was identified to be from Eastern Anatolia in 723 (25.0%), Black See Region in 612 (21.1%), South Eastern in 548 (18.9%), Marmara Region in 486 (16.8%), Middle Anatolia in 427 (14.7%), Mediterranean Region in 73 (2.5%), Aegean Region in 28 (0.9%). As a treatment option, ESWL was offered in 1297 (44.7%), percutaneous nephrolithotomy in 338 (11.7%), ureteroscopy in 574 (19.8%), open surgery in 471 (16.4%) and medical treatment in 212 (7.3%). Urinary stone disease is most commonly seen in men from Eastern parts of Turkey in the 4th decade of life, with flank pain the most common presenting symptom. ESWL is still most commonly offered treatment option.

E-7

Changing gender prevalence of nephrolithiasis

Prof. Preminger G. Scales C., Curtis L.
Duke University Medical Center, Urology, Durham, North Carolina, United States of America

Recent studies suggest that changes in environmental factors, such as lifestyle and diet, may have affected the prevalence of stone disease in the general population. However, few studies have been able to document changing epidemiologic patterns of nephrolithiasis. The objective of this study was to examine changes in the prevalence by gender of inpatient discharges for stone disease. Discharge estimates for the management of renal and ureteral calculi were derived from the National Inpatient Sample. This database includes in-patient stays from a stratified 20% sample of community hospitals in the US. Discharges were identified by ICD9-CM principal diagnosis of 592.0 (Calculus of Kidney) or 592.1 (Calculus of Ureter). Estimates were compared with the z test to account for standard error. Analysis was performed using SAS version 8.0. The proportion of females discharged for stone disease increased from 38.5% in 1997 [64,144 females, standard error (SE) 1701] to 44.3% (78,120 females, SE 2258) in 2002. This represents a 15.1% increase in the proportion of females discharged for stone disease ($p<0.001$). After population adjustment, there was a 15.6% increase in the rate of discharges for females, despite a minimal (<1%) change in the overall discharge rate for stone disease (see table). Population adjusted discharge rates for stone disease (rate per 100,000 persons) Discharge Type 1997 2002 Change P All Stones 61.5 61.3–0.34% 0.931 All stones, female 46.2 53.4 15.6% <0.001 Renal stones, female 16.5 19.8

20.0% <0.001 Ureteral stones, female 29.7 33.6 13.1% 0.006 In this nationally representative sample, there was a 15.6% increase in the rate of females discharged for stone disease. In the absence of treatment bias, this finding suggests a shift in the gender prevalence of treated stone disease. In the context of increasing ambulatory intervention, the relatively constant rate of total discharges may suggest that the prevalence of treated stone disease is increasing in the US population. Further investigation is required to confirm these apparent changes and identify the underlying risk factors.

E-8

Epidemiological and clinical factors of urolithiasis in kerala – a three year study

Prof. Marickar F., Chandran A., Stephen J.
Medical College, Surgery, Trivandrum, India

This paper studies the epidemiology and biochemical abnormalities of urinary stone disease in Kerala 805 proved urinary stone patients who attended the urinary stone clinic during 2000 – 2003 period were studied using a structured proforma. Twenty-four hour dietetic intake including drinking water of each patient was also recorded. Calcium, uric acid, oxalate and citric acid level in blood and twenty-four hour urine were estimatedThe epidemiological factors studied include age, sex, religion, type of presentation, family history, symptoms like lithuria, haematuria, vomiting, dysuria, sweating, associated conditions like urinary tract infection, urinary obstruction, Diabetes Mellitus, Hypertension, dietary habits, past surgery and biochemical changes in citrate, oxalate, uric acid and creatinine. The maximum number of patients was in 30–39 age group (33.5%). Males constituted majority (85.5%) of patients. Hindus were the dominant religious group in the study (52.3%). But the proportion of Muslims was specifically high when the religious composition of the state was concerned. More than 60% of the stone population was colic patient. The incidence of stone in each age group remained almost similar in both sexes. One third of patients presented with out any symptom. 51.5% had pain, 19.7% had haematuria and 12.9% presented with lithuria. Vomiting, dysuria and sweating were found to be the associated symptoms of urinary stone disease patients. 76.9% of patients did not have a past history of stone disease. 20.6% of patients were having recurrent attacks. 4% of patients had undergone surgical therapy for stone disease. 11.4% of patients were having Diabetes Mellitus while only 4% of patients were having Hypertension. 22% of patients had a family history of stone. 96.1% of patients were non-vegetarian. The disease was common in the rural population with an increased incidence among Gulf employed people. 72% of the study population had hypocitraturia followed by hyperoxaluria (61.8%), hyperuricosemia (36.9%), hyperuricosuria (27.1%) and hypercreatinemia (14.5%) respectively. The findings prove that epidemiological factors influence stone formation in the urinary tract. These factors will have to be kept in mind during the treatment and prophylactic interventions.

E-9

Epidemiology of urolithiasis – a link between stone formation and diabetes mellitus?

Dr. Knoll T., Zimmerer T., Haecker A., Michel M., Alken P.
Mannheim University Hospital, Department of Urology, Mannheim, Germany

The pathogenesis of calcium oxalate (CaOx) stone formation remains partially understood. There is some evidence that the initial crystallisation side may be the renal interstitium. Therefore, apart from the renal tubules, the vasculature might play a major role in urolithiasis (UL) and an association between arteriosclerosis and urolithiasis was hypothesized. Thus, stone formation should be more common in patients with diabetes mellitus (DM), who are at high risk of developing angiopathy. Aim of this study was to investigate the prevalence of UL in patients with DM and to identify specific risk factors. 340 patients with DM were evaluated (m/f 53.6%/46.4%.; mean age 63.8 yrs.). DM durance, DM therapy, BMI, HbA1c, DM-related complications, chronic diseases, kidney function, urine analysis, renal ultrasound, UL history and stone composition were assessed. Data was analysed by student's t-test, chi-square test, Fisher's exact test, U-test and Kruskal-Wallis test and was compared to actual epidemiological data in Germany (Hesse et al., Eur Urol 2003). Overall prevalence of UL was 7.82% (vs. 4.71% in Germany, p=0.047). Stone analysis was available in 36%, all patients, except of one with a CaPO3 stone, had CaOx UL. Prevalence was significantly higher in patients with coronary heart disease (27.59%; p>0.001). Patients with allopurinol and thiazide medication had a lower prevalence of stone formation (p=0.02 and p=0.03). We could not demonstrate an increased prevalence for patients with diabetic nephropathy (p=0.08). Calcium or magnesium supplementation did not influence stone formation significantly. However, none of the patients with magnesium supplement had stone formation. Patients with DM are at higher risk for UL than healthy subjects. Although underlying metabolic syndrome makes identification of risk factors difficult, we could clearly demonstrate a significantly higher prevalence of urinary stones in patients with coronary heart disease. This finding may support the hypothesis of the vasculature being a part of the puzzle of urinary stone formation.

E-10

The analysis of risk factors based on epidemiological characteristics of urolithiasis

Ass Prof. Unal D., Savas M., Yeni E., Verit A., Gulum M., Ciftci H.
School of Medicine, Harran University, Department of Urology, Sanliurfa, Turkey

Our aim is to investigate the effects of demographic, anamnestic and dietary characteristics on urinary stone disease by designing an epidemiological trial. For this study, 537 subjects from Sanliurfa area answered the questionnaire including the sections of demography, lifestyle, medical history and dietary habits. Demographic and lifestyle data consisted of gender, birthplace and inhabitancy, education, income, activity status, sun and heat exposure, brushing teeth and smoking. Medical history was inclusive of the previous stone recurrence/s and urinary tract infection/s, the stone in relatives and spouses of the subjects and sweating. In addition dietary habits of the participants were recorded. In statistical estimations, logistic regression analysis, Student's t and chi-square tests were used. The mean age of the patients was 34 years (10–99 years), with a predominant male gender (male/female: 331/206). Of the participants 46 (8.6%) had an absolute stone history. The rates of stone history were not different between male and female subjects (10% in males and 6% in females, p=0,156). In multivariate analyses, income, activity status, previous stone recurrence, the spouse with a stone, urinary tract infection history and some dietary habits significantly affected on the occurrence of the stone disease. The results of this epidemiologic study conducted in Sanliurfa known as endemic for urolithiasis suggest that the prevalence of urolithiasis is high, and various important environmental, medical and dietary factors may contribute to the endemic characteristics of this area.

E-11

Urolithiasis – contributions of islamic medicine in context

Mr. Buchholz N., Zammit P., Buchholz N.
St. Bartholomew's Hospital, Urology, London, United Kingdom

During the pre-renaissance, Islamic culture contributed works to every scientific field, including medicine and chemistry. The Islamic empire included the Byzantine and Persian empires and supported large libraries that amassed knowledge from within and without. Additionally the Islamic empire overlaps the stone belt providing the ideal ground for development of stone medicine. The works of Avicenna (Qanun), Albucasis (Tasrif), Rhazes (Mansoori), Alzahravius and Avezoar amongst others were translated into Latin and used as medical textbooks in medieval Europe. Publications regarding these works and others relating to urolithiasis are reviewed to construct the state of the art at the time with reference to understanding of the aetiology, itspresentation and treatment. Statements into aetiology are listed and tabulations for differentiating colitis versus renal pain and kidney versus bladder stones are drawn up. Pharmacopoeia and dietary advice are listed. Surgical management is considered anatomically and functionally and illustrations provided wherever available. The Islamic empire was ideally situated geographically to draw upon Greco-Roman and Arabic medicine and culturally inspired to evaluate previous works and further advance scientific knowledge. The use of translated works as textbooks for medical tuition in European universities well into the seventeenth century is a testament to this.

E-12

Differences in the dietary intake of two ethnic groups in south africa may contribute to differences in their prevalence of urolithiasis

Ms. Schloss I., Dr Lewandowski S., Prof Rodgers A.
University of Cape Town, Division of Nutrition and Dietetics, Cape Town, South Africa

Kidney stone disease is recognized as a chronic disease of lifestyle with a prevalence increasing in industralised communities in the last 90 years. The current prevalence of CaOx urolithiasis in South African males is 15% in the white ethnic population and less than 1% in the African black population. It could be hypothesized that the traditional diet of the latter group, which is high in complex carbohydrates, fibre and vegetables and low in fat and animal protein, could contribute to their lower risk of kidney stone formation. The purpose of this research was therefore to evaluate the present dietary intake of these two ethnic groups with particular reference to protective and risk factors towards urolithiasis. Two independent cross-sectional dietary surveys executed a number of years apart with differing dietary methodologies, are described in this research. Dietary Survey # 1 consisted of 11 black and 11 white age-matched males between the ages of 16–61. The black sample was drawn from a patient group in a local state hospital with minor bone injuries and residing in a peri-urban settlement. Dietary survey # 2 consisted of 10 black and 10 white age-matched males between the ages of 18–28 recruited from the local University student population residing in an urbanized environment. In both dietary surveys, the white population was drawn from residents in the local Cape Town vicinity via advertisement. Both groups of subjects were free of urolithiasis, urinary tract infections and any other metabolic illness, clinical problem or medication that would confound the results.

Both Dietary surveys made use of a standardized semi-quantitative Food Frequency Questionnaire which was self administered following specific training from a qualified dietitian re how to report intake and portion size. Particular reference was given to those foods considered relevant in the context of urolithiasis including oxalate, calcium, total and animal protein, carbohydrate, fibre, vitamin C, magnesium and vitamin B6. Other dietary assessment tools including a 24hr recall (Dietary survey 1) and a 2 day food record (Dietary survey 2) were used to compare dietary intake.

All dietary intake data was converted to daily equivalents and analysed into the respective macro- and micronutrient content with the use of the electronic software "foodFinder" version 6 and the South African Food Composition Tables (1991, MRC). Median values were determined for each group and compared using Mann whitney statistics. Both Dietary surveys showed a significantly lower intake of animal protein for the black population vs the white (Survey 1: 43.1g [34,1; 59.7] vs 67.7g [62.1;80.6] p=0.048 and Survey 2: 40,1g [23.6;51.9] vs 66.4[75.7] p=0.041). Total protein intake was also significantly lower in the black ethnic group in the second dietary survey (p=0.049) and approached significance in the first survey (p=0.66). Vitamin B6 was significantly lower in the back population for both dietary surveys: 2.05mg/day [1.4;2.9] vs 3.0 [2.29;3.9] p=0.049 and 1.85 mg/day [1.2;2.4] vs 3.06 [2.43; 3.31 p=0.02] The intake of diet in the second survey also showed a significantly reduced intake of calcium, magnesium, phosphate and potassium in the black ethnic population and an oxalate intake which was higher (p=0.052). The diet of the black population could be considered lithogenic (high oxalate, low calcium, low magnesium and low vitamin B6) except for the reduced intake of total and animal protein which could be considered protective. In summary, the apparent immunity afforded to the South African black population appears complex and not a feature of simple dietary differences. It is likely that this group exhibits a different mechanism of handling oxalate either at the gastrointestinal or renal site. Further investigations with larger and more homogenous samples are underway to investigate this hypothesis in more detail

E-13

Epidemiology of urinary tract stone disease

M. Hussain, M. Lal, B. Ali, M. N. Zafar, S.A.A. Naqvi
S.A.H. Rizvi Sindh Institute of Urology and Transplantation (SIUT), Karachi-Pakistan

To evaluate the recent data of 2004 on stone disease at SIUT with regard to age, sex, geographical distribution, occupation, social class, family history and ethnic background and to analyse the stone analysis and recent trends in the management.

Records of all patients treated during year 2004 were reviewed recent trends in the management and investigation and compared with past data. Another group of 1000 patients was interviewed in OPD regarding all epidemiologic factors. Results are tabulated. Patients treated during the period showed M:F ratio of 2.3:1 with peak age of 21–40 years. Majority of the patients come from rural areas of Sindh, family history was present in 35% cases. More than 58.4% patients belonged to poor socio economic class and occupational exposure to high environmental temperature was the main risk factor. Hyperoxaluria, hypocitraturia and hypomegnesuria are main metabolic risk factors. About 12% patients present as urological emergency in renal failure, pyonephrosis, pylonephritis etc. There is mortality of 1.1% every year in stone patients, infra red analysis showed Ca Oxalate in vast majority of patients and ammonium acid urate in pediatric patients. Stone disease is highly prevalent in Sindh, epidemiological factors are different, endemic bladder calculi are decreasing in urban areas of Sindh. There is a need to open modern stone clinics in rural areas of the province to reduce morbidity and mortality.

E-14

Neglected renal stones: Challenges and outcome

S. A. H. Rizvi, S. A. A. Naqvi, Z. Hussain, M. Hussain
Sindh Institute of Urology and Transplantation (SIUT),
Karachi – Pakistan

Neglected renal stones have been a growing challenge in Pakistan. At SIUT we have witnessed growth in the numbers of patients with urolithiasis associated with renal insufficiency over three decades. Presently stones with renal failure account for about 8% of our stone population and about 17% in case of children. These patients often come with severe urosepsis apart from varying degree of renal insufficiency necessitating early diagnosis and management.

The outcome of definitive management of stones associated with renal failure depends upon the underlying renal reserve. After the initial management of treating urosepsis and removing acute obstruction, the patients are categorized into calculus anuria and calculus renal failure. The final outcome in patients with calculus anuria ranges form 74%–90% recovery of renal functions. In the case of calculus renal failure since the underline renal pathology has existed for a period of time the outcome in terms of renal recovery is less rewarding i.e. around 50%.

The high cost of stabilizing patients with renal failure associated with renal failure reminds us of the constant need of early identifying patients with uroithiasis with renal failure. An integrated approach will be required preferably under one roof to provide maximum benefits to these patients. University centers with facilities for Endourology and SWL are likely to encourage patients to seek access early for prevention of renal deterioration. Health planners should be encouraged to study this clinically important problem to provide relief on priority.

ESWL

ESWL-1

The significance of position and shock wave frequency in the treatment of lower ureteral stones with extracorporeal shock wave lithotripsy

Dr. Sahin Y., Egilmez T., Gonen M., Turunc T., Tekin M., Ozkardes H.
Baskent University School Of Medicine, Urology, Ankara, Turkey

To determine the effect of position and shock-wave frequency on the outcome of ESWL as a first choice of treatment in lower ureteral stones. Between June 2003 and July 2004, 76 patients were treated with ESWL by using Siemens Lithostar Modularis. In group 1 (44 patients) position was supine while it was prone in group 2 (32 patients). The shock frequencies for groups 1 and 2 were 120/minute and 90/minute, respectively. Patients were evaluated by routine laboratory tests KUB, excretory urography, ultrasonography (USG) and/or non-contrast computerized tomography (CT). The procedure was always performed after a sterile urine was confirmed. The procedure was performed at suggested safe maximum energy under fluoroscopy and USG with sedoanalgesia. Number of sessions varied between 1 and 4 (mean 1.3) in the first group; and 1 and 3 (mean, 1.25) in the second group. KUB, USG and non-contrast CT were used to detect the stone-free state after ESWL. Evaluation for a stone-free status was done 1 month after ESWL. A stone-free state was defined as success. Stones were right sided in 32 and left sided in 44 patients. The mean stone size was 8.9 mm (4–17 mm) and mean stone burden was 67.3 mm^2 (12–204 mm^2) in the first group and the corresponding figures were 8.5 mm (3–18 mm) and 52.3 mm2 (6–180 mm^2) respectively, in the second group. While the stone free rate in the first group was 97.7% (43/44), it was 84,4% (27/32) in the second group (p=0.045). There was only patient with an unsuccessful treatment outcome in the first group who had a stone size of 8 mm and stone burden of 56 mm^2. On the other hand the stone size and burden in the second group with unsuccesful treatment outcome ranged between 7-18 mm and 42-180 mm^2, respectively. These values were slightly higher than the mean values. Although the size of the stone, total number of shocks, the maximum and average energy dosage and average number of sessions were higher in the first group, this difference was statistically insignificant. A patient who underwent ESWL in supine position experienced numbleness at ipsilateral lower extremity most probably due to sciatic nerve irritation which resolved spontaneausly in 10 days. Four patients in the failure group were treated with ureteroscopy and 2 patients were lost to follow up. The position of the patient and the frequency of shock waves may influence success in the treatment of lower ureteral calculi by ESWL.

ESWL-2

The role of eswl in large size (Ž10 mm) ureteral stones

Dr. Sahin Y., Egilmez T., Gonen M., K¦l¦nc F., Tekin M., Ozkardes H.
Baskent University School Of Medicine, Urology, Ankara, Turkey

To evaluate the effectivity of ESWL with a new generation machine in ureteral stones of 10 mm or more in size. Between June 2003 and July 2004, 124 stones of 120 patients (83 males, 37 females) with a mean age of 47.2 years (7–78) were treated with ESWL by using Siemens Lithostar Modularis. Patients were evaluated by routine laboratory tests, KUB, excretory urography, ultrasonography (USG) and/or noncontrast computerized tomography (CT) before the procedure. The procedure was performed at prone or supine position under fluoroscopy and/or USG with sedoanalgesia. Ninety or 120 shocks per minute at suggested maximum
energy for safety were applied. KUB, USG and non-contrast CT were used to detect the stone-free state after ESWL. Stones were left sided in 65 and right sided in 55 patients. The mean stone size and burden were 12.7 mm (10–25 mm), 120.9 mm^2 (50–300 mm^2), respectively. Number of sessions varied between 1 and 4 (mean 1.3). While 113 of the patients were stone free, the treatment failed in 6 patients. One patient (0.9%) was lost to follow up. Of the 6 failed cases 3 was localized to upper ureter, 1 to mid ureter and 2 to distal ureter. When the stones were grouped as 10–15 mm and 16–25 mm, the success rates were 97% and 85%, respectively. No complications occured. Four cases of ESWL failure were treated with ureteroscopy and 2 patients were lost to followup. The new generation ESWL machines seem to be effective in ureteral stones of 1 cm or more in size and ESWL treatment can be suggested as the first choice when the risks of surgery are considered.

ESWL-3

The extracorporeal lithotrispy by dornier dls emse 220 f-xxp: the electromagnetical evolution

Dr. De Marco F., RICCIUTI G., GRILLENZONI L., DI NICOLA S., FINI D., VICINI P.
INI STONE CENTER, UROLOGY, GROTTAFERRATA (ROME), Italy

Compared with previous electromagnetic lithotripters, such as the EMSE 220 F and the 220 F-xp, the new EMSE 220 F-XXP produces a kind of shock wave with modified parameters. The Focal Positive Pressure (P+) reaches a lower value od 90.4 MPa; in the same way the Focal Negative Pressure (P-) reaches the –8.0 MPa. The width of the shock wave increases to 412 ns and the Effective Energy value on the 12 mm plane (Eeff) reaches the 110 mJ. 587 pazients and 612 renal stones units were treated with the DLS 220 F-XXP. The stone location was: 153 pelvic stones patients and 157 stone units (P); 57 upper calyx patients and 59 stone units (UC); 109 patients with medial calyx stones and 117 stone units (MC); 268 patients with inferior calyx stones and 279 stone units (IC). The stones size ranged between 5–60 mm in the P group, between 4–30 mm in the UC group; between 4–15 mm in the MC group and between 4–40 mm in the IC group.

The results of the lithotripsy were compared based on the BMI; the number of ESWL sessions; the number of SW applied; the average energy per shot (mJ) and the energy dose applied (J).

The success rate was evaluated after 3 months and related with the number of sessions needed, the number of auxiliary endoscopic procedures performed pre and post ESWL (Auxprior and Auxpost) and the retreatment rate (reESWL) were calculated as Efficacy Quotient a and b (EQa e Eqb) defined as: EQa=% Success/(100%+% reESWL+%Auxpost) EQb=% Success/(100%+ %re ESWL+Auxpost+Auxprior). The same parameters were stratified based on stone size: <10 mm; 10–20 mm and^3 mm. The success rate at final outcome was definied as stone free or not significative clinically fragments (CIRF) after 3 months. The Chisquare-test, the t-test and ANOVA were employed for statistical evaluation p< 001 and p<0.05 indicate statistical differences in the groups p>0.05 indicates the absence of statistical differences in the groups. Stone Location P UC MC IC p-value +) Total*) Number of pts (n)Number of stone units (N) 153157 5759 109117 268279 587612 BMI (kg/msquare)Range 25.817.6-37.6 25.118.0-39.0 26.317.6-42.3 9.617.4-38.9 25.917.4-42.3.

Average stones sizeSDRange (mm) 14.87.95-60 9.44.84-30 8.21.94-15 9.64.94-40 <0.01 10.66.04-60 ReESWL (%)Tretaments per pts (N) 25.5%1.30 13.6%1.19 3.4%1.11 8.2%1.13 <0.01 12.3%1.18.

Number of SWSDRangeAverage energy per Shot (mJ)Dose of Energy (J) 2104676807-309333.271.5 1855682519-300725.548.5 165956.2650-300525.845.5 1704645300-301027.949.4 <0.01<0.01 <0.01 1810665300-309328.654.2 Success rate at 3 monthsPts *) (with only 1 ESWL)(N)Pts*) (with only 1 ESWL) (%)Pts*)(1st, 2nd and 3rd ESWL)(N)Pts*)(1st, 2nd and 3rd ESWL)(%)Aux Procedures "Prior" *)Aux Procedures «Post»*) 9963.1%13284.1% 17.2%2.5% 4678.0%5288.1%5.1%0.0% 10388.0%10690.6%8.5% 0.9% 22781.4%24587.8%10.0%0.4% >0.05 47577.6%53587.4% 11.1%1.0% EQa (%)EQb (%) 65.7%57.9% 77.6%74.2% 86.9% 80.3% 80.8%74.0% <0.05<0.05 77.1%70.3% +) P-value calculated with chi-square test *) not used for statistical analisys.

Stones size <10 mm 10–20 mm >20 mm p-value +).

Number of pts (n)Number of stone units (N) 432455 137138 1819.

BMI (kg/msquare)Range 25.817.4-42.3 26.510.0-39.0 24.618.0-34.1.

Average stones sizeSDRange (mm) 8.21.84-10 15.42.811-20 34.711.525-60 n.a. ReESWL (%)Tretaments per pts (N) 8.6%1.150 21.7%1.24 31.6%1.32 <0.05 Number of SWSDRangeAverage energy per Shot (mJ)Dose of Energy (J) 1689625300-301026.746.9 2136637901-309333.973.4 2334762550-300034.883.5 <0.01<0.01<0.01.

Success rate at 3 monthsPts *) (with only 1 ESWL)(N)Pts*) (with only 1 ESWL) (%)Pts*)(1st, 2nd and 3rd ESWL)(N)Pts*) (1st, 2nd and 3rd ESWL)(%)Aux Procedures "Prior" *)Aux Procedures «Post»*) 37782.9%40989.9%9.2%0.4% 8964.5%11281.2% 13.8%2.9% 947.4%1473.7%36.8%0.0% >0.05 EQa (%)EQb (%) 82.5%76.1% 65.2%58.7% 56.0%43.8% <0.01<0.01 +) p-values calculated with chi-square test and ANOVA The improvement of the shock wave parameters produced by the EMSE 220 F-XXP, such as the longer width of the shock wave and the higher energy applied, obtained better clinical results compared with the previous EMSE.

ESWL-4

Shock wave lithotripsy for solitary lower calyceal stone: experience of a single "stone center"

Dr. Fiori C., Cauda F., Piana P., Tizzani A., Ferrando U., Fontana D.
"San Giovanni Battista" Hospital, Urology 2, Turin, Italy

Shock wave lithotripsy (SWL) has become established as the preferred treatment for the upper urinary tract stones because it is not invasive and is very acceptable to patients, nevertheless as a primary treatment of inferior calyceal stones it remains controversial. The aim of this study is to present the experience of our "Stone Center" in the treatment of the lower calyceal stones with a lithotriptor of 3rd generation. We reviewed the charts of patients with lower calyceal stones who underwent SWL at our "Stone Center" from September 2000 to August 2004. All treatments were performed with a helectrohydraulic Lithotriptor of 3rd generation (HMT – Lithotron). We considered stone-free patients without any radiological sign of stone or with clinically insignificant residual fragment -CIRF- (fragments <4 mm). Patient's sex and age, size and position of the stones, pre-treatment stenting, number of shock waves, major complications (such as sepsis and hemorrhagic events) acceptability to patients and complications were evaluated. Statistical analysis were carried out with t -Student's and chi square test. The data of 341 patients were available for the statistical analysis: 227 (66.5%) male and 114 (33.5%) female, with a mean age of 53 years (range 20-86). In 68 /341 (20%) cases a double J stent was placed before the procedure. Mean stones size was 11 mm (5–40 mm), 199/341 (59%) on the left side, 142/341 (41%) on the right side. Mean shock wave per session was 2898 (range 1000–4500).

Overall stone free rate was 64.5%, with 11% of retreatment rate. Patients with J stent had a worse stone free rate than patient without stent (–12%, p<0.05) whilst no difference in stone size was noted between the two groups of patients (p=NS). When considering <10mm, 10–19mm and >20 mm stones, stone free rate was respectively 71%, 60% and 47% (P<0.05). In 7/341 (2%) cases treatment was interrupted due to patient choice. No major complications were recorded. Inferior calyceal stones have a low stone free rate following SWL compared to calculi elsewhere in the calyceale system; for this reason minimally invasive procedures such as mini-perc and flexible ureteroscopy are commonly used in the treatment of these kind of stones. These treatment modalities are highly effective but not free of complications. The results of this study show that SWL with a 3rd generation lithotriptor is a safe, effective and well-tolerated treatment for lower pole stones. In our opinion SWL is the first choice treatment for this kind of stones, in particular when size is <20 mm.

ESWL-5

The role of eswl in high burden renal stones

Dr. Sahin Y., Egilmez T., Cenker A., Kose M., Tekin M., Ozkardes H.
Baskent University School Of Medicine, Urology, Ankara, Turkey

It is accepted that the successful rates of PNL with stones greater than 20 mm is higher than SWL. In this study the place of new generation SWL machine, stones greater than 20 mm. Between June 2003 and July 2004, ESWL was applied to 69 stones of 61 patients (25 males, 36 females) with a mean age of 52.2 years (31–78) with Siemens Lithostar Modularis. Patients were evaluated with laboratory tests, KUB, IVP, ultrasonography (USG) and/or non- contrast computerized tomography (CT). The procedure was performed following the confirmation of a sterile urine with urine culture. The procedure was performed under flouroscopy and/or USG in supine position with sedoanalgesia. Ninety shocks per minute at suggested maximum energy for safety were applied. Stone free status was evaluated with KUB film, USG or non-contrast CT. Stones were located at lower calyces in 12 patients, upper calyces in 10 patients, middle calyces in 6 patients and renal pelvis in 33 patients. The mean stone size was 22.6 mm (20–35), mean stone burden was 352 mm2 (200–1250 mm^2). Number of session ranged between 1 to 4 (mean 1.51). While stone-free status was achieved in 31 cases (50.9%), clinically insignificant residual stone (<3 mm) were present in 26 patients (42.6%). The failure rate was 6.5% (4 patients). Total of 4 patient treatment failed and 2 of 4 localized to mid pole calyx, 1of 4 localized to upper pole and 1 of 4 localized to renal pelvis. Eleven patients had stone street but only 4 of them required ESWL, and the others disappeared spontanously. Two patients with ESWL failure underwent percutaneous stone surgery. Overall success rate was 93.5% (57/61). Although percutaneous surgery is accepted as the treatment of choice in renal stones over 2 cm, the results achieved with ESWL should not be ignored. The success rates are increasing with new generation schock wave lithotriptors.

ESWL-6

Extracorporeal shock wave lithotripsy (eswl) monotherapy with the do.li. S 220f-xp machine for the treatment of staghorn calculi

Mr. Heretis I., Nomikos M., Daskalopoulos G., Kalivianakis D., Hondros N., Sofras F.
University of Crete, Urological, Heraklion, Greece

The presentation of our preliminary results by using Dornier EMSE 220F-XP lithotripsy system for the treatment of staghorn calculi From August 2003 to March 2004, 12 patients with staghorn calculi (9 partial and 3 complete), were treated by ESWL monotherapy on the Doli S 220F-XP lithotripsy system. Preprocedure double – J ureteric stent was inserted to all of them. All patients underwent the necessary laboratory and radiological evaluation. Antimicrobial prophylaxis was also prescribed to all of them. The energy per shock wave varied from 43,8 to 59,2 mJ and the shock wave counts varied from 2800 to 3500 with a shock release frequency of 70 per minute. The number of sessions varied from 3 to 6. Analgesia included pethidine and midazolam intramuscularly according to the body weight. Fragmentation rate of 20%–25% of the stone load per session was considered a valid criterion for the progress of further ESWL sessions Clinical success was achieved to seven (58%) patients. Five patients (41%) became stone free 6 months after ESWL and two (17%) patients have stone fragments smaller than 4 mm. The mean follow up period was 9 months. Two (17%) patients developed streinstrasse that was managed with ureteroscopy. One patient with pyelonephritis after a SWL session was managed conservatively. Neither hypertension nor biochemical abnormalities were detected to anyone patient of the study The Doli S 220F-XP machine can be a safe and effective treatment modality for the management of staghorn calculi.

ESWL-7

Extracorporeal shock wave lithotripsy (eswl) monotherapy with the do.li. S 220f-xp machine for the treatment of staghorn calculi

Rn. Nomikos M., Heretis I., Boulalas I., Mauromanolakis E., Aggelidakis G., Sofras F.
University Hospital of Crete, Urological , Heraklion, Greece

Objectives: To assess the initial results of the Dornier Doli S 220F-XP extracorporeal lithotriptor for the management of solitary urinary lithiasis We prospectively examined the outcome of shockwave lithotripsy (SWL) in the first 140 patients with solitary renal and ureteral lithiasis treated by one urologist from August 2003 to May 2004 with the new power Doli S lithotriptor. Data were collected with respect to stone size, location, and stone fragmentation Ninety one patients had renal stones (Group A) and 49 patients had ureteral stones (group B). In group A, clinical success was achieved in 77 (84%) patients. One month after lithotripsy, 58 (75%) of these patients were stone free and 19 (9%) patients had stone fragments less than 4mm in size. In group B, 41 (83%) patients achieved clinical success. Thirty eight patients (77%) were rendered stone free one month after treatment and 3 (6%) patients had fragments less than 4mm in size. Seven (7%) patients in group A and three patients (6%) in group B required retreatment. Overall efficiency quotient was 67%. No patient developed perinephric hematoma. Ninety four percent of patients reported mild pain during lithotripsy. The majority of patients (91%) mentioned that they were satisfied with this new treatment modality for urinary lithiasis (mean Visual Analogue Scale satisfaction score 8) Doli S 220 F-XP is a safe and effective device for managing urinary calculi throughout the urinary tract

ESWL-8

An assessment of the efficacy of lithotripsy in the treatment of urolithiasis in patients with congenital renal anomalies.

Dr. Al-Tawheed A., Al-Awadi K., Abdul-Halim H., Kehinde E., Hanafi A., Ali Y.
Jahra Hospital, Urology, Kuwait, Kuwait

To analyze the effectiveness of lithotripsy in the treatment of stones in kidneys with congenital anomalies and determine factors that may affect the results. Patients found to have renal calculi in kidneys with different types of congenital anomalies were treated using lithotripsy. All patients were investigated by Intravenous Urogram (IVU) to confirm the diagnosis. Double J stent prior to therapy was inserted in 8 renal units. Complications encountered and factors affecting success with this treatment modality were analyzed. Twenty five patients (18 males, 7 females) were studied between 1988 and 2004. The IVU showed 31 isolated calyceal or renal pelvic stones with mean stone burden of 1.44cc. 25 patients consisting of 9 with horseshoe kidneys, 8 with ectopic kidneys, 3 with malrotated kidneys, 2 with duplex renal system, 1 patient each with polycystic kidneys, calculus in a transplanted kidney and hypoplastic kidney were studied. Out of 31 renal units containing stones (in 25 patients) treated by lithotripsy, 24 (77.4%) renal units (in 19 Patients) were completely stone-free, 2 (6.5%) renal units (2 Patients) were partially cleared of calculi and the procedures failed in 5 (16.1%) renal units (4 Patients). Out of 5 renal units in which the procedures failed, open surgery was performed in three renal units and PCNL was performed in 2. None of the 25 patients developed any major complications. No significant adverse changes in renal function tests were observed at three months follow up. The stone free rate was influenced and reduced significantly by stone size and location in the pelvi-calyceal system. Calculi in kidneys with congenital anomalies may be treated successfully by ESWL as a first line therapy in the majority of patients .With position modifications, localization of stones may be facilitated and disintegrated. The outcome in patients so treated does not differ significantly from those with normal kidneys.

ESWL-9

Complex rehabilitation of the patients after extracorporal shock-wave lithotripsy (eswl)

Dr. Mysak A., Hospodarskyy A.
Ternopil Medical University, Urology, Ternopil, Ukraine

It is known, that main problem in the treatment of the patients with nephrolithiasis by ESWL method, compare with open methods, and is remaining fragmented stones. The very important problem are acceleration self-moving of the fragmented stones, preventing of the infection of the urinary tracts, pH correction, normalization of the kidney function and prevention of the complications. That is why rehabilitation of such patients is very important. There are analyzed the result of the treatment of the 108 patients after ESWL in the urology rehabilitation department in the Husjatyn hospital (Ternopil Region, Ukraine). There are formed control group which contain 48 patients with nephrolithiasis after ESWL and which does not pass sanatorium-and-spa treatment. The fragmented stones after ESWL was founded in the pelvis of the kidney (16 patients, 14.8%), in the calyx (19 patients, 17.6%), in the upper one third of ureter (10 patients, 9.2%), in the middle one third of ureter (8 patients, 7.4%), in the lower one third of ureter (21 patients, 19.4%). The indication for sanatorium-and-spa treatment are self-moving fragmented stones, absent of temperature, blood pressure not higher than 180/100 mm Hg, absent of attendant diseases, normal kidney function. The patients pass

sanatorium-and-spa treatment on 9–12 days after ESWL. The sanatorium-and-spa treatment should continue 18-24 days. The main treatment factor is using the fresh, hydrocarbonate water like "Naftusja". We are used 6-time intake of water "Naftusja" – 1 hour before food intake and 1 hour after. The complex of rehabilitation is includes adequate diet (according to chemical structure of stone), exercise therapy. Also is used ozokeritotherapy, conifer bath, amplipulse therapy, massage, circular douche, acupuncture. All this are improved self-moving of fragmented stones. After treatment most of the patients has positive effect – discharge of stones, lost of pain and dysuria.

In 71.6% of the patients all fragmented stones discharged, in 13.5% of the patients – partially discharged and in 9.5% of the patients does not discharged or discharged during 1–2 month after sanatorium-and-spa treatment. In the control group a residual stone has 39.6% of the patients. The exacerbation of the calculous pyelonephritis and residual stones after 1 year after ESWL in patients of the research group was 2 times rarely compare with patients of control group. So, all patients with nephrolithiasis after ESWL should pass sanatorium-and-spa treatment.

ESWL-10

Assessment of stone patients' satisfaction and treatment modalities: a questionnaire study

Dr. Goktas C, Goktas C, Aykose G, Canguven O, Horuz R, Albayrak S
Kartal Training Hospital, 2nd Urology Clinic, Istabul, Turkey

To evaluate the patient satisfaction regarding to treatment modalities and outcomes. A total 120 stone patients were included of whom 40 were treated with ESWL (Group 1), 40 treated with open surgery (Group 2) and 40 treated endoscopically (Group 3), between April 2003 and December 2004. Patients were asked to complete a 4-question questionnaire which was prepared by us, then answers were evaluated retrospectively. Data were analysed by using Mann Whitney Rank Sum and Chi-Square tests. It was observed that 75% of patients had previously no knowledge about the treatment modality performed. Physician's recommendation was the main factor (92%) in choosing treatment modality. The ratio of patients who considered the treatment as successful were 80%, 90% and 95%, respectively, in Group 1, 2 and 3, and there was no statistical difference between groups (p>0,05). There was a relationship between the ratio of treatment success and patient satisfaction. According to the data of our population, majority of stone patients have no information about treatment modalities. Physician's recommendation is the primary factor determining the patients choice. Most of our patients considered the treatment modality performed as successful, indicating that treatment success is the main factor for patient satisfaction.

ESWL-11

Stone treatment in patients suffering from coagulation disorders or receiving anticoagulants: a retrospective study

Dr. Porfyris O., Platanas M., Kalantzis A., Gialas I., Aristas O., Lykourinas M.
General Hospital of "Georgios Gennimatas", Athens, Greece, Department of Urology, Athens, Greece

The aim of this retrospective study was to evaluate treatment methods and results of upper tract stone treatment in patients with coagulation disorders. In a 5-year period 1100 stone treatment procedures were performed in 980 patients. 137 patients suffered from avariety of systemic coagulation disorders or were anticoagulated as a prophylaxis for various reasons. Coagulation disorders were corrected by specific therapy prior to any procedure. A total of 115 procedures were performed consisting of ESWL, ureteroscopy and open procedures. All patients became stone free. Severe complications were observed in 25/115 procedures. ESWL was successful in 72% of patients but associated with a 35% complication rate. Ureteroscopy and open procedures were successful in all cases and complications occurred in 5% and 0% of patients respectively Patients with coagulopathy have a higher rate of complications despite normal clotting parameters during treatment and hospitalisation was prolonged. The efficacy of ESWL was lower in patients with coagulopathy and with higher complication rate.

ESWL-12

A life-threatening complication of eswl: acute necrotising pancreatitis

Dr. GOREN M., Tekin M., Ozkardes H.
Baskent University, Urology, Ankara, Turkey

A 39 year-old healthy man underwent extracorporeal shock wave lithotripsy (ESWL) for a right kidney superior calyx stone, 7x5 mm in size. A total of 3,500 shots (90 per minute) were given at a maximum of 15,083 kV under ultrasonograhic guidance by using Siemens Lithostar Modularis. Four hours later the patient was admitted to emergency ward with nausea, vomitting, abdominal and back pain. His vital signs were noted as, blood pressure=120/60 mm Hg; pulse rate= 84/min; and body temperature=37.2° C. Physical examination disclosed abdominal distension and remarkable rebound tenderness. A complete blood count revealed white blood cells of 22.9x103/mm^3 with 83% neutrophils; 16.3 mg/dL haemoglobin, and 247x103/mm^3 platelet count. Serum biochemistry including electrolytes appeared essentially normal but glucose= 130 mg/dL; amylase= 3,903 IU/mL; lipase= 9,250 IU/mL; and LDH= 552 IU/mL. Ultrasonography of the upper abdomen showed right nephrolithiasis with minimal pelvicaliceal dilatation and perirenal fluid collection. Enhanced computerized tomography of the abdomen revealed edemateous pancreas and peripancreatic fluid collection. These findings were consistent with acute necrotising pancreatitis. The peripancreatic area was drained with a percutaneous catheter and the patient improved with medication including octreotide and insulin. A concomitant pleural effusion resolved also with percutaneous drainage. The patient was discharged on the 12th day of hospitalization with the drainage tubes removed, normalized serum amylase and lipase values and reasonable bood glucose levels maintained on twice daily insulin. He became stone-free during follow-ups. Acute pancreatitis is a rare complication of ESWL in the treatment of right kidney upper pole stones. Acute pancreatitis must be seriously suggested in case of abdominal discomfort and back pain subsequent to ESWL treatment particularly for right sided upper caliceal calculi.

ESWL-13

Quantitative characteristics of blood supply of the kidney after eswl.

Prof. Alexandr I. N., Elena V. G., Vasily V. K.
State Medical University of Altai, urological, Barnaul, Russian Federation

One of the prognostic factors of the functional changes degree to renal parenchyma as a result of ESWL, suspected to be a period of restoration of blood supply of the kidney. For determination of the

period for realization the next procedure of ESWL and periods of the full restoration of blood supply of the kidney after treatment, we performed nephrosonography with dopplerography before and after ESWL, executed on devices with different kind of generation of the shock wave. The nephrosonography with dopplerography were executed on traditional scheme of the estimation renal anatomical parameters and dopplerographic factors of renal blood flow in art. renalis, segmentaris and arcuatae (Vps- peak systolic velocity, Ved-end diastolic velocity, PI-pulsatility index, RI- resistiv, S/D) before and after ESWL. The most significant changes in blood supply of the kidney were observed after ESWL performed on devices with electromagnetic and electrohydraulic kind of generation of the shock wave.Dopplerography reveals ubiquitous changes in renal blood flow spectrum in arteries referred above, with reduction of diastolic forming of the spectrum, and high, sharp systolic peak, RI and PI also noticeably increase. In contrast to low-resistive Doppler-signal in normal renal arteries, the discriminating features of which are a quick systolic ascent and long speediest curve during diastole. According to restoration of blood supply of the kidney, considering even partial propulsion of stone's fragments, the function of blood supply of the kidney is completely restored up to the fifth day after ESWL that allows performing next ESWL. The changes in blood supply of the kidney after ESWL, performed on devices with piezoelectric kind of generation of the shock wave, were insignificant. Thus piezoelectric devices suspect to be rather safe, to perform next ESWL after 24 hours.

ESWL-14

Treatment strategy improves the in vivo stone comminution efficiency and reduces renal tissue injury during shock wave lithotripsy

Prof. Preminger G., Maloney M., Marguet C., Zhong P.
Duke University Medical Center, Urology, Durham, North Carolina, United States of America

We propose that a gradual increase in output voltage during shock wave lithotripsy (SWL) will produce superior stone fragmentation with less renal tissue injury in comparison to a constant or a decreasing output voltage by optimizing the stress wave and cavitation erosion forces. BegoStone® phantoms were implanted in the renal pelvis of 13 swine and administered lithotripsy at a repetition rate of 1 Hz. Animals in the increasing strategy group (n=4) were subjected to 18, 20 and 22kV for 600, 600, and 800 shocks, respectively. The second group (n=4) received a decreasing strategy of 22, 20, and 18kV for 800, 600, and 600 shocks, respectively. The third group (n=5) received all 2000 shocks at 20kV, mimicking the clinical setting. To examine the effects of treatment strategy on renal tissue injury, these studies were repeated in 12 animals (n=4/protocol) that did not undergo stone implantation. The mean comminution efficiency, or percentage of fragments <2 mm, was improved to 1.4% by using the increasing strategy (p=0.01). A decreasing strategy or±96.5 9.8%,±3.3% and 80.7±constant output voltage produced a mean comminution of 89.0 respectively. The mean volume percentage of renal tissue injury was reduced to 2.5±0.8% when using the increasing strategy (p<0.01). By comparison, a decreasing strategy or constant output voltage produced a mean volume of 3.5±1.0% and 5.2±0.7%, respectively. A progressive increase in lithotripter output voltage can produce greater stone comminution efficiency and reduce renal tissue injury in comparison to SWL protocols employing a constant or decreasing output voltage.

ESWL-15

Do antioxidants protect against renal injury in patients receiving lithotripsy for renal calculi?

Dr. Al-Awadi K., Kehinde E., Abdul -Halim H., Olusegun M., Abraham M., Fatinikun T.
Mubarak Hosp., Urology, Kuwait, Kuwait

Extracorporeal Shock Wave Lithotripsy (ESWL) is the preferred method of treating kidney stones less than 3 cm in size, because it is non-invasive. The safety of the method has been of major concern since it was introduced in 1982 as the shock waves have been shown to induce acute and chronic lesions in the kidneys and adjacent organs. The present study was designed to find out: if ESWL produces free radicals due to ischemia and reperfusion injury, and if the administration of antioxidants pre ESWL can reduce the amount of damage to the kidney. Before ESWL, 90 patients with 1-3cm size renal calculi had double 'J' stents inserted. Patients were divided into 3 treatment groups: a) Group A (Control Group) (n=29) No antioxidants given, b) Group B (n=34) Given 2 capsules of "Nature Made R" (antioxidants) 2 hours before ESWL, and 2 and 8 hours after ESWL, c) Group C (n=27) Given 2 capsules of "Nature Made R" 2 and 8 hours after ESWL. Blood and urine samples were obtained from all patients, just before start of ESWL, and at 2 hours, 24 hours, 7 days and 28 days after ESWL. Serum levels of malondialdehyde (MDA) – a measure of lipid peroxidation and free radical damage, alpha tocopherol, ascorbic acid (both are antioxidants), C-reactive protein (CRP) and lactate dehydrogenase (CRP and LDH measure of kidney injury) were measured. At 24 hours, patients in Group B had significantly reduced serum MDA (p<0.001), higher ascorbic acid (p<0.001), higher alpha tocopherol (p<0.01) and lower LDH (p<0.01) levels compared to patients in group A. These findings indicate that ESWL generates free radicals through ischemic / reperfusion injury mechanism and the use of effective antioxidants pre – ESWL may be associated with significant reduction in the severity of renal injury.

Metaphylaxis

M-1

The problem of compliance in stone prophylaxis

Prof. Marickar F.
Medical College, Surgery, Trivandrum, India

This paper assessed the compliance rate of patients advised chemoprophylaxis against urinary stone disease 1500 proved urinary stone patients who were investigated for stone disease and treated till passage of stones were advised chemoprophylaxis and prospectively followed up for five years. Chemoprophylaxis was mainly centered on different doses of allopurinol, pyridoxine and potassium citrate according to the individual needs after a thorough clinical and biochemical study. Recurrence of stone disease was considered as radiological, crystalluria or colic. It was observed that at the end of 5 years, the patient compliance in the study group was 82%. 18% of patients had never returned for follow up. Among the 82% with compliance, 47% had been regularly visiting the clinic at designated times or more often till the end of five years. Of these 47% patients, who were reporting regularly to the clinic and reported to be consuming the chemo prophylactic drugs as per advice, 2.4% developed evidence of resurgent stone disease in spite of prophylaxis as advised. 12% of these had been advised to stop chemoprophylaxis during the period of follow up. 35% were continuing to be on drugs at the end of five years. Of the 35% who defaulted after preliminary visits, 12% defaulted after one year, 8% at two years, 7% at three years, 5% at four years and 3% at five years. There was a group of 23% of patients who defaulted chemoprophylaxis and returned at varying periods of time with recurrence of symptoms. They presented with symptoms in decreasing frequency as colic, dysuria, crystalluria, lithuria, obstructive features and anuria. Many patients who had symptomatic relief during follow up had persistent biochemical abnormalities. It is concluded that in order to have a proper follow up and compliance the drug regimes and doses should be appropriately tailored to patient needs. It is essential on the part of the treating clinician to give patient education about the disease and advice to the patient about the need for strict compliance during the follow up period.

M-2

Optimisation of the after-care of problematic patients suffering from recurrent urinary stones by means of quality assurance standards

Ass. Prof. Berg W., Janitzky V., Becker U., Huschke T., Haas C., Schubert J.
Friedrich Schiller University Jena, Urology Clinic and Polyclinic, Jena, Germany

To what extent does continual and consequential after-care lead to a more effective reduction of urinary stone recurrence in comparison to an after-care primarily focussed on complaint symptoms following urinary stone disintegration and removal? Special dispensary for 163 patients suffering from recurrent urinary stones (m/f 1.8:1; 52.2 years). Three contacts in three to four month intervals. Computer-aided evaluation of anamnesis and therapy data as well as laboratory tests. Incidence of monomineralic urinary stones (72.7%) in patients participating in the special counselling programme: calcium oxalate (CaOx) 50.3%, cystine 15.3% (!), struvite 2.7%, uric acid 1.9%, apatite 1.9%, brushite 0.6%. Further incidence of calcium oxalate in 21.6% as mixed concrement with apatite respectively uric acid (total incidence of mixed concrements 27.4%). Decrease of stone recurrences per year and patient from 1.40 to 1.16. Clear improvement of the paraclinical findings, especially for patients with distinctly pathological urine test results (* mmol/d): In parameter 1st contact 3rd contact p

65 volume (l) 1.29 1.46 n.s.
71 calcium * 7.23 5.36 <0.05
40 oxalic acid * 0.62 0.51 <0.05
21 uric acid * 5.65 3.28 <0.05
41 citrate * 1.32 2.11 <0.05
32 magnesium * 2.26 3.66 <0.05
23 cystine * 3.99 2.86 <0.05
46 supersaturation CaOx 5.39 4.90 <0.05

In 118 urinary stone patients one or more concomitant diseases (81.6% women, 67.3% men) were diagnosed – in particular recurrent urinary tract infection 20.5%, gall stones 21.4%, hypertonia 25.4%, cardiac insufficiency 14.0% and coronary heart disease 9.2%, monorenality 13.5%, osteoporosis 9.5%, gout 6.5%, diabetes mellitus 6.3%, cortisone medication 5.6%, Crohn's disease/gastroduodenal ulcers 5.3%.... Due to the dispensary, initially pathological metabolic findings of 60.1% declined significantly to 36.8%! Merely by reducing the ESWL, URS and PCNL therapies vs. metabolic diagnostics and metaphylaxis in the 163 patients of the special dispensary counselling, a net saving of about 40,700 € per year was achieved! With a urinary stone incidence of 1.47% and about 650,000 disease recurrences in Germany, that corresponds to an annual saving of at least 163 million euros in treatment costs and about 1.5 million work days which would otherwise have been lost. Note that these statistics refer only to this example of problematic patients suffering from recurrent urinary stones! For the optimal reduction of metabolic risk factors and recurrent urinary stones, even in the age of minimally invasive stone therapy procedures, we strongly recommend close-meshed laboratory diagnostic testing and a urinary stone metaphylaxis involving medication and diet. This would be economically beneficial and would reduce patient suffering.

M-3

The role of dietary citrate on biochemical risk factors of urolithiasis

Prof. Marickar F.
Medical College, Surgery, Trivandrum, India

The present study was done to find out the role of dietary citrate for the biochemical control of urinary stone disease. The study was done using the dietary intake of 400 proved urinary stone patients and the corresponding urine biochemistry. The dietary intake of citrate during a 24-hour period was calculated using the computer program and correlation coefficient was found out with the corresponding biochemical values like output of calcium, oxalate, uric acid and citrate in urine collected during the same period. When the citrate intake was high (above 600 mgs. per day), the percentage of hyperuricosurics was low at 8%, compared to the 19% hyperuricosuria in the low (100–300) citrate intake group. Among patients with a citrate intake of 0-100 mg, 14% had hypercitraturia. Among patients with citrate intake of more than 600 mg per day, 25% had hypercitraturia. So a higher dietary citrate would mean a higher citrate in urine. When citrate intake was 300–600 mg per day, the number of hyperoxalurics was low. Patients with citrate intake range of 100-300mg per day had a high percentage of hypercalciuria, whereas when the intake was

300–600mg, there was a sharp decline in the percentage of hypercalciurics. Considering the maximum hypocalciuric, hypouricosuric and hypo-oxaluric effects at the 300-600 mg per day range, it can be considered as the optimum range of intake for citrate. It is concluded that a high citrate in the diet is beneficial for preventing further stone formation.

M-4

The role of potassium citrate treatment on stone recurrence after ureterolithotripsy for distal ureteral oxalate urolithiasis

Dr. Stathouros G., Papadopoulos G., Karamichalis G., Aristas O., Lykourinas M.
Athens General Hospital, Urology, Athens, Greece

To evaluate the efficacy of potassium citrate treatment in preventing stone recurrence after ureterolithotripsy for distal ureteral calcium oxalate stones. 78 patients who underwent unilateral ureterolithotripsy because of distal ureteral stones and remained stone free for the following 4 weeks were enrolled in the study. No patient demonstrated any additional stones at the IVU study and the chemical analysis of these stones showed their calcium oxalate origin. The patients were randomized into two subgroups according to their sex, age and urinary values of citrate and calcium. One of the groups was given oral potassium citrate 60 mEq per day and the other one served as control group. After a 12 month follow-up period the stone recurrence rate in the receiving treatment was only 3.9%, whereas in the control group 28% of stone recurrence rate ($p<0.05$). Potassium Citrate treatment significantly alleviated Calcium Oxalate stone activity after ureterolithotripsy for distal ureteral stones.

M-5

Bioavailability of magnesium from various preparations

Ass. Prof. Siener R., Jahnen A., Hesse A.
University of Bonn, Department of Urology, Bonn, Germany

Urinary magnesium is suggested to be an effective inhibitor of the formation and growth of calcium oxalate stones. Urinary magnesium reduces calcium oxalate crystallization in urine by forming more soluble complexes with oxalate ions, that are then not available for precipitation by calcium. The bioavailability of oral ingested magnesium, i.e. the absorbed amount, depends on the kind of magnesium salt and the administrative form. With a consistent magnesium balance the utilization can be determined from the renal magnesium excretion. After saturation of the magnesium pools with a magnesium-rich standardized diet, 13 healthy male subjects received two magnesium preparations in a cross-over procedure. With each preparation, MgO-capsules and MgO-effervescent tablets, 450 mg magnesium were supplemented. Urinary magnesium excretion increased by 40% after ingestion of the effervescent tablets and by only 20% after intake of the capsules. Urinary pH and citrate excretion increased from 6.47 and 2.335 mmol/24 h, respectively, on the control day to 6.80 and 2.690 mmol/24 h after ingestion of the capsules, and to 6.95 and 3.258 mmol/24 h after intake of the tablets. The increase in urinary pH and citrate excretion were significantly higher after ingestion of the effervescent tablets due to the galenic form. Providing a consistent magnesium balance, these results indicate a better bioavailability of magnesium from the effervescent tablets than from the capsules. Presumably this can be put down to the fact that the tablets have to be dissolved in water before ingestion, so that magnesium becomes ionized, which is an important precondition for absorption. Magnesium supplementation in calcium oxalate stone patients should predominantly be performed with effervescent tablets to additionally assure a sufficient fluid intake.

M-6

Does verapamil therapy have any effect on stone recurrence and residual fragments after shock wave lithotripsy ? : a randomized controlled study

Prof. Sar¦ca K., İnal Y., Erturhan S., Erbag˘c¦ A., Yag˘c¦ F.
Gaziantep Univercity, Faculty of Medicine, Department of Urology, Gaziantep, Turkey

Aim: The beneficial physiological and protective effects of Verapamil (a calcium channel blocking agent) on the parenchymateous organs have revealed to its use as a protective agent in an attempt to limit the functional as well as morphological adverse effects induced by SWL. To evaluate the long-term (> 36 months) efficacy and tolerability of this agent in preventing stone recurrences and the possible growth of residual fragments after shock wave lithotripsy (SWL), a prospective randomized clinical trial has been carried out. Material and Methods: Totally 70 patients undergoing SWL for kidney stones have been included into the study program. Age of the patients in all groups ranged from 18–45 years with an average value of 33.8 years. Male/Female ratio was: 1.2 (38 M, 32 F) The patients were independently randomized into three different sub-groups as follows: Group I (n:25) Patients receiving Verapamil, (120 mg/day) 3 days prior to SWL and continued 1 month after the management. Group II (n:25) Patients receiving adequate fluid intake (3 lt/day) under careful control during and after SWL without any other specific medication. Group III (n:20) Patients receiving no specific medication apart from the general advise after SWL. This group served as controls. All patients had calcium oxalate lithiasis without any urinary tract infection (UTI) with normal renal morphology and function. Results: Comparative evaluation of our results with respect to stone recurrence and regrowth demonstrated a regrowth rate of residual stones 3/25 (12%) in Group I, 2/25 (8%) and 7/20 (35%) in the remaining two groups respectively. Again the stone recurrence rates were 8% (4/25), 4% (1/25), and 25% (5/20) in three groups. Thus medically treated patients seemed to demonstrate significantly lower recurrence and regowth rates when compared with control ones.The number of stone recurrence throughout the study in the 75 patients was 14% (10/70) Of the 25 patients on high fluid intake 22 patients (88%) remained stable throughout the study. While only 1 patient did demonstrate a true recurrence among these cases (4%), regrowth of the residual fragments has been observed in 8% of the cases. Conclusions: Our results indicated that carefully controlled fluid intake is of paramount importance for these cases especially during long-term follow-up. However, verapamil therapy has also been found to be significantly effective in the medical prevention of stone recurrence as well stone regrowth after a successful SWL. This specific effect may be attributed to its regulatory role on the blood distribution during possible transient ischemia induced by high energy shock waves (HESW). Possible functional as well as morphological adverse effects of HESW may be well limited through clinical application of such agents.

M-7

Metaphylaxis of calcium nephrolithiasis: the role of etidronic acid (xydifon)

Prof. Aboyan I., Scnar V., Pavlov S., Grachev S., Shestel A.
Clinical-Diagnostic Center Zdorovie, Urology, Rostov-on-Don, Russian Federation

The purpose of this work is the study of opportunities of osteoclastic xydifon resorption inhibitor in metaphylaxis of calcium nephrolithiasis. The results of metaphylaxis in 72 patients after extraction/destruction of calcium oxalate and phosphate (Whewellite, Weddellite, Brushite, Whitlockite) renal calculi were analysed. Patients were randomized on 3 groups. All patients received magnesium, pyridoxine, diuretics simultaneously with diet. In the second group patients received xydifon (etidronic acid). The results were evaluated according to the level and time to recurrence, frequency of crystalluria and are listed in the table:Table: Results of calcium nephrolithiasis metaphylaxis Groups of patients N=72 Patients without recurrence Patients with recurrence Time to recurrence, days Frequency of a crystalluria 1. Classical regimen N=32 21 65,6% 11 34,4% 121±10 дней 2. Classical regimen + xydifon N=40 32 80,0% 8 20,0% 208±11 дней 22% According to the table group 2 of xydifon showed 14,4% less recurrence. The late recurrence and smaller percent of crystalluria were marked. Thus the application of osteoclastic xydifon resorption inhibitor of etidronic acid (xydifon) preventing calcium output from bones, crystal formation, crystal growth and aggregation of calcium oxalate and phosphate in urine, has allowed to improve essentially the results of metaphylaxis of calcium nephrolithiasis. Taking into account the of action mechanism of the medicine, etidronic acid is especially prescribed in increased content of calcium in blood and urine, immobilized osteoporosis, hypervitaminosis D.

M-8

Are the new generation bisphosphonates effective for inhibition of calcium oxalate urolithiasis? a rat model.

Dr. Atsu N., Erem B., Adnan B., Asif Y., Resit T.
SSK Goztepe Teaching Hospital, Urology, Istanbul, Turkey

Recently new generation bisphosphonates are used for various clinical entities. We know that they are effective agents for treatment of bone metastatic cancers and osteoporosis but their effects for urinary stone disease treatment or prophylaxis are unclear. In late 1990's some restricted trials were done with older generation bisphosphonates. In vitro trials had shown that bisphosphonates bind renal calculi and inhibit calcium oxalate crystal growth but results of in-vivo trials were not satisfying. In our study we evaluated the effect of two new generation bisphosphonates in a lithogenic rat model. In this study 36 male Sprague-Dawley rats were weighed separately; creatinin and calcium levels were measured both in serum and urine and also Ca/Creatinin ratios were evaluated. Sterilized pre-weighed zinc discs of about 40 mg each, were implanted in the urinary bladders of every rat. All the rats were fed with % 0,8 ethylene glycol in their drinking water for eight weeks. The rats were divided in three groups, twelve in each. The first group received no treatment, second and third groups received weekly clodronat (20 mg/kg) and zoledronat (7,5 µg/kg) respectively. At the end of the eighth week all rats were sacrificed, zinc discs were removed and all the measurements were repeated. The weight increase in discs were measured and analyzed comparatively with the preliminary and final biochemical results. In all groups there was statistically significant increase in weight of zinc discs compared with the beginning level (Mean 41,9 mg at the beginning, 86,6 mg at the end) ($p<0,05$). The increase in the weight of discs in all cases was secondary to crystal deposition on the zinc. Crystal composition was calcium oxalate mono-di hydrate. Stone burden was higher than 200 mg in two cases of the control group. In the treatment groups there were no huge bladder stone formation. When comparing the percentage increase in weight of the zinc pellets, though the considerable less ratio for the treatment arms, there was no statistically significant difference between control and the treatment groups (mean increase ratio: 164% for controls, 90% for clodronat and 71% for zoledronic acid.) ($p>0,05$) When comparing the beginning biochemical results with the finals; in the control group blood calcium levels, urinary calcium and creatinin levels; in the clodronat group blood and urinary calcium levels and in the zoledronic acid group blood calcium levels were statistically significantly different ($p<0,05$). There are many efforts for the research of new drugs for both prophylaxis and therapy of stone disease because of its recurrent nature. In spite of the knowledge about the "in-vitro calcium oxalate binding capacity" of the earlier generations, no similar studies can be found with the new generation bisphosphonates. It is well known that the new generation bisphosphonates are up to 1000 times more potent than the earlier ones on the calcium metabolism of metastatic bone diseases. Lithogenic rat model was used in our study because of its pathophysiological similarity with the human stone disease. At the end of the study, we couldn't demonstrate statistically significant preventive effect of these new drugs on stone formation, but when analyzing the results, there were 2 huge stone formation in the control group and only small-sized stones in the therapy arms. These drugs may act a preventive role in the rats with higher metabolic and genetic risk factors for stone formation. An extention of this study is planned with the higher dose and longer duration of the therapeutic modalities. The statistically significant decrease in both blood and urine calcium levels of the animals in bisphosphonate groups support this idea.

M-9

Eicosapentaenoic acid [epa] medically prevent the recurrence of urinary calculus

Dr. Takahiro Y., Yasunori I., Atsushi O., Masahito H., Keiichi T., Kenjiro K.
Nagoya City University Graduate School of Medical Sciences, Department of Nephro-urology, Nagoya, Japan

Greenland Eskimos and coastal Japanese are reported to have a very low incidence of diseases common to Westerners, including urinary stones, and arteriosclerоses. This has been attributed to their diet, which is rich in eicosapentaenoic acid [EPA]. It was reported that among polyunsaturated fatty acids, n-3 fatty acid, found in high quantities in fish meat is the predominant fatty acid in the diet of Greenland Eskimos. Recently in Japan, with the adoption of a more Westernized diet, the incidence of both urolithiasis and arteriosclerоses has increased. We previously suggested that the formation mechanism of urinary stones and arteriosclerosis is similar. As EPA administration is effective for the prevention of hyperlipidemia and arteriosclerosis, we suggest the use of EPA as a possible method of preventing calcium stone formation. We administered a highly purified preparation 1800 mg/day EPA for over 18 months to 48 patient after therapy for urinary stones. We observed urinary stone recurrence in these patients for 8 years (both during and after medication), and we studied the effect of prevention to recurrence of urinary stones. To ascertain the effects of EPA, we measured plasma lipids and urinary parameters 3 months and 18 months after administration of EPA. The rate of recurrent urinary calculi during EPA administration was lower than that after EPA administration (the free term of EPA) (<0.05). Hyperlipidemia improved in the affected individuals and urinary calcium was significantly reduced in the hypercalciuric group but not in the normocalciuric group. (332+-86 mg/dl to 275+-135 mg/dl) When fish oil-enriched diets are administrated, EPA is

rapidly and readily incorporated into cell membrane phospholipids at the expense of arachidonic acid. Although the mechanism by which EPA inhibited urinary calculi formation is unclear, EPA has the potential to prevent urinary calculus formation in clinically.

M-10

Metaphylaxis of calcium nephrolithiasis: the role of phytotherapy

Prof. Aboyan I., Scnar V., Pavlov S., Romodanov D.
Clinical-Diagnostic Center Zdorovie, Urology, Rostov-on-Don, Russian Federation

The purpose of this work is the study of phytotherapy opportunities in metaphylaxis of calcium nephrolithiasis. The results of metaphylaxis in 67 patients after extraction/destruction of calcium oxalate and phosphate (Whewellite, Weddellite, Brushite, Whitlockite) renal calculi were analysed. Patients were randomized on 2 groups. All patients received magnesium, pyridoxine, diuretics simultaneously with diet. In the second group patients in addition to the traditional regimen received infusion of herbs traditionally used in urolithiasis (Gemmae Betulae, Herba Hyperici, Stigmata Maidis, Herba Polygoni, FoliaUvae ursi, Fructus Daucus carotae, Herba Violae, Herba Salviae, Fructus Rosae caninae) according to the Copyright of Invention Certificate N 1165403. The results were evaluated according to the level and time to recurrence, frequency of crystalluria and are listed in the table: Table: Results of calcium nephrolithiasis metaphylaxis Groups of patients N=67 Patients without recurrence Patients with recurrence Time to recurrence, days Frequency of a crystalluria 1. Classical regimen N=32 21 65,6% 11 34,4% 121±10 31% 2. Classical regimen + phytotherapy N=35 29 82,9% 6 17,1% 252±14 18% According to the table group 2 of herb extract showed 17,3% less recurrence. The late recurrence and smaller percent of crystalluria were marked. Thus the application of herb complex extract has allowed improving essentially the results of metaphylaxis of calcium nephrolithiasis. The further studies on action mechanism of herb extracts and selection of the most effective plants and their combinations are required.

M-11

Medical treatment and metaphylaxis of urate nephrolithiasis: the role of phytotherapy

Prof. Aboyan I., Scnar V., Pavlov S., Romodanov D., Shestel A.
Clinical-Diagnostic Center Zdorovye, Urology, Rostov-on-Don, Russian Federation

The aim of this work is the study of possible role of plant extracts traditionally used for treatment of urolithiasis, in descending litholysis and in metaphylaxis of urate nephrolithiasis. We analyzed 14 patients with urate renal calculi 5–20 mm. 33 patients underwent descending litholysis during 6 month period. Two groups of patients were randomized with 13 and 20 patients in each group, respectively. In both groups patients received Blemarenum and Allopyrinolum simultaneously with diet. In the second group 20 patients received the infusion of herbs traditionally used in urolithiasis (Gemmae Betulae, Herba Hyperici, Stigmata Maidis, Herba Polygoni, FoliaUvae ursi, Fructus Daucus carotae, Herba Violae, Herba Salviae, Fructus Rosae caninae) according to the Copyright of Invention Certificate N 1165403. 81 patients underwent metaphylaxis during 6–12 month period and included a diet, Blemarenum, Allopyrinolum (the latter is received in hyperuricemia/uricosuria). Patients were randomized on 2 groups – 36 with the described regimen of metaphylaxis and 45 with above described infusion of herbs. The results were evaluated in percents and according to the time to complete and partial dissolution; in % and according to the recurrence and listed in tables 1 and 2: Table 1: Results of medical treatment – descending litholylis Groups of patients N=33 Classical regimen N = 13 Complete litholysis 7 53.8% Partial litholysis 2 15.3% Absence of effect 4 30,9% Time to complete litholysis, days 136±9 Frequency of a crystalluria 28% Classical regimen + phytotherapy N=20 Complete litholysis 13 65% Partial litholysis 3 15% Absence of effect 4 20% Time to complete litholysis, days 98±6 Frequency of a crystalluria 19% Table 2: Results of metaphylaxis Groups of patients N=81 The classical regimen N=36 Patients without recurrence 27 75% Patients with recurrence 9 25% Time to recurrence, days 186±8 Frequency of a crystalluria 22% The classical regimen + phytotherapy N=45 Patients without recurrence 39 86,7% Patients with recurrence 6 13,3% Time to recurrence, days 290±12 Frequency of a crystalluria 15% Thus the application of herb extracts in complex with Citrases and Allopyrinolum allowed improving essentially the results of descending litholylis and metaphylaxis of urate nephrolithiasis. The further studies on action mechanism of herb extracts and selection of the most effective plants and their combinations are required.

M-12

Comparison of effect of three plant extracts on stone metabolism

Prof. Marickar F., Sylaja N.
Medical College, Surgery, Trivandrum, India

This paper presents the findings of the study the efficacy of three plant extracts Scoparia dulcis (SdSo), Stem of Musa sapientum (MsSo) and Dolichos biflorus (DbSo) on the urine and serum parameted related to stone metabolism in experimental urolithiasis.

Three groups of calculogenic rats (on oral sodium oxalate – So) were given three different plant extracts. The concentrates were given orally (7.5 ml extract/150 ml of deionised water) daily for two months.

The comparison of urinary and serum parameters between the Scoparia dulcis followed by sodium oxalate group (SdSo) and sodium oxalate group (So) showed that the urinary phosphorus was significantly higher ($p<0.05$) in SdSo group but the calculogenic agents like urinary oxalate ($p<0.001$), urinary calcium ($p<0.01$) and serum calcium (Ns) were significantly lower in rats of SdSo group. The mean values of urinary and serum biochemical parameters when compared between the Musu Spientum followed by sodium oxalate group (MsSo) and the sodium oxalate group showed that the urinary phosphorus was significantly higher ($p<0.01$) in rats of MsSo group. But serum phosphorus was significantly lower ($p<0.05$) in the group. Serum calcium (NS) and the serum uric acid ($p<0.01$) were also lower in MsSo group compared to the So group. The mean values of urinary and serum biochemical parameters when compared between the Dolichos biflorus followed by sodium oxalate group (DbSo) and the sodium oxalate group showed significant lower values of urinary oxalate ($p<0.01$), urinary phosphorus ($p<0.05$) and serum phosphorus ($p<0.05$) in DbSo group compared to the control group. The efficacy of plant extracts varied significantly. Even though it was seen that generally all three of the plant extracts produced inhibitory activity, the order of inhibitory activity was in the Scoparia dulcis, Musa sapientum and Dolicos biflorus respectively.

M-13

Effect of scoparia dulcis on tissue enzymes relevant in urolithiasis

Prof. Marickar F., Sylaja N.
Medical College, Surgery, Trivandrum, India

The present study was undertaken to identify the protective effects producedon tissue enzymes on administration of Scoparia dulcis to experimental rats, which had been calculogenised using sodium oxalate administration. Male Wistar rats calculogenised with sodium oxalate were fed with Scoparia dulcis plant extract for two months. After two months the rats were sacrificed and 1 gm of fresh liver and kidney were homogenized in 10 ml of normal saline/0.25 m sucrose using mortar and pestle. The tissues were cold centrifuged at 20,000 rpm for 30 minutes and the supernatant so obtained was used for all enzymes studied, namely Aspartate Aminotransferase (GOT), Alanine Aminotransferase (GPT), Alkaline Phosphatase (ALP) and Lactate dehyragenase (LDH). All enzyme estimations were completed on the same day. Scoparia dulcis treated calculogenised rats showed reduction in the level of enzymes in the kidney like GOT by 11% ($p<0.01$), GPT by 27% ($p<0.001$) and LDH by 68% ($p<0.001$) respectively compared to the calculogenised rats without Scoparia dulcis. Similarly liver enzymes like GOT, GPT and LDH were reduced by 17% ($p<0.05$), 22% ($p<0.05$) and 49% ($p<0.001$) respectively. ALP in the kidney was elevated by 130% ($p<0.001$) whereas in the liver it was reduced by 30% ($p<0.001$). The observations indicate that the levels of tissue enzymes correlated with the severity of urolithiasis. Administration of plant extract – sopria dulcis linn reversed the tissue damage produced by the administration of calculogenic agent sodium oxalate.

M-14

Probiotic yoghurts: a role in calcium oxalate urolithiasis?

Ms. Hon N., Brathwaite D., Elves A.,
Royal Shrewsbury Hospital, Urology, Shropshire, United Kingdom

The role of enteric oxalate-degrading bacteria Oxalobacter formigenes and Lactobacillus acidophillus in the aetiology or treatment of recurrent stone formers has been suggested. We report a prospective double-blind control crossover trial assessing effects of probiotic yoghurt (L. acidophillus count 2.0x107/g) on urinary oxalate, calcium and citrate. After informed consent, 30 subjects (no previous stone/bowel disease, recent antibiotic/probiotic product usage, normal urinary calcium, oxalate, citrate, serum calcium) were randomised after completing 24-hour urinary collections (baseline). Group 1 took 4 weeks 100g/day probiotic yoghurt, followed by a 2-week washout period, then 4 weeks 100g/day non-probiotic yoghurt (placebo). Vice versa for group 2. 24-hour urines were collected at weeks 4,6 and 10. Diets were unchanged during the study. Data was analysed with Wilcoxon Signed Rank Test. Median 24-hour urinary oxalate change from baseline was -0.07 mmol/24 hrs ($p=0.03$) in the probiotic arm and 0.0 mmol/24 hrs after placebo. Changes in other urinary parameters between the two arms were not significant. Yoghurts were well tolerated. Probiotic yoghurt consumption in normal subjects led to a significant reduction in urinary oxalate with no detrimental effect on calcium. Further studies are needed to establish the clinical utility of probiotic yoghurts in oxalate urolithiasis.

M-15

BONN RISK INDEX (BRI) IN CALCIUM OXALATE STONE FORMERS BEFORE AND AFTER STONE SURGERY

S. A. A. Naqvi, M. N. Zafar, L. Shahnaz, N. Ahmed, Y. Raza, S. A. H. Rizvi
Sindh Institute of Urology and Transplantation (SIUT), Karachi – Pakistan

To determine the value of Bonn Risk Index in Calcium Oxalate stone formers before and after stone removal.Twenty four hours urinary and stat urine samples were collected from 66 patients with Calcium Oxalate stones before and one month after stone removal with dietary and medical interventions. BRI was estimated in 2ml of native urine at 37°C. Ammonium Oxalate 40 mmol/L was added at minute interval with constant mixing in 0.050 ml increments and absorbance measured at 620λ in spectrophotometer. Nucleation was recorded with the increase of absorbance. Ionic Calcium was measured by an Ion selective electrode. BRI was calculated by the formula: BRI= $[Ca^{+2}]$ mmol/L/$[Ox^{-2}]$. BRI >1/L was taken as risk and BRI of <1/L as low to no risk for stone formation. Urinary calcium, magnesium, oxalate, citrate, sodium, potassium, phosphate and pH were recorded in all samples. The mean BRI before surgery in 24 hour urine was 3.4±1.8/L as compared to post-operative mean value of BRI 1.4±1.4/L ($p=0.002$). Mean urinary calcium before surgery was 1.8±0.6 mmol/L vs 1.2±0.4 ($p=0.01$) after surgery. Mean oxalate added was 0.8±0.3 vs 1.3±0.5 mmol after surgery. Urinary magnesium showed a hyperbolic correlation with BRI. No correlation was found with citrate. In comparison to 24 hour urine the mean BRI in 14 stat samples was 4.6±5.29 vs 2.1±1.8 in stat urine post-operative. BRI is a valuable tool to assess risk of Calcium Oxalate stone formation and clearly reflects the influence of dietary and medical intervention post operatively. It can be used to monitor effects of dietary and medical interventions.

M-16

Ammonium acid urate stones in children – Risk factors and ultrastructure

M. N. Zafar, Y. Raza, N. Ahmed, S. A. Naqvi, S. A. H. Rizvi
Sindh Institute of Urology and Transplantation (SIUT), Karachi, Pakistan

To evaluate epidemiology, dietary, metabolic risk factors and ultrastructure of Ammonium Acid Urate (AAU) stones in children.

Epidemiology, dietary and 24 hour urinary risk factors were evaluated in 58 children who had pure AAU stones and 30 siblings. Diet was evaluated by a food frequency questionnaire and blood chemistry included calcium, phosphate, uric acid, urea, creatinine, electrolytes, magnesium and albumin. Twenty-four hour urine included the above and citrate, oxalate, ammonium and protein. Ten AAU stones of size 1.0 to 5.0 cm were sectioned into 1–2 mm thick sections or grinded to 1–2 mm wafers. Sections were embedded in 1% bactoagar in Formal saline for light microscopy and Karnosky's fixative for TEM. Demineralization was done in 0.25 M EDTA or 2N HCl. Sections were then processed for LM or TEM. The mean age of the stone formers was 4.0±3.0 and the siblings was 6.0±3.0 years. Of the 58 patients, 46 had renal, 6 bladder and 6 ureteric calculi. The mean stone size was 1.19±0.46 cm. There was no difference between blood chemistry of stone formers and siblings in all parameters tested except for serum albumin 4.1±0.39 vs 4.5±0.2 ($p=0.01$). Twenty-four hour urine chemistry analysis showed hyperuricosuria in 50% of the stone formers ($p=0.01$) as compared to 20% in siblings, hyponatriuria in 61% vs 23% ($p=0.01$) and hypovolumia in 41% vs 20% ($p=0.04$). Increased ammonia was observed in 51% vs 1% ($p=0.0001$). Hyper-

oxaluria and Hypocitraturia was found in majority of the siblings and stone formers. Mean 24 hour urinary pH was 6.4±1.0 in stone formers vs 6.5±0.9 in siblings. Dietary analysis showed significant low protein intake in 71% vs 33%, low animal protein 71% vs 38%, high vegetable protein 25% vs 0%, low fiber 69% vs 45% and low water intake 68% vs 12%. LM sections showed abundance of matrix in stones. The structure showed in the outer surface parallel fibril material in concentric laminations. In between laminators were spherullitis ghosts of AAU crystals. There were large inter crystal spaces. Each stone showed characteristic columnar structures which were positive for PAS. Core of stones contained groups of spherullitis each with a nucleus surrounded by concentric layers. TEM of spherullitis showed central electron dense round structures. In LM these structures were PAS positive.Dietary and metabolic risk factors in these AAU stone formers shows malnutrition and dehydration, resultant hyperuricosuria, increased ammonia cause preferential precipitation of AAU in pH ranging above 6.0. AAU stones have a characteristic matrix structure which is dense and many of laminar and columnar structures are PAS positive showing glycoprotein nature of matrix.

Renal Tubules/Renal Injury

RT-1

Crystals cause acute necrotic cell death in renal proximal tubule cells, but not in collecting tubule cells.

Dr. Verkoelen, C. Schepers M., van Ballegooijen, E., Bangma C.
Erasmus MC, urology, Rotterdam, Netherlands

The interaction between renal tubular cells and crystals generated in the tubular fluid could play an initiating role in the pathophysiology of calcium oxalate (CaOx) nephrolithiasis. Crystals are expected to form in the renal collecting ducts, but not in the proximal tubule. In the present investigation, we studied the damaging effect of CaOx crystals on renal proximal- and collecting tubule cells in culture. Studies were performed with the renal proximal tubular cell lines, LLC-PK1 and MDCK-II and the renal collecting duct cell lines, RCCD1 and MDCK-I. Confluent monolayers cultured on permeable growth substrates in a two-compartment culture system were apically exposed to calcium oxalate monohydrate (COM) crystals, after which several cellular responses were studied, including monolayer morphology (confocal microscopy), transepithelial electrical resistances (TER), prostaglandin E2 (PGE2) secretion, DNA synthesis ([3H]thymidine), total cell numbers, reactive oxygen species (H202) generation, apoptotic (annexin V, DNA fragmentation) and necrotic (propidiumiodide influx) cell death Crystals were rapidly taken up by proximal tubular cells and induced a biphasic response. Within 24 hours approximately half of the cell-associated crystals were released back into the apical fluid (early response). Over the next two weeks half of the remaining internalized crystals were eliminated (late response). The early response was characterized by morphological disorder, increased synthesis of PGE2, H202 and DNA and the release of crystal-containing cells from the monolayers. These released cells appeared to be necrotic, but not apoptotic cells. Scrape-injured monolayers generated even higher levels of H202 than those generated in response to crystals. During the late response, crystals were gradually removed from the monolayers without inflammation-mediated cell death. Crystals did not bind to, were not taken up by and did not cause marked responses in collecting tubule cells. This study shows that CaOx crystals cause acute inflammation-mediated necrotic cell death in renal proximal tubular cells, but not in collecting tubule cells. The crystal-induced generation of reactive oxygen species by renal tubular cells is a general response to tissue damage and the increased levels of DNA synthesis seem to reflect regeneration rather than growth stimulation. As long as the renal collecting ducts are not obstructed with crystals, these results do not support an important role for crystal-induced tissue injury in the pathophysiology of calcium oxalate nephrolithiasis.

RT-2

Oxalate is toxic to renal tubular cells only at supraphysiological concentrations.

Dr. Verkoelen C., Schepers M., van Ballegooijen, E., Bangma C.
Erasmus MC, urology, Rotterdam, Netherlands

Oxalate-induced tissue damage may play an initiating role in the pathophysiology of calcium oxalate (CaOx) nephrolithiasis. The concentration of oxalate is higher in the renal collecting ducts (~0.1-0.5 mM) than in the proximal tubule (~0.002- 0.1 mM). In the present investigation, we studied the damaging effect of oxalate to renal proximal-and collecting tubule cells in culture. Studies were performed with the renal proximal tubular cell lines, LLC-PK1 and MDCK-II and the renal collecting duct cell lines, RCCD1 and MDCK-I. Confluent monolayers cultured on permeable growth substrates in a two-compartment culture system were apically exposed to relatively low (0.2, 0,5 and 1.0 mM) and high (5 and 10 mM) oxalate concentrations, after which several cellular responses were studied, including monolayer morphology (confocal microscopy), transepithelial electrical resistances (TER), prostaglandin E2 (PGE2) secretion, lactate dehydrogenase (LDH) release, DNA synthesis ([3H]thymidin incorporation), total cell numbers, reactive oxygen species (H202) generation, apoptotic (annexin V, DNA fragmentation) and necrotic (propidium iodide influx) cell death. Visible morphological alterations were observed only at high oxalate concentrations. Most oxalate concentrations had little effect on TER; only 10 mM oxalate decreased TER irrevocably in collecting tubule monolayers. Elevated levels of PGE2, LDH and H202 were measured in both cell types after exposure to high, but not to low oxalate. Exposure to high oxalate resulted in elevated levels of DNA synthesis with decreasing total cell numbers. High, but not low oxalate, induced necrotic cell death without signs of programmed cell death. This study shows that oxalate is toxic to renal tubular cells, but only at supraphysiological concentrations.

RT-3

Regenerating, opn- and ha-expressing tubular epithelial cells in rat kidneys transiently bind calcium oxalate crystals.

Mr. Vervaet B., Verhulst A., van den Berghe K., Verkoelen C., de Broe m.
University of Anwerp, nephrology, Antwerp, Belguim

The initial phase of nephrocalcinosis/-lithiasis is the retention of crystals in the renal tubuli. Multiple cell biological factors have been correlated with this phase: tubular injury/-regeneration and upregulation of the crystal binding molecules osteopontin (OPN) and hyaluronan (HA) at the luminal surface of tubular cells. Previous experiments in rats clearly showed CaOx crystal retention in the presence of these events/factors after 4 days of ethylene glycol (EG)-induced hyperoxaluria. The current study investigated whether retained crystals disappear when EG is withdrawn from the drinking water. Therefore crystaluria, crystal retention, tubular epithelial injury/regeneration and luminal OPN- and HA-expression were studied 2, 5 and 10 days after 4-days EG-treatment (0.75% vol/vol). On day 4 crystaluria (quantified by measuring precipitated calcium after centrifugation) was 1.03±0.42 mg/24h (control: 0.22±0.17 mg/24h; $p<0.05$), whereas 268±558 crystals/renal section (control: 1.14±2.61 crystals/section; $p<0.05$) were observed on Von Kossa stained tissue sections. Crystals were present in regenerating, OPN- and HA-expressing tubuli as scored on PAS/PCNA-, OPN- and HA-stained sections, respectively. When EG was withdrawn from the drinking water crystaluria dropped immediately to control values, whereas crystal retention increased to >900 crystals/section. This increase was accompanied by an increase in regeneration (flattened and/or PCNA positive cells) and luminal OPN- and HA-expression. Furthermore visualization of the crystals in these sections by polarized light microscopy revealed 94.3%, 96.7% and 75.7% to be present in regenerating, OPN- and HA-expressing tubuli, respectively. On day 10, when kidneys showed restitutio ad integrum, OPN- and HA-ex-

pression were declined and crystal retention had clearly decreased. This experiment shows that mature regenerated cells loose their crystal binding phenotype and confirms the previous findings that crystal retention is associated with regenera OPN- and HA-expressing cells.

RT-4

Preconditioning of the distal tubular epithelium of the human kidney precedes nephrocalcinosis in transplanted kidneys

Dr. Verhulst A. Asselman M., De Naeyer S., Mengel M., Verkoelen C., De Broe M.
University of Anwerp, nephrology, Antwerp, Belguim

Recently, intratubular calcifications (nephrocalcinosis) were found in protocol-biopsies from transplanted kidneys (N.Eng.J.Med. 349:115-224, 2003). The presence of these calcium deposits increased from 3.6%, 6 weeks after transplantation up to 18.5%, 6 months after transplantation and is associated with poor long-term graft survival (Am. J. Tranpl. 5:323-9, 2005). Intratubular calcifications (Ca oxalate or Ca phosphate crystals) occur when tubular crystal formation goes along with tubular crystal retention. From experiments using human tubular kidney cell cultures and hyperoxaluric rats we recently obtained evidence that crystals are retained solely in injured tubules with proliferating/regenerating cells expressing crystal binding molecules hyaluronic acid (HA) and osteopontin (OPN) at their luminal surface (J.Am.Soc.Nephrol 14:107, 2003 and 14:3155, 2003). In tubules of the healthy kidney, however, HA and OPN are respectively absent and very sparse.In the present study, expression of HA and OPN was investigated in protocol-biopsies from transplanted kidneys. Serial tissue sections of protocol biopsies from 10 transplant patients taken 12 and 24 weeks post-transplantation were stained for OPN, HA and von Kossa (Ca staining). 12 weeks post-transplantation all biopsies showed pronounced expression of HA and OPN at the apical surface of the distal nephron, whereas only two of these biopsies were positive for Von Kossa. 24 weeks post-transplantation, however, the pronounced expression of OPN and HA went along with Von Kossa positive staining in the tubules of 6 biopsies. Furthermore, as was noticed in the serial sections, it became clear that tubules with calcifications in their lumen were also positive for HA or OPN. In conclusion, expression of crystal binding molecules (HA and OPN) at the luminal surface of the distal tubules precedes crystal retention to the distal nephron epithelium. This corroborates our paradigm that renal epithelial injury (cyclosporine toxicity?) induces changes in the composition of the tubular cell membranes, e.g. expression of molecules such as HA and OPN and causes in this way nephrocalcinosis.

RT-5

Hepatocyte growth factor has inhibitory effects in crystal-cell interaction and crystal deposits in stone forming rat model kidney.

Mr. Tei N. Tsujikawa K., Yoshimura K., Tsujihata M., Miyake O., Okuyama A.
Osaka University Graduate School of Medicine, Urology, Suita, Japan

Crystal-cell interaction is an important factor during the early stages of stone formation. Studies in cultured cells have shown that high oxalate level induced cell injuries and increased adhesion of calcium oxalate monohydrate (COM) crystals to renal tubular cells. Hepatocyte growth factor (HGF) is initially identified as the most potent growth factor for hepatocytes and is well known as a mesenchyme-derived pleiotropic factor on various types of cells. In the kidney, HGF has mitogenic, morphogenic, and anti-apoptotic action on renal tubular cells. Recently it is reported that the apoptosis could be responsible for the cell injuries induced by high oxalate level and that hepatocyte growth factor gene transfer by electroporation into skeletal muscle is feasible and effective against morphologic injury in subtotally nephrectomized rats. We investigated whether HGF has a role on apoptosis and crystal-cell interaction and we investigated protective effects of HGF gene therapy on stone forming rat model using electroporation -mediated gene transfer. MDCK cells were exposed to potassium oxalate (KOX 0.5mM) or COM crystals (500 μg/ml) in the presence or absence of HGF (0 to 100 ng/ml). We measured the lactate dehydrogenase (LDH) activity in the medium as a marker of cell injury and the effects of HGF on apoptosis were analyzed by flow cytometry (FACS; Annexin V-assay). We examined the inhibitory effect of HGF on the adhesion of COM crystals to MDCK cell. CaOx crystals were induced by the administration of 0.5% ethylene glycol (EG) in the drinking water and forced feeding of 0.5 g 1 -OH-D3 every other day through a gastric tube to 10-week-old male Sprague–Dawley rats. Plasmid vector encoding HGF was transferred into skeletal muscle by electroporation in stone forming rat on day 1. Both kidneys were excised on day 7 during the administration of EG and 1 -OH-D3. Kidneys were examined for crystal deposits. Exposure of both KOX and COM crystals to MDCK cells resulted in an increase in LDH release and apoptotic cells, but these effects were reduced by HGF. HGF had inhibitory activities against the adhesion of COM crystals to MDCK cells. HGF gene transfer significantly reduced crystal deposits on the renal tubules in stone forming rats, as assessed by H.E. staining. HGF has inhibitory effects in cell injuries by high oxalate level and against the adhesion of COM crystals to MDCK cells and HGF gene transfer has revealed that HGF might have an inhibitory effect in crystal deposits on the renal tubules in stone forming rats. These findings suggest that HGF might play an important role in stone formation.

RT-6

Mechanism of inhibitory effect of fibronectin on stone formation

Dr. Tsujikawa K. Tei N., Yoshimura K., Okuyama A., Tsujihata M., Miyake O.
Osaka University Graduate School of Medicine, Urology, Suita, Japan

Attachments of newly formed crystals to renal epithelial cells appear to be a critical step in the development of kidney stones. We recently reported that fibronectin (FN: 220–240 kDa) was oversecreted from the renal tubular cells as a result of the stimulation of calcium oxalate monohydrate(COM) crystals, and inhibited the adhesion of COM crystals to renal tubular cells in MDCK cells. However, the exact mechanisms of inhibiting the adhesion of COM crystals are not yet understood. Therefore, to examine the role of FN during early stage of stone formation, we established stable transfectants of FN in MDCK cells. To investigate the role of FN in renal epithelial cell injury, we examined the effects of FN in transfected MDCK cells. MDCK cells were transfected with rat FN cDNA inserted into a mammalian vector. FN mRNA and protein were quantified with reverse transcription-polymerase chain reaction and western blot analyses. We examined the inhibitory effect of FN using transfectants. Experiment 1; we assessed crystal-cell interaction by addition of calcium oxalate crystals by measuring the lactate dehydrogenase (LDH) activity. Experiment 2; we assessed the inhibitory effect of FN on the adhesion of COM crystals. Experiment 3; we assessed the association of COM crystals

and cell was visualized by scanning electron microscopy. We concerned that FN was transfected in MDCK cells via reverse transcription- polymerase chain reaction and western blot analyses. LDH was significantly reduced compared with MDCK in cells. In inhibitory assay transfectants had inhibitory effects of adhesion compared with MDCK cells. Moreover, the morphological SEM study showed that few crystals were attached to the surface of transfectants. It is suggested that FN plays an inhibitory role mainly in the crystal-cell interaction on stone formation

RT-7

Should prophylaxis be started before stone formation or after?

Prof. Marickar F., Sylaja N.
Medical College, Surgery, Trivandrum, India

This paper attempts to identify the differences in the changes occurring in the rat kidneys if they are directly exposed to lithogenic substances or exposed after the prophylactic agents are administered. In another study, it has been established that three plant extracts, Scoparia dulcis, Musa sapientum and Dolichos biflorus have antilithic properties. It has also been established that sodium oxalate initiated destructive changes in the rat kidney. In this study six groups of male albino rats were used. Three groups were pretreated rats with Scoparia dulcis, Musa sapientum and Dolichos biflorus for two months were given sodium oxalate along with the drinking water and pellet feed for two months. In the other three groups, the sodium oxalate was given for two months and then the three plant extracts were given for two months. After two months all the rats in three groups were assessed fro serum and urine biochemistry. On comparing the urinary and serum parameters between sodium oxalate group (So) and the Scoparia dulcis followed by sodium oxalate group (SdSo), the urinary phosphorus was significantly higher ($p<0.05$) in SdSo group but urinary oxalate ($p<0.001$), urinary calcium ($p<0.01$) and serum phosphorus ($p<0.05$) were significantly lower than the So group. In the second group, Musa sapientum followed by sodium oxalate (MsSo) group showed that the urinary phosphorus was significantly higher ($p<0.01$); whereas serum phosphorus ($p<0.05$) and serum uric acid ($p<0.01$) were significantly lower in MsSo group when compared to the So group. In the third group, the Dolichos biflorus followed by sodium oxalate group (DbSo) showed significant reduction in urinary oxalate ($p<0.01$), urinary phosphorus ($p<0.05$) and serum phosphorus ($p<0.05$) in DbSo group compared to the So group. The study concluded that pretreatment with protectors against stone formation will prevent the biochemical damages of calculogenic agents. This indicates the prophylaxis would be beneficial for stone formers before the process of stone formation starts.

RT-8

A new approach to influence renal oxalate transport – the impact of angiotensin 2 and at2-subtype2-receptor-blockers

Dr. Straub M., Weber L., Hautmann R., Braendle E.
University of Ulm, Urology and Pediatric Urology, Ulm, Germany

The regulation of renal oxalate transport is complex. In previous studies we used the model of transcellular oxalate transport – introduced by BRAENDLE ET AL. – to investigate the influence of local hormones on cellular oxalate uptake in vivo. Angiotensin 2 had strong inhibitory effects on the oxalate transport rate, leading to higher urinary oxalate excretion. Therefore we now focused our interest on specific angiotensin-2-receptor blockers. Luminal oxalate transport was characterized in vivo (rat model) at the proximal tubule using the in-situ-stopped flow microperfusion method. For a time period of 3 minutes peritubular preperfusion with different concentrations of the AT2-Subtype2-Receptor-Blocker PD123319 (10-12–10-4 mol/l) was performed. Then luminal transport of 14C-oxalate was determined by luminal micropuncture. Peritubular perfused PD123319 activated 14C-oxalate transport significantly. The stimulatory effect on cellular 14C-oxalate uptake was dependent to the perfused PD123319 concentration: control 20.71% vs. PD123319 10-12 mol/l 24.29% (n.s.), 10-8 mol/l 33.21% ($p=0.003$), 10-6 mol/l 32.31% ($p=0.005$) and 10-4 mol/l 18.73% (n.s.). The hormonal effect of Angiotensin 2 on renal oxalate transport seems to be mediated by the AT2-Subtype2-Receptor. AT2-Subtype2-Receptor-Blockers enable us in the animal model to reverse this effect. This is the first step on the way to develop an "oxalate blocker" for hyperoxaluric stone formers. Further studies must reveal if the substance is useful for our clinical demands in humans.

RT-9

Role of mutations in the sodium dicarboxylate cotransporter-1 (nadc1) in the etiology of hypocitraturia in calcium-oxalate stone disease

Ass. Prof. Lahme S., Zimmermanns V., Brauers E., Lang F., Eggermann T.
Hospital St. Trudpert, Urology, Pforzheim, Germany

Etiology of urolithiasis is influenced by environmental as well as by genetic factors. Indeed, the genetic basis for specific metabolic disorders that lead to urolithiasis, such as cystinuria and oxaluria, is well established; however only little is known about the genetic basis of hypocitraturia as the major stone forming factors in calcium-oxalate stone disease. Urinary citrate concentration is primarily determined by its rate of reabsorption in the proximal tubule. Citrate reabsorption is mediated by NaDC1. Recent studies showed, that increased NaDC1 expression is associated with a decline in urinary citrate excretion. Aim of our study was to determine the role of mutations of the coding region of the NaDC1 as a cause for hypocitraturia. Patient population was evaluated by means of 24h-urinary specimen and citrate load test. 13 patients with hypocitraturia less than 1 mmol/d were included in the study. Genomic DNA was extracted from peripheral lymphocytes by standard techniques. The coding sequence (12 exons) as well as the intron/exon boundaries of NaDC1 was screened by single strand conformation analysis (SSCP). Most exons were amplified as single fragments, but the larger exons (7 and 12) were split and amplified in several overlapping fragments to allow a reliable detection rate. PCR and SSCP were performed according to Eggermann et al., 1999. To demonstrate the sensitivity of our SSCP approach, 10 of the fragments were additionally analysed by denaturing high-performance liquid chromatography (DHPLC) according to Bergmann, 2004. By SSCP and DHPLC analysis, we detected unusual patterns in the fragments of exons 3, 8, and 12 of the NaDC1 coding sequence. Direct sequencing of these variations confirmed basepair substitutions which correspond to known SNPs (rs11568466 in exon 3, rs11568443 in intron 7, rs11568454 in exon12). All three variants were detected in patients as well as in controls. In total, our results do not indicate a relevant role of mutations in NaDC1 in the etiology of hypocitraturia.

RT-10

A new knock-out cell culture model for investigation of cystinuria

Dr. Knoll T., Sagi S., Haecker A., Alken P., Michel M.
Mannheim University Hospital, Department of Urology, Mannheim, Germany

Aim of this study was to establish a stable knockout model of cystine transport by RNAi in human proximal tubular cells in vitro and to generate a cystinuria phenotype in the above cells to facilitate the study of gene therapy. HK-2 (human proximal tubular cells (PTC)) were used. RNA from HK-2 cells was isolated and reverse transcribed (RT) using Oligo DT primers. The presence of rBAT gene was determined on the c-DNA by PCR using the rBAT primers. Similarly total protein from the HK-2 cells was isolated. Western blot using peptide antibodies generated against the protein rBAT was done to check for the gene expression. For the RNAi, the rBAT gene was amplified from the cDNA using specially designed primers with restriction sites such that the entire 2 kb gene insert would be aligned in reverse in the vector to generate and antisense mRNA. Successful knock-out was confirmed on DNA and protein level, and functionally by measurement of radiolabeled cystine transport into the cells. The PCR product (170 bp) of the cDNA verified the presence of the rBAT gene in HK-2 cells. The western blot confirmed the expression of the rBAT gene in HK-2 cells with the 87 kD molecular weight. The PCR product of the gene specific primers when analyzed on an agarose gel showed the 2 kb insert. Cystine transport into knock-out cells after incubation with 1 µCi for 30 minutes was significantly lower compared to control. This study demonstrates the existence of the b0;+ amino acid transport system in human proximal tubular HK-2 cells when cultured in vitro. After the cloning the insert into the vector and sequenced to check for the proper alignment, this vector can be used to transfect the HK-2 cells in order to generate a stable cell line. Cystine transport can now be studied in such a knockout cell line to establish gene therapeutic procedures which could be transfered into an animal model of cystinuria.

Risk Profiles

RP-1

Importance of ca : ox vs ox : ua vs ca : ua ratios in urolithiasis

Prof. Marickar F.
Medical College, Surgery, Trivandrum, India

In this paper, a comparative study of the statistical significance of the different urinary biochemical parameters has been undertaken. 482 patients were studied for three ratios, urinary calcium: oxalate, oxalate: uric acid and calcium : uric acid. It was found that the in male stone patients, the percentage of high probability of stone formation was maximum in high calcium, normal oxalate group and lowest in the low calcium, high oxalate group. The maximum percentage of high probability was noted in the high uric acid high oxalate group. The lowest percentage of high probability was seen in the high uric acid normal oxalate group. In females, high calcium and high oxalate and low calcium and normal oxalate were indicators for high probability value. Low probability was seen in the normal calcium and high oxalate group. The highest percentage of high probability of stone formation was noted in the normal calcium, high uric acid group with 95% of patients having a probability more than 0.74. The lowest percentage of high probability was observed in the low calcium normal uric acid group. In females, the highest probability value was observed in the low calcium high uric group and the high calcium low uric acid group. A low probability was seen in the normal calcium and low uric acid group. The study helped to find out the most probable biochemical combination for predicting probability for stone formation.

RP-2

Metabolic stone risk factors associated with papillary calcification on unenhanced spiral computed tomogram

Prof. Kim Y., Cha J.
Chonbuk National University Medical School, Urology, Jeonju, Korea (south)

Increasing evidence suggests that Randall's plaques contribute to the pathogenesis of urinary stone formation. The purpose of our study was to compare the incidence of abnormal metabolic stone risk factors in calcium stone patients with papillary calcification on unenhanced spiral computed tomogram with those in calcium stone patients without papillaty calcification A series of patients with calcium stones (N=49) underwent unenhanced spiral CT and complete metabolic evaluation on random diet after stone removal. Of the 49 patiens, 38patients showed papillary calcification and 11 patients did not show papillary calcification. Blood was evaluated by multichannel analysis sequential multichannel autoanalyzer (SMA)-20 and PTH. 24-hour urinary constituents were assayed for calcium, oxalate, citrate, total volume, phosphorus and sodium. We compared the incidence of abnormal metabolic risk factors between the two groups. Statistical analysis was performed using chi-square test. The incidences of hyperuricemia were 27.3% in patients without papillary calcification and 31.6% with papillary calcification. The incidence of hypernatriuria were 18.2% versus 42.1%, hypercalciuria were 36.4% versus 26.3%, hyperuricocuria 18.2% versus 18.4%, hyperoxaluria were zero versus 28.9%, hypocitraturia were 45.5% versus 44.7%. The difference between the two groups was statistically significant only in hyperoxaluria. Hyperoxaluria is the only metabolic risk factor that was more frequently occurred in patients with papillary calcification. Hyperoxaluria is important in the pathogenesis of papillary calcification.

RP-3

Influence of the metabolic disorders correction on stone relapses in urolithiasis

Dr. Nitkin D., Gres A.
Medical academy of postgraduate education, Urology and nephrology, Minsk, Belarus

To estimate a role of correction of the metabolic disorders in prevention of the recurrent stone formation in patients with urolithiasis. We carried out the diagnostics of metabolic disorders in 261 patients with the urolithiasis, having taken place on treatment in urological departments of the Minsk regional clinical hospital for the period of 2002-2004. In group of the surveyed patients men were 128 (49,04%), women – 133 (50,96%). Median age of patients (Ì±σ) was 49,48±14,25 years (range 9-88). After the diagnostics of metabolic disorders in 159 (60,9%) patients pathological changes have been revealed, which were isolated or combined. After the stone removal in conformity to type of the revealed disorders patients were distributed on 4 medical groups: 1 group (18 patients) – patients with hypercalcemia in a combination with hypercalciuria + patients with resorptive hypercalciuria (without hyperparathyroidism); 2 group (18 patients) – patients with absorptive and renal hypercalciuria; 3 group (20 patients) – patients with hyperoxaluria; 4 group (18 patients) – patients with hyperuricuria with or without hyperuricemia. With the purpose of correction of the diagnosed metabolic disorders and prevention of the stone relapses the following therapy was administered to the patients of medical groups within 3 months: to the first group of patients: a diet, water loading, preparations of aminobisphosphonate group: (etidronic acid, "Xydiphon") in a daily doze of 10 mg/kg of weight of a body, citrates: sodium potassium citrate ("Blemaren") under the ðÍ urine control; to the second group of patients: a diet, water loading, thiazides: hydrochlorothiazide in a daily doze of 25 mg, preparations of magnesium: magnesium asparaginate in a daily doze of 0,316 g, citrates: sodium potassium citrate ("Blemaren") under the ðÍ urine control ; to the third group of patients: a diet, water loading, pyridoxine (vitamin Â6) in a daily doze of 80 mg, preparations of magnesium: magnesium asparaginate in a daily doze of 0,316 g, citrates: sodium potassium citrate ("Blemaren") under the ðÍ urine control; to the fourth group of patients: a diet, water loading, xanthineoxydase inhibitor: Allopurinolum in a daily doze of 100 mg, citrates: sodium potassium citrate under the ðÍ urine control. 28 patients (median age 52,11±14,47, 19 men and 9 women) with the diagnosed metabolic disorders, which after the stone removal kept to traditional recommendations on regular reception diuretic herb, have made the control group for comparison of the stone recurrences. For an estimation of dynamics of biochemical parameters control researches of blood and urine were carried out at the end of therapy and in 3 months after the end of therapy in all medical groups. For the confirmation of data on absence of relapses ultrasonic research of kidneys was carried out each 3 months within 2 years after the stone removal. Stone detection at ultrasonic research in the size more than 4 mm was considered as relapse. Statistical processing was carried out by program Statistica 6.0. At the performance of control biochemical tests after the end of therapy in the first group authentic ($p < 0,01$) decrease of a degree of calciuria on 53,7% is established and in 61,3% patients normalization of a calcium level in blood serum is determined. In the second group the decrease of a degree of calci-

uria on 50,9% (p <0,01), in the third group the decrease of a degree of oxaluria on 44,8% (p<0,01), in the fourth group the decrease of a degree uricuria on 41,7% (p<0,01) were established. In medical groups (1–4 groups, 74 patients) stone relapses were detected in 1 (1,35%) patient within one year and in 6 (8,10%) patients within 2 years after the stone removal. Thus in medical groups within 2 years after the stone removal a relapse has arisen in 2 (11,1%) patients with resorptive hypercalciuria (1 group), in 1 (5,6%) patient with absorptive and renal hypercalciuria (2 group), in 2 (10,0%) patients with hyperoxaluria (3 group) and in 1 (5,6%) patients with hyperuricuria (4 group). In control group relapse was diagnosed in 4 (14,29%) patients within one year and in 9 (32,14%) patients within 2 years after the stone removal. For studying reliability of differences of occurrence of relapses in medical and control groups we used nonparametric $\chi 2$-criterion: within 1 year: $\chi 2=4,022$, P=0,045 (P<0,05); within 2 years: $\chi 2=4,990$, P=0,025 (P<0,05).

Thus, the differentiated correction of metabolic disorders in urolithiasis allows to decrease 3,97 times authentically the frequency of recurrent stone formation in comparison with control group within 2 years after the stone removal. The probability to not receive relapse (stone-free period) within 24 months after the stone removal in the patients of medical groups is 90,5±10,9%. While the probability to not receive relapse (stone-free period) for the similar period in patients of control group is 67,9±14,81%, that is authentic (Ð<0,05) below in comparison with medical group (reliability of distinctions between two groups is determined with log-rank test). 1. Etiological significant metabolic disorders are revealed in 60,9% patients with urolithiasis that is necessary to take into account in metaphylaxis of urolithiasis.

2. The administration of the differentiated scheme of correction of metabolic disorders in urolithiasis after the stone removal allows to lower saturation of lithogenic substances in urine, activity of the stone formation and prevents the occurrence of relapses.

3. Differentiated correction of metabolic disorders in urolithiasis allows to decrease 3,97 times authentically the frequency of recurrent stone formation in comparison with control group within 2 years after the stone removal.

RP-4

Gender and race-related differences in urine composition and the risk of calcium oxalate kidney stone formation

Gretchen Baretta, Rodgers Allen, Shameez Allie-Hamdulay, Sonja Lewandowski, Diane Pinnock
Department of Chemistry, University of Cape Town, Cape Town, South Africa

In western countries calcium oxalate stone disease occurs more frequently in men than in women [1]. Ethnic population groups also show variations in the incidence of urolithiasis. For example, in South Africa the prevalence of stone disease is less than 1% in the black population whereas in the white population it is comparable to that which occurs in the rest of the world [2]. In the present study, urine compositions and stone formation risk factors were compared in healthy and stone-forming subjects of both genders and both ethnic population groups.Twenty four hour urinary parameters were accumulated over a period of 10 years and a database of these values was compiled. Urines were analysed using standard biochemical techniques. Relative supersaturation (RS) values of CaOx were computed using the EQUIL programme [3]. Data were statistically analysed using ANOVA. Data for a few key risk factors are presented in the table. Comparison of gender data (1vs2) in whites shows that with the exception of citrate, risk factors are greater in females. This is surprising as it is contrary to data observed elsewhere.Comparison of data on an ethnic basis (1vs3) shows that calcium is lower while oxalate is higher in black subjects. These results agree with those published previously in a smaller study [4]. Comparison of data between healthy subjects and stone formers in whites (1vs4 and 2vs5) show that risk factors are higher in the latter. Similarly, in black subjects (3vs6) the risk in stone formers is higher. These results are not unexpected.

	1 Healthy White Males n=202	2 Healthy White Females n=165	3 Healthy Black Males n=75	4 White Male Stone formers n=93	5 White Female Stone formers n=92	6 Black Male Stone formers n=11
RI	152	281	216	247	387	293
RS CaOx	2.53	3.15	2.35	4.16	4.85	4.25
Cit	2.51	2.81	2.39	2.44	2.24	2.16
Ox	0.17	0.21	0.22	0.23	0.40	0.20
Ca	3.05	2.79	2.53	3.36	3.40	3.33

Statistical Comparisons: p values

	1vs2	1vs3	1vs4	2vs5	3vs6	4vs5
RI	P<0.05	P<0.05	P<0.05	P<0.05	0.16	P<0.05
RS CaOx	P<0.05	0.55	P<0.05	P<0.05	P<0.05	0.142
Cit	P<0.05	0.47	0.62	P<0.05	0.57	0.27
Ox	P<0.05	P<0.05	P<0.05	0.210	0.64	0.40
Ca	0.15	P<0.05	P<0.05	P<0.05	0.151	0.45

The ethnic differences of the present study confirm results which have been reported in a previous study involving smaller groups and highlight the intriguing mystery of the rarity of stone disease in the healthy black South African population. An unexpected result in the present study is that which shows the urinary risk factors in healthy white South African females to be higher than those in healthy males. Actual incidence rates are not available but should be investigated in future studies.

RP-5

Different urinary patterns in depend on age and weight

Ass. Prof. Vashchula V., Rybina I.
Belarussian Medical Academy of Postgraduate Education, Urology and Nephrology, Minsk, Belarus

For the clinical estimation of the results laboratory investigations of patients forming different types of stones is very important to know variation of different urinary patterns in depend on age and weight. A total of 80 normal subjects (40 males and 40 females) underwent renal ultrasonography and metabolic evaluation based on spot urine sample. All patients were on a free diet. The renal function was normal in all patients. In all urine specimens pH, specific gravity, creatinine, urea, Ca++, Mg++, K+, Na+, Cl+, phosphate, citrate, uric and oxalic acids were determined. Serum levels of Na+, K+, Cl+, Mg++, Ca++, phosphate, uric acid, creatinine, glucose were normal. From this trials were exclude 8 patients (3 males and 5 females) with abnormal values of blood tests. A mean age was 45,6 (18-79) years for males and 39,3 (18–74) for females. The data of urine specimens testing are shown in the table below. results males (n=40) females (n=40) X cp SD standard error X cp SD standard error

Ca++, mmol/l 2,88 1,61 0,254 3,27 1,50 0,236
Ox, mmol/l 0,28 0,16 0,026 0,32 0,20 0,032
Citrate, mmol/l 3,78 2,68 0,312 3,78 2,40 0,342

Mg++, mmol/l 3,08 1,88 0,297 3,54 1,91 0,302
Phosphate, mmol/l 20,40 8,92 1,410 23,47 11,91 1,88
Uric acid, mmol/l 2,99 1,85 0,293 3,52 1,75 0,277
K+, mmol/l 45,87 28,03 4,55 60,41 29,67 4,75
Na++, mmol/l 162,42 53,04 8,60 190,61 73,85 11,83
Cl++, mmol/l 118,4 40,9 6,64 136,7 53,2 8,52
Creatinine, mmol/l 10,94 6,07 0,960 12,62 5,74 0,908
Urea, mmol/l 384,0 90,6 37,0 286,6 105,5 28,21
Ca++/ Mg++ 1,09 0,76 0,12 1,13 0,66 0,104
Ox / Mg++ 0,11 0,08 0,013 0,11 0,07 0,011
K+/ Na++ 0,29 0,16 0,026 0,34 0,16 0,026

In healthy female in connection with overweight was revealed decreasing of Mg++ (r=0,3817; p=0,034) and ratio Ox/Mg (r=0,4358; p=0,014) but in connection with age were revealed decreasing of Mg++ (r=0,4777; p=0,002), Cl+ (r=0,5117; p=0,001), uric acid (r=0,4887; p=0,001) and creatinine (r=0,3294; p=0,038). In healthy male in connection with age were revealed decreasing of Mg++ (r=0,3388; p=0,033) and creatinine (r=0,3654; p=0,020).

Our results show that there are variations for some important urine parameters in healthy people. We recommend take into consideration this variation for the estimation of the results laboratory investigations of patients with urolithiasis and detection of the etiopathogenic mechanisms of urolithiasis.

RP-6

Body Mass Index and the risk of idiopathic stone formation

Philippe JAEGER, Isabelle CHAMPENOIS, Catherine DEWISME, Soumeya BEKRI, William G Robertson
University Hospital Nice, Department of Nephrology, Nice, France

Idiopathic calcium stone formers (ICSF) have been repeatedly shown to have higher body mass index (BMI) on average than a non stone forming control population. Recently, urinary pH has been reported to be inversely related to body weight among patients with stones, and the latter phenomenon has been associated with insulin resistance in obese subjects.

To gain more insight into the overall mechanisms governing renal stone formation in obese subjects, 80 consecutive ICSF were investigated at our renal stone clinic and were divided into 3 groups according to BMI of the patients :group A: <25 (normal weight, n=37), group B: 25 < BMI < 30 (overweight, n=34), group C: > 30 obese (n=9).

The results are presented as means±SEM in the following table:

	U-Ca.V (mg/24h)	U-Urea.V (mmol/24h)	U-Urate.V (mg/24h)	Psf (UA) (%<0.9)	Psf (CaOx/UA) (%>0.9)	Psf (CaOx) (%>0.9)
Group A	289±22	395±15	616±16	0	0	16.2
Group B	333±36	428±20	708±34	2.9	5.9	20.6
Group C	356±29	483±44	871±74	11.1	22.2	44.4
p	<0.5(AvsC)	<0.5(AvsC)	<0.01(AvsC)	NS	<0.05	NS

Obese subjects had a significantly higher total fluid intake ($p<0.05$) than either the overweight or the normal weight groups, but without any difference in urine volumes. In addition, there was a trend for both fasting and 24-h U-pH to be lower in the obese and overweight subjects than in the normal weight group.
We conclude that obesity is associated with an elevated probability of uric acid as well as CaOx stone formation. This is due to higher U-Ca and U-urate in addition to the trend in lower urinary pH, all of which result from excessive intake of flesh protein as it appears from the high U-urea excretion. Higher fluid intake did not play any protective role probably because of higher rate of sweating in the obese group. Studies are under way to evaluate the participation of insulin resistance in the mechanism of stone formation in overweight or obese patients.

RP-7

Risk factors and the impact of medical therapy on the management of nephrolithiasis in obese patients

Dr. Platanas M., Kalantzis A., Karamichalis G., Aristas O., Gkialas I., Doumas K.
General Hospital of Athens "G.Gennimatas", Athens, Greece, Department of Urology, Athens, Greece

Studies have demonstrated that obesity can increase risk of stone formation as well as recurrence rates of stone disease. Yet appropriate medical management can significantly decrease the risk of stone disease. Therefore, we analyzed our obese patient population assessing the risk factors for stone formation and the impact of selective medical therapy on recurrent stone formation. A review was performed to identify obese patients with stone disease grouping them according to age and sex. We consequently studied how many patients responded to the medical therapy comparing them with no obese groups of stone formers. Out of 1100 patients 352 (32%) were considered obese (body mass index greater than 25). Out of these patients, a thorough metabolical study was performed in 72 with an average follow-up of 5 years. According to the results, the gout was the most common disorder (62%), followed by hypocitraturia (51%) and hyperuricosuria (34%). All these percentages were found higher than nonobese stone formers. The performed stone analysis of 165 obese patients proved to be uric acid made calculi. Both obese and nonobese groups commenced medical treatment resulting in the reduction of the average stone formation per person per year from 2.01 to 0.34 as the metabolical disorders significantly subsided. The consumption of calories and purine without measurement as well as type II diabetes mellitus seem to have a more significant role in the pathophysiological paths of stone formation than what we used to believe. Therefore, the appropriate dietary consultation as well as pharmacological intervention, when necessary, could probably lead to reducing the incidence of stone disease.

RP-8

Dietary fibre intake and the risk of CaOx stone formation

William G. Robertson, Isabelle Champenois, Catherine Dewisme, Soumeya Bekri, Philippe Jaeger
University Hospital Nice, Department of Nephrology, Nice, France

Insufficient intake of dietary fibre is currently regarded as a habit which might aggravate the risk of renal stone formation (RSF) by means of increased intestinal-hyperabsorption of Ca and hypercalciuria, or through insufficient K^+ and alkali intakes resulting in hypocitraturia. On the other hand, whether high or even excessive dietary fibre intake holds a protective role or is a risk factor of RSF in itself is a matter for debate, since it has been suggested that a high fibre intake may limit the intestinal absorption of water by trapping water in the cellulose structure of the fibres.

To address this issue, 84 consecutive idiopathic calcium stone formers (ICSF) investigated at our renal stone clinic were divided into 3 groups according to the mean daily intake of dietary fibre (DF) recorded over a 7-day survey by the patients on their free choice diet.

The following differences were statistically significant

	Total fluid intake (l/d)	Beverage intake (l/d)	U-Volume (l/24h)	K-intake (g/d)	U-K (mEq/24h)
group 1: DF <15 g/d (n=33)	2.71±0.18	2.14±0.17	1.75±0.14	2.16±0.09	65±3
group 2: 15 DF < 22 g/d (n=37)	2.85±0.16	2.16±0.15	2.09±0.14	2.74±0.08	68±3
group3: DF Ž 22 g/d (n=14)	3.61±0.26	2.63±0.26	2.38±0.18	3.29±0.15	75±4
p<	0.005(1v3) <0.01(2v3)	NS	<0.05(1v2) <0.005(1v3)	<0.0001 (1v2,1v3)	<0.05 (1v3)

The probability of CaOx stone formation (Psf CaOx) was >0.9 in 39% of the patients in group 1, 24% in group 2, and 29% in group 3.

At low fibre intake (<15g/d), there is an increased risk of CaOx stone formation. With increasing DF intake over the range 15-32 g/d, urinary volume does not decrease; this is in agreement with a previous study on this topic over that particular range, whereas at higher intakes of fibre, urine volume would decrease and cause an increase in the Psf CaOx. Therefore DF intakes up to 30 g/d can be regarded as safe.

RP-9

Investigation of the effect of a dietary oxalate challenge on renal injury in South African black and white subjects

Ntombovuyo Bungane, Allen Rodgers, Sonja Lewandowski, Dawn Webber
University of Cape Town, Department of Chemistry, Cape Town, South Africa

Renal stone disease is a common disorder involving around 15% of the white and less than 1% of the black South African populations [1]. *N*-acetyl-β-D-glucosaminidase (NAG), a lysosomal enzyme located primarily in the proximal tubular cells of the kidney is one of the most sensitive marker enzymes for renal tubular injury [2]. It is believed that dietary oxalate plays a major role in renal damage. This study was undertaken to measure the response to an oxalate load in black and white South African subjects with a view to identifying possible differences in the two ethnic groups. 9 black and 4 white subjects consumed a standardized diet for 2 days. A 24 h baseline urine was collected on day 1. On day 2, subjects continued with their standardized diets but were given rhubarb juice containing 600mg oxalate instead of coffee. Urine was collected after 6 h and after a further 18 h. NAG activity was measured in the baseline as well as in the 6-and 18-h urine samples using a NAG colorimetric assay (Roche Mannheim, Germany). No statistically significant differences in the mean NAG activities were found within the groups. In contrast, when making inter-group comparisons, whites had higher mean NAG activities than blacks as shown in Table 1. Mean urinary NAG and p-values within and between the study groups

	NAG (U/ l)		
	Black	White	Black vs White
			p-value
Baseline	0.19	0.93	0.008
Oxalate (6 h)	0.29	0.96	0.004
Oxalate (18 h)	0.27	0.53	0.061

Dietary oxalate may be considered as an important contributing factor responsible for the elevation of NAG. The results showed that the two ethnic groups differ in oxalate handling as lower NAG activities were observed for the black group suggesting that this group is able to handle the dietary oxalate challenge more easily than the white group. However, much larger groups need to be studied before firm conclusions can be made.

References

1. Whalley NA, Moraes MFBG, Shar TG, Pretorius SS, Meyers AM. Lithogenic risk factors in the urine of black and white controls. *Br J Urol* 1998; 82: 785-90
2. Sikora P, Glatz S, Beck BB, Stapenhorst L, Zajaczkowska M, Hesse A, Hoppe B. Urinary NAG in children with urolithiasis, nephrocalcinosis or risk of urolithiasis. *Pediatr Nephrol* 2003; 18: 996-99

RP-10

The significance of glycosaminoglycans in biochemical aspects of urolithiasis

Prof. Marickar F
Medical College, Surgery, Trivandrum, India

To find out the relevance of Glycosaminoglycans (GAG) in determining the urinary risk factors of stone formation A total of 30 samples of 24-hour urine with thymol as preservative were analysed for assessing the urinary GAGs using the method of Whiteman and were compared with 25 age and sex matched control samples. Results were expressed as mg of glycosaminoglycan excreted/ 24hrs. The values of GAG were correlated with the values of urinary oxalate and uric acid.

The results showed that excretion of urinary glycosaminoglycan excretion was very low in stone patients (8.97+0.77mg per day) compared to that in normal individuals (16.45+1.02mg per day). This difference was statistically significant (P<0.001). There was significant correlation with urine uric acid levels (P=0.019), but there was no correlation between the urine GAG and oxalate levels. The patients with low glycosaminoglycans in their urine might alter the uric acid metabolism and enhances the level of uricosuria.

RP-11

Isolation and Semiquantitative Analysis of Urinary Bikunin and Its Fragments from the Black and White Population Groups in South Africa

N. F. Mabizela[1], A. L Rodgers[1], D. Webber[1], E. D. Sturrock[2] and S. Schwager[2]
[1]Chemistry Department and
[2]Division of Medical Biochemistry, University of Cape Town, South Africa.

The difference between the incidence of kidney stones in the black (1%) and white (~15%) population in South Africa is unexplained[1]. Bikunin is a ~30kDa protein derived from the protease inhibitor inter-α-inhibitor (IαI) found in serum and urine. This protein has been found to inhibit calcium oxalate crystal nucleation and growth[2]. The present study focuses on isolating and quantifying bikunin from black and white South African male subjects with a view to eventually testing whether the sample from black subjects is a more powerful inhibitor of CaOx crystallization than that from white subjects. 24 hr urine samples from healthy black (n=5) and white (n=5) males were separately pooled and dialyzed. Ammonium sulphate (70% saturation) was added and the

suspension was centrifuged. The pellet was washed with 90% cold acetone. Bikunin and its fragments were then isolated using immunoaffinity chromatography. The purity of the protein was checked by sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) and Western blotting. Precipitated urinary proteins and isolated bikunin and it's fragments were analyzed by SDS-PAGE (Fig. 1) and Western blot using Microglobulin α1 antibody (Fig. 2). Five principal bands at ~20, 30, 45, 66 and 120 kDa for the protein precipitate were detected. Using a bikunin antibody, a ~30 kDa band was observed (Fig. 2).

Fig. 1: Purification of urinary bikunin. Fractions before (lane 1) and after (lanes 2 and 3) immunoaffinity chromatography were analysed using: (A) SDS-polyacrylamide gel electrophoresis and (B) immunoblotting. Proteins were visualised using silver staining. The column eluent was run under non-reducing (lane 2) and reducing (lane 3) conditions.

Isolated bikunin and its fragments was 0.06 mg and 0.13 mg per litre of urine for black and white subjects, respectively. These results show the presence of bikunin in the protein precipitated by ammonium sulphate from both race groups. The higher concentration of bikunin and it fragments in white subjects suggests that if this protein proves to be a more potent inhibitor of CaOx crystallization in black subjects, it may be due to molecular differences rather than quantitative differences.

RP-12

Effects of Evening Primrose Oil Supplementation on Calcium Oxalate Urinary Risk Factors in Healthy Males

Diane Pinnock, Allen Rodgers, Shameez Allie-Hamdulay, Gretchen Baretta, Sonja Lewandowski
Department of Chemistry, University of Cape Town, Cape Town, South Africa

Evening Primrose Oil (EPO) is an essential fatty acid extracted from the seed of the Evening Primrose plant (Oenothera biennis). EPO is a rich source of γ-linolenic acid (GLA), while α-linolenic acid is found exclusively in fish and fish oils. Previous studies have shown that dietary fish oil supplementation reduces urine calcium and oxalate excretion.(1) Other studies have also shown that the effects of the α-linolenic acids can be enhanced by the fatty acids derived from GLA found in EPO.(2) In this study we investigated the effects of EPO on urinary risk factors of calcium oxalate (CaOx) kidney stone formation.

Twenty-five healthy white males in the age group 18–25 years participated in the study. Each subject was required to ingest 2 EPO capsules per day for 30 days. Prior to supplementation, each subject provided 2 control 24h urine samples. While on supplementation, 24 h urines were collected on days 3, 10, 20, 30. After supplementation ceased, additional 24 h washout urine samples were collected on days 33, 36, and 40. Urines were analysed using standard biochemical techniques. Relative supersaturation (RS) values of CaOx, brushite and uric acid were computed using the EQUIL program. The Tiselius Risk Index was also calculated for each sample. Data were statistically analysed using ANOVA. Comparison of data collected on day 30 with baseline values showed a statistically significant decrease in urinary oxalate and statistically significant increases in urinary citrate and the CaOx metastable limit. Comparison of data collected on the last day of supplementation (day 30) with data collected on the last day of the washout period (day 40) showed a rapid increase in oxalate excretion tending towards the baseline value.

Variable	Mean Baseline	Mean Day 30	Mean Day 40	p-Value Baseline vs Day 30	p-Value Baseline vs Day 40
Oxalate excretion (mmol/24hr)	0.15	0.13	0.15	0.004	0.038
Citrate excretion (mmol/24hr)	2.30	3.06	2.53	0.028	0.184
Metastable Limit	0.50	0.93	0.65	0.003	0.132

EPO showed that three important urinary risk factors were favourably altered. Hence, EPO could be considered as a possible conservative treatment regimen for CaOx kidney stone formation. However, further research is warranted in stone formers.

RP-13

Renal hypouricaemia and renal stone disease: a new association

Philippe JAEGER, Isabelle CHAMPENOIS, Catherine DEWISME, Soumeya BEKRI, William G Robertson
University Hospital Nice, Department of Nephrology, Nice, France

Renal hypouricaemia (RhU) is being increasingly recognized under a host of clinical conditions including acute and chronic tubulo-interstitial nephritis and even systemic infections without frank renal disease. Recently a mutation in the gene encoding for a urate-anion exchanger has been identified. We raised the question whether RhU would be present in a population of idiopathic calcium stone formers (ICSF).

To address this issue, we measured systematically fasting fractional excretion of urate (FE-urate) in 179 consecutive ICSF who were investigated at our renal stone clinic.

Concurrence of FE-urate >9% and serum concentration of uric-acid ($[uric\ acid]_S$) <200 µM was defined as RhU based on values obtained in a cohort of healthy volunteers.
The following cases met the criteria for RhU.

Name	Age	Gender	Stone composition	Family History	FE-urate (%)	[uric acid] (µmol/l)
Ch	33	F		+	9.4	197
Fe	41	F	Uric acid	+	9.4	185
Ca	62	F		–	14.4	194
Ci	76	F		–	12.3	197
Ju	32	M	Brushite	+	11.8	196
Pa	27	F	CaOx-CaP	–	11.0	141
Au	43	F	CaOx-urate	+	11.8	98
Se	20	F		+	14.9	168
Le	22	F		+	12.4	180
De	35	F		+	13.9	183
Do	62	F		–	22.8	118
Na	48	F		–	12.2	186
Oc	24	F	CaOx	–	17.1	142

Recognition of the link between RhU and ICSF as a new entity raises numerous questions such as the functional status of the urate-anion exchanger, its potential mutation, as well as the possible hypersensitivity of these patients to meat protein. The influence of nutrition on the genetic material (nutrigenetics) also needs

to be addressed in this population of ICSF. The predominance of females in this subgroup is noteworthy and requires further investigation.

RP-14

Nephrolithiasis and renal insufficiency, the predicting factors

Dr. Karamichalis G., Kalantzis A., Stathouros G., Aristas O., Farmakis A., Lycourinas M.
General Hospital of "Georgios Gennimatas", Athens, Greece, Department of Urology , Athens, Greece

Renal calculous disease may be associated with various degrees of renal insufficiency secondary to a combination of obstruction, urinary infection, frequent surgical intervention, and coexisting medical disease. Herein, we present our data on the progression of renal function in patients with stones associated with renal insufficiency and assess the significance of various factors that could predict postoperative renal function deterioration. Data were obtained from 4400 patients undergoing treatment for calculous disease at our institute since 1991. Renal insufficiency, defined as a baseline serum creatinine >1.5 mg/dL, was present in 84 (1.9%). Predictive factors evaluated for renal function deterioration were preoperative (age, duration of symptomatology and nephrolithiasis, urinary tract infection, coexistent medical diseases, baseline serum creatinine, and stone burden), intraoperative (number of percutaneous tracts), and postoperative (recurrent infection, proteinuria, cortical atrophy, residual fragments, and stone recurrence). Over a mean follow-up of 2.2 years (range 6 months-6 years), 33 patients (39.3%) showed improvement, 24 (28.6%) showed stabilization, and 27 (32.1%) showed deterioration in their renal function. Higher baseline serum creatinine, proteinuria >300 mg/day, renal cortical atrophy, stone burden >1500 mm(2), recurrent urinary infection, and age <15 years were significant predictors of subsequent renal function deterioration. Patients with nephrolithiasis and mild to moderate renal insufficiency warrant aggressive treatment aimed at complete stone clearance and prevention of recurrence of stones and urinary infection. A higher baseline preoperative serum creatinine, proteinuria >300 mg/day on follow-up, renal cortical atrophy, stone burden >1500 mm(2), recurrent urinary infection, and age <15 years are associated with a significantly higher likelihood of renal function deterioration after treatment of the calculous disease.

RP-15

Effects of recurrent urinary tract infection on urolithiasis

Prof. Marickar F.
Medical College, Surgery, Trivandrum, India

The study was conducted to find out the biochemical changes in urinary stone patients with recurrent urinary tract infection. Out of 1205 stone patients studied, 35 had microbiologically proved urinary tract infection more than once. The urine uric acid, oxalate, calcium and citric acid and serum calcium and uric acid of these patients were compared with those of 1170 patients who did not have recurrent infection. Student 't' test was performed to find out statistical significance. Among the patients with recurrent urinary tract infection, gram negative bacteria Escherichia coli (80%) constituted majority followed by coagulase negative staphylococci (7%), proteus mirabilis (6%), Klebsiella sp, Enterobacter sp, Serratia sp and Psuedomonas aeroginosa (4%) and other gram positive bacteria (3%). 71 percent of these patients did not have pus cells in their urine. On comparing the biochemistry, it was observed that the group with recurrent infection had lower urine uric acid (629 vs 632 mgs per day – $p<0.01$), urine oxalate (87 vs 92 mgs per day – $p<0.001$), serum calcium (7.57 vs 11.63 mg% – $p<0.001$) and serum uric acid (10.23 vs 12.21 mg% – $p<0.001$) were significantly lower in the infection group. The urine citric acid (164 vs 155 – $p<0.001$) was higher in the infection group. It was noted that most of the promoter values were lower in statistically significant levels in stone patients with urinary tract infection. The inhibitor citric acid was higher in the group. It is concluded that recurrent urinary tract infection produced a lesser biochemical stimulus for stone formation. This explains that the metabolic pathway of stone disease in this group is different from the pathway of idiopathic calcium oxalate urinary stone formation. Management of these patients has to be different from the general pool

RP-16

Indinavir sulfate in patients with hiv infection and renal lithiasis.

Dr. Karamichalis G., Kalantzis A., Platanas M., Aristas O., Liakatas I., Lycourinas M.
General Hospital of "Georgios Gennimatas", Athens, Greece, Department of Urology, Athens, Greece

We evaluate the clinical, diagnostic and radiographic findings in patients on indinavir therapy who presented with renal colic, and propose appropriate treatment options for indinavir urolithiasis. A total of 6 patients positive for human immunodeficiency virus on indinavir were evaluated for 11 episodes of severe renal colic requiring hospitalization. Laboratory evaluation was performed in all patients followed by an imaging study. Conservative treatment included intravenous hydration, analgesics and temporary cessation of indinavir. Intervention was elected only in patients with persistent fever or intractable pain. A month after hospital discharge an excretory urogram and metabolic stone evaluation were performed. Mean followup was 9.3 months and 2 patients had recurrent symptoms. All patients presented with sever flank pain, nausea or vomiting and hematuria. Imaging studies confirmed obstruction in all patients with radiolucent (indinavir) stones. Patients with radiolucent stones demonstrated significant differences in urinary pH and serum creatinine. Conservative therapy was successful in all patients within 48 hours and 4 patients (25%) with radiolucent calculi required endoscopic stenting for persistent pain and fever. Metabolic stone evaluation demonstrated significant hypocitruria (less than 50 mg./24 hours) in all patients with radiolucent calculi. The urologist should be familiar with this growing cause of renal colic in patients on indinavir therapy. Pure indinavir stones are radiolucent and have a soft, gelatinous endoscopic appearance. Conservative treatment is successful in most patients and if intervention is deemed medically necessary, endoscopic stent placement should be the procedure of choice.

Surgery Renal Stones

SR-1

Two step pcnl under local anesthesia

Dr. Aravantinos E., Karatzas A, Kalogeras N, Oekonomou A, Papakonstantinou V, Melekos M
University of Larissa, Urology, Larissa, Greece

Percutaneous nephrolithotripsy is no doubt the method of choice whenever indicated. The high efficacy of the technique in according to its low morbidity and hospitalization of the patients make PCNL a considerable choice of treating kidney stones, especially large stones of the renal pelvis. We describe our experience of using PCNL in two steps under local anesthesia in selected patients. From 2/2000 to 4/2004, 28 patients with median age of 47,8 years old (32–69) and kidney stones, were classified in two groups: 1) Patients with obstructive pyelonephritis due to large stones of renal pelvis, who underwent percutaneous nephrostomy as a therapeutic method of choice (n=19) and 2) patients with persistent renal colic and obstruction due to stones of renal pelvis,greater than 2.5 cm (n=9). All patients in both groups were first treated with percutaneous nephrostomy and a 18 ch nephrostomy tube remained for a period of a week, allowing for the nephrostomy track to mature. Then, PCNL under local anesthesia was taken place. Pain scores were collected from all patients using a visual analog scale, with 0 being no pain and 10 being the worst pain ever experienced by the patient Technique: A typical percutaneous nephrostomy is first taking place, using metal telescoping dilators of the Alken type and leading to the insertion of a 18 ch nephrostomy catheter for about a week. Then PCNL follows. Thirty minutes before the operation, 50mg of pethidine is given intravenously to all patients. Under local anesthesia with the injection of 10cc of Xylocaine 2%, the nephrostomy track is dilated using metal dilators until a 27 ch channel is acquired. A 24 ch Amplatz sheath is inserted and a 24 ch rigid nephroscope is then advanced into the pelvis. Lithoclast is used for stone disintegration. The fragments are removed by grasper and a nephrostomy tube is finally inserted. The median time of the whole process, including both steps,was 127 min (75 min–155 min). The whole procedure was well tolerated. Only two patients needed to receive additional Midazolam. The average hemoglobin decrease was 1,1dl, whether no patient needed blood transfusion. The nephrostomy tube,for both procedures,remained for a median time of 7,5 days (3–15 days). Six patients had residual fragments which were retrieved the next day through the nephrostomy track, using mini nephroscope under local anesthesia and sedation.The median time of hospitalization was 2 days. Percutaneous nephrolithotripsy has become nowadays the standard treatment of kidney stones whenever indicated. Even more, PCNL under local anesthesia may prove to be a cost-effective and benefitial solution for selected patients, especially those with large stones of the renal pelvis. These encouraging results should be confirmed by further studies.

SR-2

Minimal invasive pcnl in patients with renal pelvic and calyceal stones – enhanced experience in 119 cases

Dr. Zimmermanns V., Liske P., Lahme S.
Hospital St. Trudpert, Urology, Pforzheim, Germany

Stones of the renal pelvis can be treated either by extracorporeal shock wave lithotripsy (SWL) or percutaneous nephrolithotomy (PCNL). As a low-risk procedure with a longer treatment period, SWL often leads to persistent residual stone fragments, whereas conventional PCNL achieves a higher stone-free rate and allows a shorter treatment period albeit with a somewhat higher surgical risk. To reduce the invasiveness of conventional PCNL 4 years ago a miniaturised instrument for PCNL (MPCNL) was introduced. The preliminary results of this technique were promising. This study reports about the enhanced experience in 119 cases. For MPCNL a rigid nephroscope with a calibre of 12 F was used in 119 patients. After puncture of the kidney under ultrasound control and single-step dilatation a 18 F Amplatz sheath was placed. Data on the stone size and location, stone-free rate, blood transfusions, operating time and complications were recorded. A subgroup with stone mass larger than 4cm^2 was analized separately. In 119 patients, the part of the kidney afflicted by the stone was successfully punctured. On average re-treatment rate was 0.48 (subgroup: 0.74). The mean stone size was 2.8 cm^2 (subgroup: 5.9 cm^2) The average operating time was 79.4 min. (subgroup: 101 min). In every case, the absence of residual stones was confirmed radiologically and nephroscopically. Overall stonefree rate was 92.5% (subgroup: 96%). Haemorrhages requiring a blood transfusion occurred in one case (0.83%). A febrile pyelonephritis occurred as a postoperative complication in 3 patients (=2.5%). MPCNL represents a reliable alternative treatment modality to SWL for renal calculi with a size from 1 to 2 cm located in the renal pelvis and calices, especially the lower calix. The advantages are the short treatment time, the high stone-free rate and the accessibility of lower pole stones which are less amenable to SWL. Complicationrate of MPCNL is comparable to SWL. A larger stone mass is associated with a moderate increase of operating time but nevertheless a high stonefree rate is accomplished.

SR-3

The “mini-perc” technique in the treatment of kidney stones: our experience

Dr. Cauda F., Frattini A., Squintone L., Sedigh O., Fiori C., Ferrando U.
“San Giovanni Battista” Hospital, Urology 3, Turin, Italy

Percutaneous nephrolithotomy (PCNL) is the most effective method for stone removal without open operation in patients with large kidney stones, nevertheless PCNL has some disadvantages, these include mainly its invasiveness, the risk of hemorrhage requiring transfusion, or re-intervention. The mini-perc procedure was developed to decrease operative trauma of standard PCNL. We describe our experience in the treatment of kidney stones with this technique. We reviewed the data record of 52 consecutive patients undergone mini-perc procedure at our Institutions. The mean age was 50.years, male to female rate was 3:2 whereas the mean size of the treated stones was 1.6 cm. The procedure was the same in all cases using the mini-perc set: we performed a percutaneous nephrolithotomy through a 14Fr sheath with the patient in prone position in 47/52 patients (90%) and in supine position in 5/52 patients (10%). Lithotripsy was conducted with laser probe or pneumatic probe. At the end of the procedure we left in place a 12 Fr nephrostomic drain. We considered stone-free patients without any radiological sign of stone or with clinical insignificant residual fragment -CIRF- (fragments <5 mm). The stone free rate, complications, need of secondary intervention, postoperative stay were evaluated. Basic statistical analyses were carried out with a PC program. Forty-six/52 (88%) patients were stone free whilst in 6 patients (12%) we observed residual fragments >5 mm. We recorded hemorrhagic complications in 4 cases (7%) with requirement of blood transfusion in 3 cases (5.6%). In one case (2%) a

mono-J stent was placed to treat colic pain. In 2 cases (4%) a steinstrasse was successfully treated with ureteroscopy. When considering stones <2 cm the stone-free rate reached 100% ($p<0.05$) without any case of steinstrasse. Mean postoperative stay was 4 days. On the basis of our experience mini-perc procedure is safe and effective in the treatment of kidney stones, with the drawback of high operative times. Our data suggests that stone-free rate is higher and complications rate is lower when considering stones <2 cm.

In our opinion mini-perc is the gold standard in the treatment of kidney stones <2 cm, in patients who have failed SWL or in case of unfavorable renal anatomy.

SR-4

Mininimally invasive pcnl: a simple technique to applicate haemostatic sealant for closure of the tracts

Dr. Schilling D., Udo N., Anastasiadis A., Stenzl A., Sievert K.
University of Tübingen, Urology, Tübingen, Germany

Gelatine matrix haemostatic sealant (GMHS) has been proven as a haemostatic agent and urinary tract sealant in open, laparoscopic and endourologic procedures. In the present study, we describe a new application device to facilitate the use of GMHS in tubeless Mini-PCNL for small volume stones. A Mini-PCNL was performed on nine. Prior to procedure, a transurethral catheter and an intraureteral balloon catheter were placed. After complete stone removal, a double-J was placed antegradely. After the Amplatz sheet was withdrawn from the collecting system without irrigation under vision, the urothelium collapsed. A 15 Fr metal application sheet with a 10 Fr. working channel is inserted into the Amplatz-sheet. With further retraction of the Amplatz-sheet, GMHS is injected simultaneously. The sealing procedure of the Mini-PCNL tract through the kidney's parenchyma can be performed within minutes. Mean OR-time was 87 minutes. In the first five cases, an iv pyelography was performed, demonstrating an intact collecting system in all cases. During the following procedures, ultrasonography revealed no signs of urinoma. Ten of 11 patients, who underwent the "sealing-procedure" were discharged 2.3 days after the procedure.All patients had an uneventful follow-up without major complications. Closing the track of the Mini-PCNL with our new device and GMHS in the same setting is a save, uncomplicated and fast alternative to the common nephrostomy. The new device is easy to use compared to published methods and is superior to our previous used application technique using a 9 Fr. peel away sheet because of a more precise application without accidental GMHS filling of the collecting system. The introduced procedure is standard of care at our institution, and its feasibility and safety is currently being tested on a larger patient cohort.

SR-5

Sealing percutaneous access using a gelatin matrix hemostatic agent after pcnl

Dr. Schick V., Deeb A.
Robert-Koch-Hospital, Dpt.of urology, Gehrden, Germany

Parallel to the pilot project of Lee et al. which was published in february 2004, we also considered to seal percutaneous nephrolithotomy (PCNL) access after complete stone removal via the local amplatz sheath. We started our project aiming for an increase of postoperative patient comfort, minimizing the risk of bleeding, and reducing postoperative cost and length of the hospital stay by performing this minimal invasive technique in 7 patients of medium stone burden All patients were treated by removing stones via a working channel passing the lower pole calix. After complete stone removal a hemostyptic gelatin powder (SPONGOSTAN, Johnson & Johnson) was prepared to a doughy paste, some drops of contrast media were added and the whole material was introduced through the amplatz sheath into the working channel under imaging control. Merely imaging controlled insertion of the doughy gelatin clot through the amplatz sheath into the parenchymal part of the channel resulted in immediate hemostasis in all patients. The amplatz sheath was retracted over a 28 Fr. rectal tube which was used to push forward the gelatin. There was no need for an additional tamponade of the renal fat capsule or the abdominal wall. After 2 minutes precluding channel bleeding skin sutures were placed Bleeding of the nephrostomy tract did not occur in any of the 7 patients. Average operative time was 50 minutes which was not significantly reduced by performing the new procedure. However, hospital stay was reduced by 2 days. Two of the patients showed a single fever episode during the second postoperative evening. All patients presented steady postoperative laboratory values without evidence of bleeding. Free urinary flow from the collecting system was controlled by means of ultrasound and urography. Similar to recent usage of FloSeal/Baxter reported by Lee et al. we can confirm very reliable and immediate hemostasis using a pasty preparation of Spongostan/Johnson & Johnson gelatin powder which was classified less toxic by the FDA in 2003 due to the lack of glutaraldehyde and bovine thrombin. Therefore, tubeless PCNL can be used for complete percutaneous clearance of stones without bleeding.

SR-6

Tubeless percutaneous nephrolithotomy in selected cases: a prospective randomized comparison

Dr. Tefekli A., Muslumanoglu A., Tepeler K., Binbay M., Altunrende F., Aydin S.
Haseki Teaching and Research Hospital, Department of Urology, Istanbul, Turkey

In selected cases, avoiding external nephrostomy tube drainage significantly decreases pain and morbidity of percutaneous nephrolithotomy (PNL), and decreases related expenses. Herein, we prospectively compared standard and tubeless PNL in a highly selected group of cases with renal stones. Patients with simple, isolated renal pelvis or lower pole caliceal stones and no significant hydronephrosis were randomly enrolled to undergo either standard PNL, in which routine nephrostomy tube was placed at the end of operation, or tubeless PNL. Patients with previous history of renal surgery, congenital urinary tract anomalies, solitary functioning kidney, elevated serum creatinine levels, and active urinary tract infection were not enrolled to the study. Occurrence of intraoperative complications, total operative time exceeding 2 hours, indication for additional access or second-look PNL due to residual stones were the other exclusion criteria. Patient and stone characteristics did not differ between groups. There were 11 isolated lower pole caliceal stones (mean stone burden: 3.1cm^2, range: 1.5-4 cm^2) and 6 isolated renal pelvis stones (mean stone burden: 2.8 cm^2, range: 1.5-6 cm^2) in the tubeless PNL group (n:17), and 9 isolated lower pole caliceal stones (mean stone burden: 3.4cm^2, range: 1.5-4.5 cm^2) and 9 isolated renal pelvis stones (mean stone burden: 3.1 cm^2, range: 1.5-8 cm^2) in the standard PNL group (n:18). Mean operative time, including preparation period, was 59.6+9.1 (range: 50-90) minutes in the tubeless group, and 67.3+10.1 (range: 60-115) minutes in the standard PNL group, but the difference was not statistically significant. Successful stone removal was achieved in all cases, and no significant complication was observed in any case. Mean hospital stay was 1.6+0.4 (range: 1-3) days in the tubeless group, and 2.8+0.9 (range: 2-4) days in the former group. Beside increased hospitalization period, need for fluoroscopy and contrast agent for nephrostomy tube removal further increased related cost. Our results indicate that tubeless

PNL is safe in the management of selected cases and that mean hospitalization time and total procedural cost is diminished with this modification.

SR-7

Extending the application of tubeless percutaneous nephrolithotomy (pcnl)

Dr. Sofer M., Beri A., Lidawi G., Mabjeesh N., Chen J., Matzkin H.
Tel-Aviv Sourasky Medical Center, Urology, Tel-Aviv, Israel

Tubeless PCNL has been successfully performed when limited to short procedures, infracostal single accesses, stones smaller than 30 mm and normal anatomy. This study assessed the possibility of extending the application of tubeless PCNL. 86 consecutive PCNL patients have been prospectively enrolled in this study from January-December, 2004. Tubeless PCNL was performed when perforation, residual stones and significant bleeding were intraoperativelly excluded by fluoroscopy, flexible nephroscopy, endoscopic assessment of the working tract and hemodynamic stability. Large stone burden, supracostal and/or multiple accesses, horseshoe kidneys, other anatomical anomalies, and previously operated kidneys were not considered contraindications. Under this protocol, we performed 36 tubeless and 50 regular PCNL's. The 2 groups were statistically compared in terms of operating time, stone burden, complications, hemoglobin and creatinine changes, analgesia requirements, hospitalization and recovery time. The average age (57.5 vs 53.7 years; $p>0.05$), stone burden (33.1 vs 39.9 mm; $p>0.05$), operative time (131 vs 104 minutes; $p>0.05$), complication rate (10% vs 13%; $p>0.05$) and decrease in hemoglobin (1.17 vs 1.32 mg/dl; $p>0.05$) were similar for the tubeless and regular PCNL groups respectively. None of the patients required blood transfusion. The average analgesia requirements (pethidine hcl) were 0.4 and 1.2 mg/kg ($p<0.01$), the median hospital stay was 1 and 4 days ($p<0.01$) and the back-to-work median time was 7 and 15 days ($p<0.01$) for the tubeless and regular PCNL groups, respectively. The applicability of tubeless PCNL can be safely and effectively extended when perforation, intraoperative bleeding and residual stones are excluded. Tubeless PCNL is associated with reduced postoperative pain, hospital stay and recovery time.

SR-8

Simultaneous bilateral percutaneous nephrolithotripsy (pcnl) using epidural analgesia

Dr. Aravantinos E., Karatzas A., Kalogeras N., Stamatiou G., Michaloudis D., Melekos M.
University of Larissa, Urology, Larissa, Greece

The use of simultaneous PCNL for the treatment of bilateral large stones of renal pelvis is well documented. Until recently, all such patients were receiving general anesthesia in addition to some kind of postoperative analgesia. Combined general anesthesia and epidural analgesia are quite commonly used for urological surgery. However, epidural analgesia alone for PCNL has not been reported previously.

We describe our experience of using simultaneous bilateral PCNL with epidural analgesia alone as a novel approach of treating large kidney stones, with regard to effectiveness, side effects, induction time and recovery in selected patients. From 4/2001 to 10/2004, 11 patients requiring bilateral PCNL for the removal of large calculi of renal pelvis were enrolled in the study. Any contra-indications to epidural analgesia were taken into consideration. Surgical analgesia was achieved with epidural morphine. An epidural catheter was inserted into the L2-L3 vertebral intreval. Morphine sulphate 5 mg was administered epidurally 30 minutes before the initiation of PCNL. All patients were continuously monitored during the procedure with ECG, BP, and pulse oxymetry, and oxygen was administered via nasal cannulae. A typical bilateral PCNL then followed, leading to the disintegration and removal of the stones. Pain was assessed using a 10-point visual analog scale and VRS. The whole procedure was well tolerated. None of the patients needed additional analgesia. There were no airway or other related complications. All stones were successfully removed. There was no need for blood transfusion. All patients after surgery were directly transferred back to the ward. There was no need for any extra postoperative analgesia. The median time of hospitalisation was 2,5 days. Simultaneous bilateral PCNL under epidural analgesia has been demonstrated to be a well-tolerated, safe, cost-effective, and expeditious treatment for selected patients with large stones of renal pelvis. Yet, these encouraging results should be confirmed by futher studies.

SR-9

Pnl today – still modern, efficient and minimally invasive?

Mr. Hentschel H., Weirich T., Janitzky V.
Klinikum Pirna GmbH, Urology, Pirna, Germany

To evaluate the efficiacy of percutaneous litholapaxy (nephrolithotomy – PNL) Between 01/01 and 12/03 we performed 116 PNL in our department. 98 patients (47 females, 51 males) were treated. The mean age was 55 years (range 19,7 to 82,7). In 102 cases PNL was primary treatment.

Indications for PNL were: stone Ž20 mm, stones that cannot be positioned within the focus of the shockwave or without desintegration after ESWL and urinary obstruction not caused by the stone itself (e.g. caliceal diverticulum, ureteropelvic stenosis). Data concerning past medical history, signs, symptoms, x-ray and procedure (complications and postsurgical progress) were collected. Depending on the size of the stone(s) 18; 20,8 and 27 F nephroskopes were used without Amplatz sheath. Desintegration was achieved with ultrasonic energy. In cases with ureteropelvic stenosis combined with stone disease endolithotomy was performed. 62 (61%) of the patients had a history of prior stones. Complaints: 38 patients (39%) none, 27 patients (28%) intermittend flank pain, 19 patients (20%) recurrent renal colic. 12 patients (13%) presented with infection stones, one patient (1%) with pyonephrosis. Clinical signs: hematuria 70%, hydronephrosis 38%, UTI 13%. Stones treated were 5 to 60 mm. In 29 pts. (28,4%) relief of obstruction (double-j ureteral stent or percutaneous nephrostomy) or ESWL were performed prior to PNL.

Most patients were classified as ASA 2 (62%) or 3 (31%). Mean operating time was 83 (range 30 to 235) minutes. Complications occurred in 24 (21%) procedures. Severe: one pulmonary embolism, one septicaemia, three open revisions (including one nephrectomy) and two blood transfusions for blood loss. Efficacy: No residual stone/gravel after one PNL: 71 (70%). Of the 31 (30%) patients with residual stones/gravel 19 were treated with secondary PNL (13 patients), ESWL or ureterorenoskopy. 73,5% (75 of 102) of our patients were discharged without residual stone. In stones from 20 mm one PNL can provide a sufficient treatment in about 70% of the patients. In most of the remaining cases, further, usually minimally invasive treatment (e.g. secondary PNL, ESWL, ureterorenoskopy) is indicated. A consequent out patient follow up and metaphylaxis is mandatory.

SR-10

The results of 1170 percutaneous nephrolithotomies in 16 different hands

Ass. Prof. Aridogan I., Zeren S., Bayazit Y., Soyupak B., Satar N.
University of Cukurova Faculty of Medicine, Urology, Adana, Turkey

Percutaneous nephrolithotomy (PNL) is an effective endoscopic treatment for renal calculi with high success rates. Although it has been performed in various urology departments, there are some minor and serious complications of this type of treatment. The results and complications of 1170 patients who underwent PNL between June 1997 and October 2004 were evaluated and reported. The operations were performed by 8 staff urologists and 8 surgeons in training. PNL was performed in 708 male and 462 female patients. The age of the patients was between 9 months and 78 years. The average stone size was 514±489 mm^2 (between 25 and 6500 mm^2. The overall stone free rate was 64.4%. When residual stones less than 4 mm was defined as clinically insignificant the success rate increases to 74.5%. The success rate in the group of surgeons in training was 60.7%, while it increases to 89% when a staff surgeon is in the operation. In 195 (16.7%) patients, hemorrhage requiring transfusion was seen during and after the operation. Fever was the most frequent postoperative complication and 208 (17.7%) patients got fever higher than 38ºC. In 1 patient hemothorax occured and there was no need of any other type of treatment other than thorasynthesis. In none of the patients colon perforation was seen. The rate of other minor complications were very low. The surgeon performing percutaneous surgery should be aware of complications that may arise during the operation and should take the neccessary precautions in high risk patients. Recognizing a complication during the operation is important as well as planning the treatment. In departments where PNL had become a routine procedure, success rates and rates of complications are similar to overall rates also in the hands of the surgeons in training.

SR-11

Pcnl in patients with previous renal open surgery

Dr. Balci M, Ceylan O, Hazar I, Gursoy G, Senkul T, Akcetin Z
Taksim Teaching Hospital, Urology, Istanbul, Turkey

The aim of the study is to evaluate the multiple access in the PCNL of staghorn kidney stones performed in our clinic A total of 17 PCNL operations were performed for staghorn kidney stone between June 2004 and February 2005 (6 female, 11 male patients). Average age of patients was 45 (27–61). Five of the stones were complete staghorn, twelve were uncomplete staghorn. 6 fr. end open catheter was placed to ureter and PCNL was performed under fluoroscopic guidance. After the 30fr. baloon dilatation stones were defragmentated with pneumatic lithotriptor by using 26 fr rigid nephroscope. Average stone area of the cases was 1280 mm^2 (705–3150). The procedure was completed in one session in 14 patients, in two sessions in 3 cases. Average operation time was 135 sec. (60–280). Average number of Access per case was 2,6 (2–4). Six cases required.blood transfusion. Only in one case more than one unit blood transfusion was required. All incomplete staghorn cases were succesfully treated in one session. Two complete staghorn cases were treated in two sessions. Stone free rate was 70.58%. Average residuel fragment size was 0.7 mm. in two cases, 1.2 mm in three cases. Post operative hospitalization time was 3.2 (2–7) days. Average follow up time was 3,7 months (0,5–8). Any post operative complication was not observed. Multiple Access in a single PCNL session is effective in the treatment of staghorn kidney stones. But increase of access number is sometimes accompanied by an increase in a blood transfusion rate.

SR-12

Pcnl in patients with previous renal open surgery

Dr. Ceylan O, Balci M, Sakalli E, Yuzuak Z, Akcetin Z
Taksim Teaching Hospital, II. Urology, Istanbul, Turkey

PCNL in patients with previous renal surgery causes some difficulties and requires deep experience. The results of PCNL in such cases are presented A total of 42 PCNL operations were performed between June 2004 and February 2005. Eighteen of these patients with previously open renal surgery (14 secondary and 4 tertiary) are included in our study. Three cases had upper caliceal stones, four had renal pelvis stones, six had coraliform stones, three had multiple caliceal stones, two had lower caliceal stones. Average stone size was (5,01 cm^2). Seven of the eighteen patient's access were performed with USG. We used fluoroscopy for the remaining eleven patients. In three patients PCNL was performed in two sessions. In 1 case, balloon dilatation was not successful due to balloon burst. PCNL was applied through mechanical dilatators. The operation was terminated by fixing a 14 Ch Malecot nephrostomy in all cases (Except 3 patients, in which second session was necessary. We used re-entery catheter for this three patients). There were no significant differences in our group compared to primary cases in terms of hospitalization time, stone free ratio and complication rates. One case in whom mechanical dilatators was used required transfusion. Although the anatomic positional differences of the kidney and perirenal fibrosis makes access and the operation technically difficult in secondary or tertiary cases, this problem can be solved either by high pressure balloons or by mechanical dilatators.

SR-13

The impact of access point number and location on complication rates in percutaneous nephrolithotomy

Ass. Prof. Muslumanoglu A., Tefekli A., Binbay M., Tok A., Karadag M., Berberoglu Y.
Haseki Teaching and Research Hospital, Department of Urology, Istanbul, Turkey

Percutaneous nephrolithotomy (PCNL) is sometimes associated with complications, especially in patients with complex stones. Herein, we reviewed our experience with PCNL to determine the effects of multiple access and supracostal access on complication rates. During a 2-year period, a total of 275 patients with a mean age of 42.3+14.8 (range:13–75) years underwent PCNL. Stones were classified as simple in 51.3%, and complex (staghorn calculi or renal pelvis stones coexisting with caliceal stones) in 48.7%. Stone size was <4cm2 in 85 (30.9%), 5–10 cm^2 in 128 (46.5%), and >10 cm^2 in 62 (22.5%) cases. Percutaneous access was done under C-armed fluoroscopy and tract was formed with high-pressure balloon dilatation system. One percutaneous access was sufficient in 210 (76.4%), while 2 accesses were utilized in 44 (16%), and >3 accesses in 21 cases (7.6%). Supracostal access was performed in 23 (8.4%) cases. An overall success rate of 95% was achieved on 3rd postoperative month. Significant complications included bleeding necessitating blood transfusion in 28 cases (10.2%), hydropneumothorax in 2 cases (0.7%), and perinephritic abscess in 1 case. Bleeding was observed in 31.9% of cases with supracostal access, and in 7.6% of cases with subcostal access ($p<0.01$). Increased number of access point also significantly aug-

mented the risk for bleeding (p<0.05). Bleeding was encountered in 7.6% of cases with 1 access point, and in 18.5% of cases with >2 access point. Hydropneumothorax occurred in cases with supracostal access. The need for multiple access points and supracostal access significantly increases complication rates.

SR-14

The impact of medical disorders on the outcome and complication rates of percutaneous nephrolithotomy

Dr. Tefekli A., Muslumanoglu A., Binbay M., Tok A., Ozkuvanci U., Aydin S.
Haseki Teaching and Research Hospital, Department of Urology, Istanbul, Turkey

Presence of complex stones, multiple-tract procedures and prolonged operative time are major risk factors affecting outcome of percutaneous nephrolithotomy (PNL). Herein, we assessed the impact of serum lipid abnormalities (SLA), hypertension (HT) and Diabetes Mellitus (DM) on the outcome and complication rates of PNL. Data were collected prospectively from 430 patients, with a mean age of 42.7+14.5 (range: 11-80) years, undergoing PNL at our institute since October 2002. There were 240 men and 190 women. SLA was observed in 123 (28.6%) patients, HT in 108 (25.1%), and DM in 44 (10.2%) cases. Treatment outcome of cases with or without these disorders were compared. Overall, a success rate of 96.3% (including clinically insignificant residual fragments in 21.8%) was achieved during follow-up. Auxiliary treatment alternatives were indicated in a total of 11.8%. Major complications were observed in 49 (11.6%) cases. Success rates were similar among groups (p>0.05). Auxiliary retreatment rates in cases with SLA, HT, and DM were 11.4%, 11.1%, and 20.5%, respectively. Auxiliary retreatment rates in cases with DM was significantly (p<.05) higher that cases without DM. Major complication rates were similar among cases with or without SLA, but 19.4% of cases with HT and 22.7% cases with DM experienced major comlpications, and these rates were siginificantly higher (p<.05) when compared to 8.7% and 10.1% complication rates observed in normotensive and non-diabetic cases, respectiely. Our results indicate that presence of HT and DM, but not SLA, are associated with significantly increased major complications despite similar success rates. An increased need for auxiliary treatment is also encountered in cases with DM.

SR-15

Long-term follow-up of percutaneous nephrolithotripsy and nephropexy.

Prof. Martov A., Gushchin B., Ergakov D.
Institute of urology, Endourology, Moscow, Russian Federation

Nephroptosis is defined as a downward displacement of the kidney by more than two vertebral bodies (>5 cm) when the patient moves from a supine to an erect position. Nephroptosis can be associated with pyelonephritis, renal calculi, haematuria, hypertension and renal ischaemia. Combination of renal calculi with excessive kidney mobility presents a dilemma for urologists. The aim of this report is to evaluate long-term follow-up of percutaneous nephrolithotripsy and nephropexy. Percutaneuos nerphrolithotomy and nephropexy was applied for a combination of kidney stones and nephroptosis in 48 patients; 43were females, 5 males; mean age 36 years (range 22-58). Routine IVP and renography revealed renal descent of more than two vertebral bodies in all patients and mild renal function deterioration in 32 patients (66,6%). The right side was affected in 30 patients (62,5%), the left side – in 18 (37,5%). Single stones were found in 34 cases, multiple – in 14. Stone size ranged from 1,0 to 6,5 cm in the long axis. Staghorn calculi were observed in 14 (29,2%) patients. The principal technical features of the operation were: 1. Creation an access into the freely movable kidney in the its most proximal position (Trendelenburg position, during breath out); 2. Kidney traction with balloon catheter and its firm fixation to patient's skin for a 3 weeks period. Endoscopic operation was successful in renal stones removing and kidney fixation in all but one patient. A follow-up period ranged from 48 to 120 months, and was available in 44 patients. Recurrent stones and normal kidney mobility were observed in 4 cases and successfully treated with ESWL. Excessive kidney mobility (more than two vertebral bodies) with combination of intractable pain, recurrent UTI and kidney stone disease in one case required open surgery – stone removal and nephropexy. Our experience shows that renal stones associated with nephroptosis could be successfully treated with percutaneous stone removal. We believe that ESWL should not be a method of choice in this clinical situation, since the bend of uretero-pelvic junction, hydronephrosis of some stage in combination with chronic UTI may cause stone fragments retention in renal collecting system, acute kidney inflammation, and subsequent stone formation.

SR-16

How to manage nephrolithiasis during laparoscopic pyeloplasty for ureteropelvic junction obstruction?

Ass. Prof. Corvin S., Sturm W., Stenzl A.
University of Tuebingen, Urology, Tuebingen, Germany

During the past few years, laparoscopic pyeloplasty for ureteropelvic junction (UPJ) obstruction has gained increasing popularity. The optimum management of concomitant nephrolithiasis however is still unclear. In the following report we describe techniques and own experiences with stone removal during laparoscopic pyeloplasty. During the past 2 years, 41 patients underwent laparoscopic pyeloplasty at our department. 5 of these individuals suffered from concomitant nephrolithiasis. One patient had a solitary calculus whereas all others showed at least 6 stones. In all stone patients a dismembered pyeloplasty (Anderson-Hynes) was performed. In one individual the stone was removed preoperatively by means of percutaneous nephrolithotomy (PCNL). In the other patients calculi were removed through a pyelothomy using a flexible cystoscope, which was introduced through one of the trocars. All procedures could be performed laparoscopically without conversion to open surgery. The patient, who had undergone PCNL for stone removal, showed extensive scar formation around the renal pelvis leading to prolonged postoperative urine extravasation. In the other 4 patients with 6 to 120 calculi, the stones couldn't be removed completely with the technique described above. The following ESWL/PCNL lead to freedom from stone in all patients. These data demonstrate that the management of stone disease during laparoscopic pyeloplasty is still unsatisfactory. Preoperative stone removal by means of PCNL should be avoided due to scar formation around the renal pelvis associated with an elevated risk of intra- and postoperative complications. Technical improvements are necessary to improve the effectiveness of laparoscopic stone removal.

SR-17

Surgical removal of urinary calculi in patients with renal failure

Dr. Platanas M., Kalantzis A., Karamichalis G., Aristas O., Doumas K., Farmakis A.
General Hospital of Athens "G.Gennimatas", Athens, Greece, Department of Urology , Athens, Greece

Patients with chronic renal failure and nephrolithiasis were evaluated in the direction of improving their renal function after surgical removal of the calculi. We studied 58 patients with chronic renal failure and nephrolithiasis. An initial ultrasonographic assessment of their urinary tract was made. Disturbances of their acid – base balance and electrolytes were corrected and patients with critical renal function were led to dialysis before having been operated on. In 49 patients the calculi were removed with pyelonephrolithotomy and in the residual 9 patients with percutaneous nephrolithotomy. The calculi were found to be calcium oxalate monohydrate in 8%, calcium oxalate dehydrate in 11%, mixed in 76% and struvite calculi in 24%. All of the patients were examined regularly after their release. Creatinine clearance estimations and dynamic renal scans were performed as follow – up methods. Preoperatively the average serum creatinine was 5.83 mg/dl whereas after one year follow – up there has been an average reduction of 1.64 mg/dl .The dynamic renal scans showed an improvement of 24.6%. Furthermore, 24 patients had such an improvement of their renal function that dialysis was no longer needed. The patients who have more to gain from the surgical removal of their calculi seem to be the ones with moderate renal failure, as they can even face life free from dialysis.

SR-18

Percutaneous endoscopic extraction of two different ureteral stones from the middle part of the ureter

Dr. Berczi C., Flasko T., Farkas A., Toth C.
University of Debrecen, Department of Urology, Debrecen, Hungary

The authors report a rare case of percutaneous endoscopic extraction of two ureteral stones, which located in different sites of the middle part of ureter. A 56-year-old women underwent radical hysterectomy because of cervix carcer in 1987. After this operation the patient received radiation therapy. In 1991, small bowel resection was performed, because the radiation treatment caused bowel injury. The patient had renal pain in 2004. The urological examination showed stones in the left kidney and in the lower part of the left ureter. Ureteral stone was treated successfully by ESWL. After this, ESWL treament of the renal stone was performed. Due to this procedure the stone crushed two pieces. One of them located in the upper part of the ureter, while the other was at the level of LV. Further ESWL treatments were unsuccessful. Authors tried to remove stones by ureterorenoscopy. However, they detected a serious stenosis of the ureter from 7–8 cm from the bladder, and they could not dilatate this stricture. During the ureterorenoscopic intervention the upper stone came down to the level of LIII. The size of the upper ureteral stone was 10 mm and the size of the lower stone was 7 mm. The authors decided to perform percutaneous endoscopic uretaral stone exctraction. Using percutaneous endoscopic method stone extraction was performed successfully from two different puncture during one operation. In conclusion, percutaneous endoscopic ureteral stone extraction is a good choice of treatment, when the ureteral stones cannot be removed by ESWL or ureterorenoscopy. However, this technique is very rare used in those cases when two stones are located in two different position.

SR-19

Retrograde intrarenal lithotripsy (rirl): limits and possibility

Dr. De Marco F., Ricciuti G., Grillenzoni L., Di Nicola S., Fini D., Vicini P.
INI, Unità Funzionale di Urologia, Grottaferrata (Rome), Italy

The international guide lines on the urolithiasys indicate the extracorporeal shock waves lithotripsy (ESWL) and the percutaneous nephrolithotripsy (PCNL), alone or in association, as the first step therapy of the kidney stones more than 20 mm. These two techniques had, after two decades of availability, different periods of diffusion and application due to the production of lithotripters of new generation but with a lower efficacy, compared with the gold standard such as the Dornier HM3. At present the improvement of endoscopic devices and intracorporeal lithotripters, such as the Holmium YAG Laser and and the new ultrasonic generation, permit the retrograde approach for the treatment of the kidney stones when the ESWL alone is not indicate and when the PCNL is too invasive.

We evaluted retrospectively all the 125 RIRL performed since September 1999 and December 2004 (67 females and 58 males). In some cases the RIRL was associated to a not planned – ESWL, while in other cases the RIRL represented the first step of a planned endoscopic treatment and ESWL. The aim of this retrospective study was to define the safety, the efficacy and the limits of the retrograde approach in that "border line stones" such as the stones that due to the size and chemical composition could be removed by PCNL and/or multiple ESWL, therapeutic options that could be affected by an higher morbidity and a lower compliance for the patient. 24 patients had a pelvic and inferior calyx stones (PIC group=19.2%), 66 patients had a pelvic stone (P group= 43.9%), 6 patients had a inferior calyx stone (I group=4.8%), 2 patients had an upper calyx stone (U group=1.6%) and 27 patients had a pelvic and multiple calyx stones (PMC group=20.8%). The stones size ranged in the PIC and P groups between 25 and 45 mm; in the I and S group between 15 and 35 mm and in the PMC between 35 and 75 mm. The Holmium:YAG Laser Dornier MediLas, the ultrasonic ACMI USL-2000 and the Dornier lithotripters HM3 and DLS were employed as source of energy for the intracorporeal and extracorporeal lithotripsy. The P group was treated by only the endoscopic procedure in 53/66 (80.3%) cases; while in 13/66 (19.6%) cases associated to^3 1 ESWL and the overall stone free rate was 96.9% (65/66 pts). The PIC and PMC groups were never treated by the only RIRL but were associated to 1 ESWL in the PIC group in 16/24 (66.6%) cases and in 15/27 (55.5%) in the PCM group. Two or more ESWL were necessary in 8/24 (33.3%) cases in the PIC group and in 12/27 (44.4%) cases in the PCM group. The stone free rates were, respectively, in the PIC and PCM groups, 79.1 % and 70.3%. In the I and U groups the RIRL was effective in 100% of the cases. We only reported one perirenal hematoma and one urinoma as a post RIRL complication. The RIRL was pratical, safety and effective in the pelvic stones group with a stone size ranged between 25 and 45 mm. The international guide lines indicate the PCNL±ESWL as the treatment of choice in this group of patients, but the higher stone free rates of the RIRL associated or not a planned or not planned ESWL, the lower operating time, and the lower morbidity must consider this therapeutical approach competitive with the PCNL in this group of patients. Therefore in the PIC and PCM groups , despite the stone free rates obtained, the RIRL seems to be too demanding for both the patient and urologist and could be used only in that cases where controindications to PCNL and/or ESWL do exist.

Surgery Ureteral/Bladder Stones

SUB-1

Is open ureterolithotomy justified in the new millenium?

Mr. Saw NK., Rindani R., Downey P.
South Manchester University Hospitals Trust,
Department of Minimally Invasive and Laparoscopic Urology,
Manchester, United Kingdom

Ureterolithotomy [open or laparoscopic] is considered an option in the management of large ureteric stone burdens but is associated with significant morbidity. A recent audit of stone management in the UK conducted by the Section of Endourology revealed that open ureterolithotomy was still being offered to patients with large ureteric stones in non-specialist centers. We reviewed our experience with minimally invasive retrograde ureteroscopic management of such stones in our tertiary referral hospital. We reviewed the case notes and X-rays of patients who underwent ureteroscopic holmium laser lithotripsy between February 2003 and September 2004 at our institution to identify those with large stone burdens. Stone burden [calculated as stone surface area] was determined from pre-operative renal tract X-rays. Stone free status was assessed by plain radiography on the first post-operative day and at three-month follow-up. 6 patients were identified with large stone burdens in 7 renal units. Three patients had more than 1 stone present. Stones were located in the upper [n=3], mid [n=5] and lower [n=1] ureter respectively. Mean stone burden was 286mm2 (range 125 to 544). 6 of the 7 renal units were completely cleared of stone following a single procedure. The stone burden in the remaining renal unit was reduced from 304mm2 to 40mm2 following the first procedure and the patient was made stone free following a second procedure. Mean operative duration was 88.6min. (range 35 to 180). Three patients required JJ stent insertion at the end of the procedure. Median postoperative stay was 1day (range 1 to 11). The JJ stents were removed two weeks later. At three-month follow-up all patients remained free of stones. Retrograde ureteroscopic holmium laser lithotripsy should be considered as a first line treatment in patients with large stone burdens in specialist centres.

SUB-2

Mini-incision high ureterolithotomy

Ass. Prof. Hinev A., Paunov S.
Varna Medical University, Department of Surgery,
Clinic of Urology, Varna, Bulgaria

Stones in the upper third of the ureter can be currently managed by a variety of treatment options, including ESWL, endoscopic or open surgical methods. A novel minimal invasive open surgical technique, an alternative to the standard urological procedures, is proposed herein. Since March 2004 seven consecutive patients (mean age 44 years, range 28–62 years) underwent surgery for urinary stones, obturating the upper third of the ureter. The surgical technique included: a 6-cm lumbar skin incision made below and parallel to the 12th rib; sharp incision of the aponeurosis of the external oblique muscle, followed by blunt division of the fibers of the abdominal wall muscles; sharp incision of the lumbodorsal fascia; extraperitoneal dissection of the ureter and identification of the stone; oblique ureterotomy and stone extraction; closure of the ureteral incision by a continuous absorbable 4-0 suture, facilitated by the use of the "knot-slider" instrument. Three patients required insertion of double J endoprotheses. The mean operative time was 50 min. (range 35–95 min.). No peri- and/or postoperative complications were recorded. The blood loss was minimal, at 60 (40–110) mL. Stone size ranged from 6 to 18 mm. (mean 12 mm.). The mean hospital stay was 3.7 days (range 2–5 days) with minimal analgesic requirement. At follow up, fast and complete patient recovery with a cosmetic wound healing was documented in all patients. The initial results confirm that the novel mini-incision high ureterolithotomy technique is a viable alternative to the standard urological procedures currently used for removal of stones located in the upper third of the ureter.

SUB-3

Ureteroscopy as the first line treatment for distal ureteral stones.

Dr. Kugel V., Mohr G., Kloetzing W., Karimi K., Sobek H., Pr. Koehrmann K.
Theresienkrankenhaus und St.Hedwig Klinik,
Urological department, Mannheim, Germany

In the last years we see changes in balance of choosing treatment for distal ureteral stone. More and more authors prefer ureteroscopy (URS) and laser lithotripsy to extracorporeal shockwave lithotripsy (ESWL) as the first-line therapy in these cases. Technical advances in ureteroscopy such as smaller size of semirigid ureteroscope, holmium-YAG lithotripsy and expirience improvement of surgeons in endourologic procedures significantly increase stone free rate and decrease the incidence of complications during URS. Intention of our study was to evaluate stone free rate and safety of routine ureteroscopy for distal ureteral calculi. 61 ureteroscopies were performed for 60 patients with distal ureteral stones in our department between 1.9.2003 and 31.1.2005. Their ages ranged from 21 to 80 years, with women accounting for 23%. Three patients had an ureteral stent before URS: one due to suspected pregnancy at the beginning of the treatment, two others after previous ureteroscopies. All patients were routinely followed up at the first day after procedure with ultrasound and plane film and after 3 months. Distal ureteral stones smaller or equal to 10 mm in size were treated successfully in 96,7% in one URS session. Average procedure time was 45 minutes (range 15–150). One patient required a second URS and one ESWL after pushback. Complications after ureteroscopy were observed in 3 patients.Two patients required antibiotic treatment after procedure for urinary tract infection with hospital stay 1–3 days, one patient with subcapsular abscess (due to improper technique) required hospitalization for 21 days. URS patients were successfully completely stone free after one procedure in 89% and with fragments smaller or equal to 2 mm in 96%. Two patients were stone free after second URS and ESWL after push back respectively. This summs up to an immediate stone free rate of 100% for the patients. Stone analysis was performed to 53 patients and revealed that calcium oxalate monohydrate and apatite were present in 37 cases (70%). Ureteroscopy is an invasive but safe and highly successful treatment for distal ureteral calculi, with low rate of complications, with high stone-free rate after single procedure. The high rate of hard stones argue for primary ureteroscopy and against ESWL as first choice treatment for distal ureter stones.

SUB-4

Ureteroscopy for ureteral stones in day surgery

Dr. Merlo F., Maccatrozzo L., Faggiano L., Cicerello E.
Regional Hospital, Urology, Treviso, Italy

The possibility of performing ureteroscopies in day hospital was reported in the past but the operations were often unplanned and sporadic.

This operating method has gradually become routine over the last few years to the extent that it is now applied in most patients with ureteral stones.

The aim of this work is to assess the effectiveness, safety and results of this form of treatment in day surgery. We evaluated 287 patients who underwent ureteroscopy for ureteral stones between June 1999 and June 2004, 191 (66%) of whom in day surgery. Day surgery in our hospital is considered as a 24-hour admission, therefore inclusive of an overnight stay (one day surgery). The following have been taken as the criteria for inserting these patients in programmed day surgery: ASA, age, habitus, compliance, social situation, urological conditions (site, number and size of the stones, situation of the upper excretory tracts). All the patients were treated with 7.5-8.5F semi-rigid ureteroscopes. Swiss Lithoclast was used as the lithotripsy system until March 2002 and then the Holmium laser Luminis 20W. Operations were performed under peripheral or general anesthesia and a decision was taken at the end of the procedure whether or not to place a double or single-J ureteral stent, according to the condition of the excretory tract. Stones were successfully removed in 260 patients (91%) and a single or double J ureteral stent was placed in 224 (78%).

Thirty-five (18%) of the 191 patients operated in the programmed day surgery scheme were transferred to an in-patient ward for the following reasons: 11 with a high temperature, 7 with macrohematuria, 6 symptoms attributable to the anesthetic (headache, nausea), 6 clinically required monitoring of the condition of the excretory tracts or kidney function and 5 due to logistic or family reasons. After a 24-hour admission, 156 patients were discharged and 7 (4%) of these were re-admitted within 7 days due to high temperature, flank pain or symptoms related to the stent (intense pollakiuria, dysuria, vesical tenesmus). Technological evolution of the instruments, reduced operating times, awareness and prevention of complications and the adequate, complete information given to the patient today allow the successful ureteroscopic treatment of ureteral stones in day surgery in most cases (82% in our experience). It is, however, essential in these patients to ensure adequate antibiotic therapy, effective control of post-operative pain as well as good drainage of the excretory tract.

Further experience and better organization of the day surgery service, for example with dedicated spaces and staff, could lead to more operations of this kind in the future.

SUB-5

Ureteroscopic management of renal calculi: do ureteral access sheaths improve stone-free rates?

Prof. Preminger G., L'Esperance J., Ekeruo W.
Duke University Medical Center, Urology, Durham,
North Carolina, United States of America

Routine use of the new generation of ureteral access sheaths (UAS) has greatly facilitated upper tract access during flexible ureteroscopy. However, reports of stone-free rates while using UAS have been contradictory. We therefore evaluated our experience with the ureteroscopic management of renal calculi, specifically focusing on stone free rates with and without the use of a ureteral access sheath. A retrospective review of ureteroscopically managed renal stones between 1997 and 2002 was performed. Data from these procedures were entered into a dedicated database and queried for stone size, location, method of treatment, and overall efficacy. The use of adjunctive procedures, such as UAS insertion or stone re-positioning, is reported as well. Overall stone free rates were stratified by stone location and the use of the UAS. Stone free status was confirmed by either tomograms or non-contrasted renal CT. A total of 181 patients (103 males and 78 females) underwent 270 procedures for symptomatic renal calculi. Flexible ureteroscopy was used in 91% of the cases. UAS were used in 67% of the cases. The lower renal pole was the most common presenting location for kidney stones and required stone displacement with a nitinol basket 34% of the time. The majority of stones were effectively fragmented with a holmium laser, resulting in a 75% overall stone free rate. The stone free rates in the upper pole were 68% vs. 52%, in the mid pole were 84% vs. 79%, in the lower pole were 80% vs. 73%, and in the renal pelvis were 83% vs. 67% with and without the use of an UAS, respectively. Overall, the stone free rate was 79% vs. 67% in the 2 different groups. In our experience, the ureteral access sheath is associated with significantly improved stone-free rates in all portions of the kidney. This finding can be explained by simplified repetitive access to the collecting system and improved irrigant flow with resultant washing out of small fragments.

SUB-6

Ureteroscopic treatment of ureteral calculi: a multiaspect evaluation

Dr. Erturhan S., Sar¦ca K., Yagc¦ F., Erbagc¦ A., Solakhan M.
Gaziantep Univercity, Faculty of Medicine,
Department of Urology, Gaziantep, Turkey

Treatment of lower ureteral stones still showes controversy despite the dramatic changes in the management of urinary calculi including clinical introduction of ESWL. Although there are a variety of choices applied in the management of such stones; today the skill of the operator and the technological availibility are the most crucial factors affecting the final outcome of the management Between 1996-2004 ureteroscopic management of ureteral calculi has been performed in a total of 704 patients with 715 ureteral stones (462 male, 242 female, M/F: 1.9) with an avarage age value of 40 years (17–81 years).All procedures were performed either under spinal or general anesthesia. Stones >5 mm. resistant to ESWL, stones <5 mm that could not be passed despite appropriate measures and medical therapy, any obstruction longer than 15 days and that of in solitary kidneys were the inclusion criteria. Stone size, localization,mucosal factors,duration of the procedure, irrigation fluid consumed and the adhesion degree of the stone to the ureteral wall have been evaluated in a comparative manner. Pearson correlation test was used for statistical evaluation. Stone size ranged from 0.4 to 2.3 cm (mean 1.4). While 307 stones were removed by ureteroscopy alone (43 %), additional procedures such as electrohydraulic (EHL) disintegration, bascet application etc. were necessary in the remaining 408 (57%). Mean operation time was 27 min. (12–54). The procedure was completely successful in 683 cases with completely stone free status (95%) and unsuccessful in 32 cases (5%). Ureteral stent was placed in 136 cases following stone removal (19%).Although majority of the procedures were done in an outpatient basis, mean hospitalization time was 36 hours (6–72 hours). There was a statistically significant positive correlation between stone volume and not only time of the operation, but also volume of the irrigation fluid ($r:39$, $p<0.05$). The same findings were true for stone adeherence to ureteral wall and time of the operation together with the volume of the irrigation fluid ($r:76$, $p<0.05$). However, there was no statistically significant correlation between the stone volume and the kind of the endoscopic procedure ($r:16$, $p>0.05$). Although the disintegration of the lower ureteral stones with ESWL is a valuable alternative, our results indicated the success of ureteroscopic re-

moval in skilled hands with its reliable, effective and safe results. We believe that ureteroscopy in skilled hands,should be the first choice in the majority of lower ureteral calculi with a proper patient selection.

SUB-7

Is failed shockwave lithotripsy a limiting faktor for ureteroscopic lithotripsy ?

Dr. Tugcu V., Taşçi A., Gürbüz G., Gürkan L., Gönen M., Ötünçtemur A.
Bakirkoy Treaning and Research Hospital, Urology, Istanbul, Turkey

We reviewed our experiences on ureteroscopic pneumatic lithotripsy (URS-PL) for the treatment of distal ureteral stones and investigated whether failed extracorporeal shockwave lithottripsy (SWL) is a limiting factor for the ureteroscopic procedure. We ratrospectively studied the medical records of 287 patients treated with URS-PL from 1999 to january 2004 in our clinic, 148 of these patients were treated with URS-PL, primarily (Group I), while the remaining 127 patients had undergone failed ESWL before URS-PL was performed (Group 2). We used 9-9,5 French rigit instrument and vibrolith (Elmed, Ankara, Turkey). In Group 1, 143 of 148 patients (96,7%) were treated successfully with URS alone, and so were 122 of 127 patients (96,1%) in Group 2, who had previously undergone SWL, Impacted stones were observed in 15 patients Group I (10,1%) and in 45 patients in Group 2 (35,4%). Average operation time 7,31 in Group 2 We±8,93 minutes in Group I and 57,51±was determined as 33,10 belive that the higher frequency of impacted stones in group 2 caused this difference in operating time However, no statistically significant difference was found between the complication rates of the two groups (0.7% vs 2.4% p>0.2). Stone-free rates of the two grouos were significantly different on the first postoperative day, but this difference decreased to an insignificant level at the end of the first month of follow-up. Our survey demonstrated that when ESWL fails, URS and pneumatic lithotripsy are as safe and effective as primary URS. Pneumatic lithotripsy also seems to be an effective treatment modality for impacted stones.

SUB-8

Effectiveness of ureteroscopic lithotripsy for lower ureteral stones with a dimension of 1 cm and greather

Dr. Tugcu V., Taşçi A., Ozbek E., Aras B., Gürkan L.
Bakirköy Traning and Research Hospital, Urology, Istanbul, Turkey

To investigate whether stone dimension is a restrictive factor for ureterorenoscopic procedures 287 patients who had undergone ureterorenoscopic pneumolithotripsy (URS-PL) for lowerureteral stones between January 1999 and January 2004 in our clinic had been evaluated retrospectively. 12 patients excluded because of nonopague or multiple stones.185 (67.3%) of the patients were men and 90 (32.7%) were women. Mean age of the patients was 39.44+/-11.57 years. Patients grouped according to stone dimension, 126 patients with stones smaller than 1cm being group 1 and 145 patients with stones 1cm and greater than 1cm in dimension being group 2. Rate of stone free-ness, operative time and rate of complications of the groups compared. Pearson Chi-Square test, Fischer's Exact Test and Students's t test were used for statistical analysis. P value was accepted as being meaningful if p<0,05. For group 1, mean operative time was 38,75 +/-14,33 minutes. No complication was seen in 121 patients. Four proximal stone migrations, 1 false-route observed. Cumulative rate of stone-freeness was 96,3%. For group 2, mean operative time was 49,061+/-1,982 minutes. 138 (95,2%) of the patients were stone-free after first session and 5 of them were stone-free after second session with URS-PL. Ureterolithotomy was performed in two patients due to perforation. Cumulative rate of stone-freeness was 96,5%. Effectiveness of URS was independent from stone dimension. There was no meaningful effect of stone dimension on complication rates

SUB-9

Pyelon and upper ureteric stone destruction by semirigid ureteroskope (lithotripsy): does it make sense?

Prof. Djozic J., Marusic G., Sekulic V., Bogdanovic J., Djozic E.
Clinical Center Novi Sad, Department of Urology, Novi Sad, Yugoslavia

SWL is considered to be the first therapeutic option for upper ureteric (and pyelon) stones (UUPS) due to its efficiency, invasiveness, time consummation and cost benefit. Semirigid ureteroscopy (tripsy) (SURST) is an equal therapeutic option to SWL in lower ureteric stones, but in very special cases, and forced conditions, SURST can be used in destruction of UUPS, successfully. This prospective study, made in year 2003 and 2004 (when our SLW machine was out of order), presents our results with SURST as the first therapeutic option for UUPS. During the period of two years (2003-2004) 73 patients (pts) with UUPS (67 ureter and 6 pyelon) underwent endoscopic retrograde lithotripsy by Lithoclast at our department. In group I (27 pts) SURST was done as the very first (primary) treatment, and in group II (46pts) SURST was performed after two weeks of stent (J-J or ureteral) indwelling into the ureter (kidney) for reaching the stone easier. Size of stone was between 1 and 2,5 cm (average size 1,43). In group I ureter was completely obstructed by stone, and in group II was not. 6 pts with pyelon stones (size 2-3 cm) also underwent SURST. Before the treatment, intravenous pyelography or Chevassu was carried out on the site of stone to confirm normal and wide enough ureter distally from the stone. Procedure has been done under epidural or general anesthesia. In group I (27pts) destruction of the stone was successful in 17pts (62,9%), in situ or after migration to the kidney. Unsuccessful procedure was in 3 pts (11,1%) – with consecutive ureterolithotomy. Perforation of ureter has happened in 4pts (14,8%) and conversion to ureterolithotomy was carried out, consequently. In 3 pts only (11,1%) ureteral probe could have been placed behind the stone, and those pts were treated as in group II, after two weeks time. All pts in group I had J-J stent after procedure during 2-4 weeks.

In group II all stones were destructed in situ, or into the kidney, after migration of the stone (7+6 pts). There was no perforation of the ureter, but in 6 cases partial lesion of the ureter has happened, and only in those pts J-J stent was left in place next two weeks. Usually, J-J stent was not left "in situ" after procedure. Semirigid ureteroscopy (tripsy) can be used for destruction of upper ureteric (even pyelon) stones as a safety, efficiency procedure, if it is made by experienced and skilled urologist, after two weeks of catheter indwelling into the ureter (kidney). Primary, SURST is not recommended due to its serious complications. SWL is still treatment of choice for upper ureteric (and pyelon) stones.

SUB-10

Ureteroscopy and pneumatic lithotripsy for ureteral calculi in the laser era

Dr. Turna B., Nazl¦ O., Simsir A., Apaydin E., C¦k¦l¦ N., Cureklibat¦r I.
Ege University Medical Faculty, Urology, Izmir, Turkey

Ureteroscopy with intracorporeal lithotripsy has become the most successful treatment for ureteral calculi and is rapidly becoming a first-line treatment. In this study, we present the short-term and long-term outcome of ureteral calculi treated with ureteroscopy and pneumatic lithotripsy. Between March 1987 and June 2004 a total of 1071 patients who underwent ureteroscopy and pneumatic lithtripsy were reviewed retrospectively. During the procedures, 10 Fr and/or 8 Fr Storz® semirigid ureteroscopes were used. For stone fragmentation, Elmed Vibrolith® or Storz Calcusplit® pneumatic lithotriptors were used. For removal of small fragments (5 mm) various baskets and/or forceps were used. The mean patient age was 34.3 years old (range 17-69). The mean stone size was 7 mm (range 5-20). Seventy-eight stones were located in the proximal ureter, 212 stones were located in the middle ureter and 781 stones were located in the distal ureter. 20 out of 781 distal ureteric stones were stein-strasse secondary to shock wave lithotripsy. Complete fragmentation was achieved in 642 cases (59.9%). Partial fragmentation and basket extraction and/or forceps extraction was used in 320 cases (29.8%). Ureteral stents overnight were placed in 243 cases (22.6%) while 123 cases (11.4%) reqired JJ stent insertion for 2 to 4 weeks. Intra-operative complications were proximal migration of small fragments in 78 cases (7.2%), ureteral perforations in 28 cases (2.6%) (14 cases required conservative measures, 14 cases required open surgery), engagement of basket within ureter in 1 case, ureteral rupture in 1 case and total ureteral avulsion in 1 case. Recorded short-term complications were post-operative fever in 47 cases (4.3%), bleeding in 3 cases (0.2%) and urinary tract infections in 93 cases (8.6%). Recorded long-term complications were ureteral stricture in 36 cases (3.3%). The overall success rate at 3 months was 89.8% for all procedures. The success rate at 3 months was 70% for proximal ureteral stones, 84.4% for middle ureteral stones and 93.2% for distal ureteral stones. Ureteroscopy and pneumatic lithotripsy is a safe, efficient and cost-effective method for the treatment of all ureteral calculi. However, this method is not without intra-operative, post-operative short-term and long-term complications. One should carefully consider pneumatic lithotripsy as an alternative to lasertripsy if the main aim is stone management.

SUB-11

Experimental studies pertaining to the tissue safety of the u100plus laser lithotripsy system

Dr. Zörcher T., Todorov J., Faller G., Hochberger J., Krause S., Engehausen D.
Friedrich-Alexander-University Erlangen, Urology, Erlangen, Germany

In 1998,in a previous in vivo study we were already able to examine the minimal tissue damage potential and the high degree of safety of the frequency-doubled dual-pulse neodymium YAG laser with 120 mJ ("FREDDY," U100). Within the scope of further developments, a new generation of this laser type designed for the lithotripsy of stones and calculi in the urinary and biliary tract, has now been equipped with an optionally higher energy output (U100Plus/160 mJ) and the option of applying "double-pulses" (two laser pulses time offset by 50 µs, energetically identical laser pulses) with the goal of increasing the laser's efficiency. Objective of this preclinical trial was to determinine the tissue damage potential and the degree of safety of this new, technically advanced generation of the FREDDY Laser U100 plus with a maximum energy of 160 mJ. The urothelium of the opened bladder of 9 anesthetized rabbits was subjected to the direct laser energy of the FREDDY laser system at different application sites and at different pulse rates (1-500) with energies of 120 mJ and 160 mJ using single- as well as double-pulse mode; the entire bladder was then removed as one organ. The individual application sites were then prepared as histological cross-section specimens and examined for the damage pattern. The results were evaluated in comparison with the analyses of a control group (sham group). The direct exposure of the urothelium of the bladder to laser pulses at 120 mJ as well as 160 mJ (single-, double-pulse modes) result exclusively in superficial epithelia defects of the urothelium layer and / or bleeding in the area of the submucosa and muscularis. None of the evaluated 41 application sites with 120 mJ and none of the 35 application sites with 160 mJ exhibited a perforation of the bladder wall. As already proven in one of our own studies conducted in 1998, the frequency-doubled dual pulse neodymium:YAG, non-thermal laser lithotripsy system FREDDY has insignificant tissue damage potential. This result applies to the basic model U100 with 120 mJ as well as the advanced model U100plus with 160 mJ of energy output and additional optional double-pulse mode. However, whether the modification of the new device can reach the desired and required increase of the fragmentation efficiency, especially with the previously difficultly to fragment or sufficiently fragmented stone compositions, will have to be determined with the corresponding future clinical studies.

SUB-12

Treatment of urolithiasis with the frequency-doubled dual-pulse nd:yag laser: results of 587 patients with the first and the new advanced system

Dr. Brandt H., Krankenhaus Düren
Clinic for Urology, Pediatric Urology and Urologic Oncology, Düren, Germany

The introduction of ESWL (Extracorporeal ShockWave Lithotripsy) had opened up a new dimension in the elimination of urinary stones. After the initial euphoria over this new, non-invasive therapy, the focus was again cast on treatment times, especially after the continuous discussions regarding costs in the health care system and the recent introduction in Germany of new billing practices (Diagnosis Related Groups). With multiple ESWL treatments, the onset of hydronephrosis, stone fragments remaining in the ureter following treatment (Steinstrasse), and Post-Operative measures such as temporary catheters, it often takes weeks until the patient is healed and able to return to work. For this reason endoscopic lithotripsy methods are gaining more and more in relevance. With the introduction of modem laser procedures for the endoscopic treatment of stones, even large urinary calculi can now be quickly and effectively fragmented. A specially developed device for lithotripsy, the FREDDY Laser, avoids the risk of injury to surrounding tissue, even at maximum power. At the Urology Stone Center of the Urology Clinic in Düren, Germany, the first type and an advanced system were evaluated on 587 patients in the last three and a half years. We present and compare the clinical data of fragmenting kidney stones, ureteral stones as well as bladder stones which were targeted with the two different FREDDY-Lasers. We were able to disintegrate 95% of stones in a single treatment without causing perforations of surrounding tissue under any circumstances. Endoscopic lithotripsy with the FREDDY laser of the first as well as the advanced type is a safe and fast method for the fragmentation of all urinary calculi. The advanced type especially improves fragmenting capability with very big and extremely hard concrements. Treatment duration until the patient is stone free is short, and costs as well as patient recovery times are also markedly reduced.

SUB-13

Holmium:yag laser treartment of ureteral calculi. Five years experience

Dr. Farkas A., Péteri L., Salah M., Lőrincz L., Berczi C., Tóth C.
University of Debrecen, Medical and Health Sciene Center, Urology, Debrecen, Hungary

Summary: The authors report their results and experience – gained in a five year period – with Holmium:Yttrium-Aluminum-Garnet (Ho:YAG) lasertripsy in the treatment of ureteral stones. Material and method: In the present study 137 transurethral ureterolithotripsies (TUL) were performed. A m reusable flexibleμHolmium-Yttrium-Aluminium-Garnet laser device, 360 and 550 fibers, semirigid and flexible ureterorenoscopes were used. Results: The distribution of stones were the following: thirteen stones (9.48%) were situated in the upper ureter, 31 stones (22.62%) in the middle and 93 stones (67.88%) in the lower ureter. Six patients had bilateral stones. The final success rate of treatment in the upper, middle and lower ureter was 84.6%, 96.7%, 94.8%, respectively (average: 96.3%). The pulsatile Holmium:Yag laser beam fragmented all kinds of stones easily. No ureteral stricture or reflux were noticed during the follow-up period. Conclusion: In our opinion the Ho:YAG laser provides a highly effective, safe and multifunctional source of energy for lithotripsy in the field of urology.

SUB-14

Ureteric stenting after ureteroscopy for urinary calculi as a roytine procedure: the question is still open

Dr. Porfyris O., Platanas M., Galanakis I., Doumas K., Farmakis A., Lycourinas M.
General Hospital of "Georgios Gennimatas", Athens, Greece, Department of Urology, Athens, Greece

We conducted a study to assess the need for routine ureteral stenting after ureteroscopy for ureteric calculi. In all, 450 patients with ureteric calculi amenable to ureteroscopic management we randomized into a stented (230) or an unstenyed (220) group. Ureteroscopy was performed with the patient under either general or epidural anesthesia. A semirigid ureteroscope (7,5 Fr) was used in all cases and either ureteroscopic basketing or intracorporeal lithotripsy with electrokinetic lithotripter was performed(without ureteric dilatation). In group A a double pigtail ureteral 4,8 Fr polyurethane stent was placed following ureteroscopy. All patients were closely evaluated on follow up examinations. The outcomes measured were postoperative pain, lower urinary tract symptoms, hospital stay and postoperative complications. Baseline variables (age, stone location, mean stone size) were not significantly different in two groups. A successful outcome was achieved in 100% in both groups. The mean pain score on day 2 was not significantly different in both groups. Similarly the analgesic requirements and need for hospital stay in the two treatment groups was not significantly different. However, patients with stents had significantly more pain (flank pain with voiding), urgency and haematuria. Radiologic follow up was available for 72,6% of the patients at the 3-month visit. None of the patients had evidence of ureteral stricture. Uncomplicated ureteroscopy for removing calculi is safe with no stent after treatment and we think that routine use of ureteric stent after uncomplicated ureteroscopy is unnecessary.

SUB-15

Totally endoscopic management of forgotten or retained indwelling ureteral stents

Dr. Aravantinos E, Karatzas A, Kalogeras N, Moutzouris G, Papakonstantinou V, Melekos M
University of Larissa, Urology, Larissa, Greece

Double J stent are a comfortable method for assuring urine passage with little or no burden for the patient. However, problems relating to the use of indwelling ureteral stents continue to occur. From September 2001 to December 2004, 9 retained ureteral stents were managed in our Department. The average patient age was 58 years (range 26–73 years) and the average time the stent had been in place was 15 months (range 6–36 months). Most of the patients presented with urinary tract infection. To remove encrusted retained ureteral stents cystolithotripsy, percutaneous nephrolithotomy and retrograde ureteroscopy with or without intracorporeal lithotripsy were used.These endourologic procedures (range 1–3) performed in one or more sessions to remove the stent and all associated stone burden. All the retained or forgotten indwelling ureteral stents were removed.Treatment decisions were based on the clinical presentation and imaging findings.Patients received either general or local anesthesia.

Analysis revealed that the most common component of the encrustations was a combination of calcium oxalate and phosphate. Stent encrustation is one of the most serious complications of double J stents. A combination of endourologic approaches is used for the successful management of forgotten or retained indwelling ureteral stents. Open surgery is an option of last resort in cases of failed endoscopic procedures and poorly functioning kidneys with encrustated stents. To avoid these difficulties patients with DJ stents have to be closely checked to recognize the beginning of incrustation as early as possible.

SUB-16

Therapeutical management of encrusted ureteral stents

Dr. Schwenke C.Eggersmann C., Ubrig B., Waldner M., Roth S.
HELIOS Klinikum Wuppertal, Department of Urology and Paediatric Urology, University of Witten/Herdecke, Wuppertal, Germany

The extraction of encrusted ureteral stents can cause severe surgical problems and complications. We review our experience and the different options employed for treating this complication. We performed a retrospective review of the cases of all patients with encrusted ureteral stents who were treated in our Department between 1/1998 and 12/2003. We identified 8 patients over 5 years (age: Ø 55 years; range: 20–85 years). The stents had been in place between 9-34 months (Ø 19,8 months). The initial indication for placement of a ureteral stent was treatment of urinary calculi in 6 cases, prophylactic stent placement before surgical laparotomy in 1 case and symptomatic hydronephrosis during pregnancy in 1 case.

7/8 patients underwent extracorporeal shockwave lithotripsy (ESWL). For 2 patients, no further therapy was necessary. In 5 patients endoscopic surgery (PCNL, URS, transurethral Cystolitholapaxy) and in 1 case suprapubic cystolithotomy was nessecary. The patients required an average of 4,6 sessions (range: 1–12) and remained hospitalized for 3–34 days (Ø 15,7 days). In all cases a complete stone-free-status was achieved while preserving the urinary tract. Retained ureteral stents can be a challenging problem that can cause severe morbidity. Successful treatment is nearly always time-consuming and requires a range of endourologic approaches.

The extracorporeal shockwave lithotripsy (ESWL) is a worthwhile approach and should be chosen with priority. Additional invasive treatment is often inevitable. The patient and his family should be informed in detail about the indwelling ureteral stent and the necessity of stent removal. Additionally, from a forensic point of view, it is essential to provide patients general practitioner and urologist with written information

SUB-17

Missed ureteric stents – can they be avoided?

Mr. Buchholz N., Saddique A., Albanis S., Zammit P., Bafaloukas N., Buchholz N.
St. Bartholomew's Hospital, Urology, London, United Kingdom

Concern about forgotten ureteric stents is reflected by numerous publications. Our stent register involves multiple urologists across several sites, in a multi-ethnic population with significant migration. There is plenty of potential for stents to be forgotten. Primary capture of stents is by manual forms at insertion. Redundancy checks are by patient letters. Removal is recorded separately. Overdue stents are flagged. Stents were inserted for urolithiasis (~80%), for retroperitoneal compression, and strictures. We analysed 964 cases over 7 years. The register showed 101 cases (10.5%) unaccounted for. Those records were reviewed. 15 cases (1.5%) remained unaccounted for. 4 needed stent-removal, 4 patients couldn't be traced, and 7 had no stents any more. We identified several problem areas. Forms weren't filled in, there was no estimated date of stent removal, or they never reached the administrator. Increasing awareness may be the key here. In our area, patient compliance and migration is a major problem. Patients leave the country, sometimes for treatment, or simply do not turn up for follow-ups. We are now introducing a computer-based register which will give automated e-mail alerts for overdue stents and hopefully will improve the efficacy and safety of stent follow-ups.

SUB-18

Percutaneous cystolithotripsy under local anesthesia

Dr. Aravantinos E, Karatzas A, Kalogeras N, Tzortzis V, Mitsogiannis H, Melekos M
University of Larissa, Urology, Larissa, Greece

During last decade minimal invasive techniques tend to become the gold standard for the removal of bladder stones. Until recently, percutaneous cystolithotripsy was performed using general anesthesia. The aim of our study was to demonstrate that percutaneous cystolithotripsy using local anesthesia can be a very attractive alternative with excellent results in selected patients. From 10/2000 to 4/2004, 27 patients with median age of 66 years old (27–84) with bladder calculi underwent percutaneous cystolithotripsy under local anesthesia. The patients were classified in 3 groups

1. Patients without BOO (n=11), with normal uroflow parameters and IPSS score
2. Patients with LUTS (n=13)
3. Patients with BOO caused by BPH (n=3) The average size of stones was 3,7 cm (2.1–5.6 cm). All the patients underwent IVU and uroflowmetry. History of urinary retention, blood coagulation parameters, creatinine levels and the presence of hydronephrosis were evaluated in all groups. We also estimated IPSS and PVR.Pain was assessed using a 10-point visual analog scale. Technique: Thirty minutes before the operation, 50 mg of pethidine was given intravenously to all patients. The bladder was filled with 300 ml saline to make access easier. Local anesthesia followed with the injection of 10cc of xylocaine 2% and then a typical percutaneous cystolithotripsy was performed. A suprapubic catheter of 14ch was left in place for 24-48 hours. The whole procedure was well tolerated by all patients and all the stones were completely removed. No significant complications were observed in this series. None of the patients suffered from acute urinary retention. Six patients of the second group continued referring LUTS and they were administered a-blockers postoperatively. They all had improvement of their IPSS score and uroflowmetry parameters. The Qmax increased to all patients of this group, while the PVR decreased significantly. The patients of the third group underwent transurethral prostatectomy in second time. They all had significant BOO due to large prostate volumes (64, 73 and 80 gr respectively). The median time of hospitalization was 2 days in all groups. Percutaneous cystolithotripsy is no doubt the method of choice in patients with large bladder stones. The high efficacy of the technique in according to its low morbidity and hospitalization of the patients makes it a considerable choice for the removal of bladder calculi. The advantages of using local anesthesia though is the avoidance of the complications of general or spinal anesthesia and the early mobilization of the patient. Thus, we believe that this method is a cost-effective and beneficial solution for selected patients with large bladder stones.

Urinary Stones in Children/Kidney Anomalies

Ch-1

Urolithiasis in the childhood – the german multicentre evaluation

Dr. Straub M., Schubert G., Leusmann D., Lahme S., Oehlschlaeger S., Autenrieth M.
University of Ulm, Urology and Pediatric Urology, Ulm, Germany

Worldwide epidemiological data show an increase in prevalence and incidence rates of stone disease. Despite the highly developed health care system in Germany HESSE and coworkers (2003) found in the last decade a dramatic increase of the incidence rate from 0.4% to 1.47% for adult Germans. Unfortunately the group of pediatric and adolescent stone formers is poorly investigated. Therefore the German multicentre evaluation was initiated. Five stone centres brought a total of 1,783 stone analyses into the evaluation. For the stone analysis only the common standard methods were accepted: X-ray diffraction, infrared spectroscopy and polarization microscopy. The study collective was analysed by the means of age-cohorts (0–5 years, 6–10 years, 11–15 years and 16–20 years) and gender. Routine statistics were performed. Out of the 1,783 investigated calculi 1,055 stones were of male and 728 stones of female origin. The different age groups comprised 469 (0–5 years), 328 (6–10 years), 400 (11–15 years) and 586 (16–20 years) patients. Stratifying for the main crystal phase in the calculi the following distribution was obtained: 53.5% calcium oxalate, 20.5% apatite, 7.0% struvite, 4.9% cystine, 4.4% matrix, organic and others, 4.0% artefacts, 2.6% brushite, 1.5% ammonium urate and 1.4% uric acid. Specific subgroup analysis was performed too. Stone composition during infancy is different from adults. Apatite, weddellite and cystine seem to be more common whereas uric acid is irrelevant in this cohort. The metabolic disorders causing pediatric and adolescent stone disease might be more severe and differ from the causes in adult stone forming patients.

Ch-2

The change in the management of pediatric urolithiasis in turkey: experience with 500 children in 15 years

Prof. Satar N., Aridogan I., Izol V., Doran S.
University of Cukurova Faculty of Medicine, Urology, Adana, Turkey

The efficacy and safety of different treatment methods for pediatric urolithiasis and the change in the type of approach in time have been evaluated. The records of 515 children younger than 16 years of age with pediatric stone disease was retrospectively reviewed. From 1990 to 1994, 112 patients were treated with open surgery while endoscopic methods were used in 44. Between 1995 and 1999 these numbers were 64 and 91, and between 2000 and 2004 35 and 169 respectively. Of the 515 children 318 (61,7%) had renal, 152(%29,5) had ureteral and 45(8,7%) had bladder calculi. The renal stones were treated in 140 patients by open surgery and in 178 patients by endoscopic surgery. The ureteral stones were treated in 62 patients by open surgery and in 90 patients by endoscopic surgery. The bladder stones were treated in 9 patients by open surgery and in 36 patients by endoscopic surgery. The stone clearance rate in open surgery 96% and 92% in PNL. In ureterolithiasis these rates were 100% and 96% respectively and for bladder stones 100% and 100% respectively. The use of endoscopic methods in the management of pediatric urolithiasis has resulted in treating the children with a short hospital stay, early recovery period and beter cosmetic results. Endoscopic surgery replaces open surgery in time and the results are convincing as open surgery. In conclusion, endoscopic surgery is safe and effective in the treatment of pediatric stone disease and should be the first line of treatment.

Ch-3

The effect of different preventive measures on stone recurrence and regrowth rates in children during long-term follow-up

Prof. Sar¦ca K., Erturhan S., Yurtseven C., Erbag˘c¦ A., Yag˘c¦ F.
Gaziantep Univercity, Faculty of Medicine,
Department of Urology, Gaziantep, Turkey

Aim: As a recurrent pathology, urolithiasis could reveal functional as well and morphologic changes in the urinary tract and apart from urogenital abnormalities; metabolic and enviromental factors should be evaluated thoroughly in each children suffering from this pathology. In this present prospective study, 173 children with stone disease are being evaluated with respect to the effects of three different preventive measures on stone recurrence as well as regrowth rates after treatment. Between 1996-2004, 173 children (121 male, 52 female) with complaints due to urolithiasis, with an age range of 0.3–15 years (mean 8.2 years) have been evaluated. All patients were examined with respect to stone localization, associated abnormalities, urinary tract infection, positive family history and that of serum, urine risk factors. Of the 173 patients, 139 (80.3%) were available for final evaluation during long-term follow-up (6–60 months, mean 35.6). Depending on the outcome of treatments, patients were divided into two main groups: Group I. (n:65) Stone free patients, Group II (n:74).: Patients with residual stones) and were randomly managed with three different preventive measures (Dietary management, adequate fluid intake and medical treatment). Of these 59 children received no specific preventive measure. Follow-up results were comparatively evaluated with respect to the stone recurrence and/or stone growth rates in all groups. Stone size ranged from 0.5 to 3.9 cm. with an average value of 2.1 cm. With respect to the stone forming risk factors ;our results in 78 patients demonstrated that hypocitraturia with or without hyperoxaluria was the most common risk factor detected in our group (36%). Majority of the stones treated were calcium containing stones (74.2%). Following the treatments; while a total of 91 (52.6%) patients were completely stone free; residual stone fragments were present in remaining 74 ones (42.7%). Regarding the preventive role of each modality, adequate drinking and potassium citrate therapy have been found to be more effective than dietary management. As expected patients receiving no specific measure did show evident regrowth as well as recurrence rates. Conclusions: Apart from stone removal procedures; treatment of pediatric urolithiasis requires a thorough metabolic and environmental evaluation of all patients in an individual basis. Depending on the metabolic abnormalities each child should be advised for adequate drinking which reveal to urine volume increase in accordance to body mass index and medical therapeutic agents which in turn give rise to urine citrate levels should be encouraged.

Ch-4

The role of percutaneous nephrostomy in urgent management of stone urinary obstruction in children

Mr. Fotas A., Papathanasiou A., Mprouskelis N., Charalampous S., Fatles G., Rombis V.
Ippokrateio Hospital, Urology Clinic, Thessaloniki, Greece

The aim of the presentation is to demonstrate the importance of percutaneous nephrostomy as a temporary management of the urinary obstruction, caused by lithiasis or other disorders, in children, before the final treatment. During the period 1999-2004 we performed percutaneous nephrostomy under ultrasound control in 26 children patients with urinary obstruction. All patients underwent general anaesthesia. 8 of them had lithiasis as a primary disorder. The drainage of the hydronephrosis was successful in all patients. Regarding the patients with lithiasis, 6 were treated with extra corporal shockwave lithotripsy (ESWL), 1 with ureteroscopy and in 1 patient spontaneous stone release took place. As for the rest 18 cases in 12 of them the primary disorder was managed surgically and in the rest 6, the primary disorder was resolved without surgical operation. Percutaneous nephrostomy is a safe method, less invasive, with a minimum child's exposure in irradiation or surgical operation. It is also helpful in the management of urgent problems caused by urinary obstruction itself such as electrolytic disorders or uraemia.

Ch-5

Current treatment options metamorphoses in children's urolithiasis coburg 2005

Prof. Dutov V., Trapeznikova M., Rumyantsev A.
MONIKI, Urology, Moscow, Russian Federation

Introduction of new treatment modalities essentially has cardinally changed a parity of open operations quantity and minimally invasive technologies in urolithiasis treatment. We've obtained 106 patients with urolithiasis aged from 2 till 16 years, or 8, 3% all children. Renal calculi took place in 70 children, bilateral process – in 17, staghorn stones- in 15, relapses calculi – in 6 patients. The solitary kidney stones were revealed in 5, ureter stones – in 20, bladder stones in 16 children, including 3 ones with recidive growth due to infravesical obstruction: posterior urethral valves (at 2) and artificial urethra stenosis after hypospadie repair (1). At the beginning (till 1990) the basic method of treatment was surgical approach (53 children):pyelolithotomie (24). Nephrolithotomie did not carry out even in staghorn and recidive nephrolithiasis. Ureterolithotomie was made in 8 patients. Nephroureterectomie was an operation of a choice (2) in terminal stage of refluxive megaureter with secondary kidney stones. The treatment of bladder stones in senior age group was carried out by contact cystolithotripsie (5). In younger age group (11) we've preferred cystolythotomie with a deaf seam bladder. Such tactics is justified after exception infravesical obstruction. Children with secondary stones were underwent reconstructive operations directed on restoration of outflow wet: ureteropyeloneostomie at hydronephrosis (6), ureterocystoneostomie at megaureter (7), and urethroplasty at urethra stricture (2), TUR of the posterior urethra valves (2). Introduction of new treatment modalities (1990) essentially has cardinally changed a parity of open operations quantity and minimally invasive technologies in urolithiasis treatment. Only 4 from 40 children with nephroureterolithiasis were executed for open operative intervention in this period. ESWL monotherapie (Lithostar-Plus, Siemens) was applied in 30 children with ureteral (6) and renal calculi (24), including children with staghorn (6) bilateral (2) stones. A shock waves generator voltage level from 13 up to 15 kV was sufficient for stone destruction. Due to high ureter elasticity in children even large (4-5 mm) splinters passed arbitrary, not causing urinary tract obstruction. The satisfactory results – destruction of a stone (including coral ones) and its splinters passing – were achieved received in all. The necessity in ureteral stents has arisen in 2 children. So, new treatment options can be successfully applied in all cases of pediatric urolithiasis.

Ch-6

Percutaneous nephrolithotomy in children

Prof. Martov A., Lisenok A., Ergakov D.
Institute of Urology, Endourology, Moscow, Russian Federation

Pediatric renal calculus disease has been a management dilemma in view of the concern about the effect of the various treatment modalities on the growing kidney, the significant recurrence rate and the long-term outcome. We report our experience with percutaneous nephrolithotomy (PCNL) monotherapy in large renal and staghorn calculi. We retrospectively analyzed the case records of 75 patients (male – 39, female – 36) younger than 16 years (younger than 7y.o. – 15, 7-16 y.o. – 60 children) who underwent PCNL. The stones included 44 staghorn (complete or partial) and 4 children had a stones in a solitary renal unit. The stone size varied from 42 mm to 67 mm. Original "mini-perc" PCNL was performed at 23 cases, while standard operation technique has been done in 52 patients. The patients were followed regularly every 6 months after discharge with kidney ultrasonography, intravenous urography and technetium-99m DTPA renography. Complete clearance was achieved in 66 (88%) patients. Of these, 51 required a single tract, while 15 required multiple tracts. With subsequent SWL, the clearance rate increased to 100%. We didn't detect any deterioration of a renal function with serum creatinine tests and isotope renography conducting follow-up in this group. Early complications included significant intraoperative bleeding in 3 cases, renal pelvis perforation in 5 and transient fever in 8. There was a combination of different complications in most cases. We found out "mini-perc" technique more safe than standard operation technique because there are no postoperative bleeding. All complications have been managed without open surgical intervention. During follow-up 6 patients had a recurrence of small renal stones and were successfully treated with single session shock wave lithotripsy. PCNL is a safe and effective procedure for treatment of children with renal calculi. At long-term follow-up the procedure improves renal function without renal scarring. "Mini-perc" technique is indicated in cases of PCNL in non-dilated or slightly dilated renal pelvis.

Ch-7

Minimal-invasive pcnl in children – indications and results

Dr. Liske P., Zimmermanns V., Amon O., Lahme S.
Hospital St. Trudpert, Urology, Pforzheim, Germany

Although Extracorporeal Shock Wave Lithotripsy (SWL) is the first line therapy to treat urolithiasis of upper urinary tract in children, a percutaneous procedure can be indicated in case of ESWL failure, simultaneous treatment of obstruction or large stone mass. Mini- percutaneous nephrolithotomy (MPCNL) is a miniaturised, minimally invasive procedure for percutaneous treatment of urolithiasis. This prospective study evaluates the significance of MPCNL in children. N=8 percutaneous nephrolithotomies in children (4m and 4f, mean age 8.4 yrs) were reviewed relative to stone size, stone localisation, operative duration, stone-free rate, complications and adjuvant procedures. A 12 Ch miniature neph-

roscope or 5 Ch flexible nephroskope was used. The puncture of collecting system was ultrasound guided. Ultrasound disintegration, ballistic or Holmiumlaser lithotripsy was used. Stone-free rate was verified endoscopically, radiological and by means of ultrasound examination. In total 2 staghorn calculi, 2 renal pelvic calculi, 3 lower pole stones and 1 proximal ureteral stone were treated. The average stone burden was 1.7 cm^2. Ultrasound guided puncture was successful in all cases. The mean operation time was 95 min including retrograde endoscopic procedures. Stone-free rate was 100%. In 50% of cases at least one second-look PCNL was necessary. No complications like febrile pyelonephritis, perforation or bleeding were observed. Percutaneous treatment of upper urinary calculi using miniaturised instruments can reach high success and stone free rate with minimal risk. Indications for percutaneous stone treatment in children are: SWL failure, simultaneous treatment of obstruction and staghorn calculi. The results of this study justify the use of MPCNL in individual cases in children.

Ch-8

Ureteroscopical treatment of ureterolithiasis in childhood. Our experience

Mr. Toutziaris C., Papathanasiou A., Voulgaris S., Fotas A., Salpigidis G., Robis V.
Hippokratio Hospital, Department of Urology, Thessaloniki, Greece

Purpose: To demonstrate our experience at ureteral lithotripsy in the pediatric population Between 1996-2004, 105 patients aged 1,5-13 years with urolithiasis were treated in our department. Eight of them with ureterolithiasis (5 in the lower ureter and 3 in the middle one) were treated with ureteroscopy (URS). The mean age of the patients was 7,5y (3-12 years) and one of them had bilateral ureterolothiasis which was treated at the same time. The whole procedure took place under general anesthesia. A rigid ureteroscope 8Fr and a pneumatic lithotriptor (Lithoclast AMS) was used. The mean time was 35min The procedure was possible to all patients and the ureteroscopical approach of the stone and following lithotripsy took place without major complications. There was a small difficulty to entrance the ureteral orifice but it was overcome using dilations. On the other hand, there was no problem with the ureteral width. All the patients were stone free after 3 months and no stent was placed.

URS (ureteroscopy) constitutes the golden standard for the treatment of ureteral lithiasis in children as well as in adults, as long as the narrow ureteral orifice is dilated. Pediatric ureter has good compliance and does not cause any problems to the whole procedure.

Ch-9

Combined flexible and semirigid ureterorenoscopy with laser lithotripsy for the treatment of refractory upper urinary tract stones – a paediatric case report

Dr. Ebert A., Prof. Rösch W., PD. Dr. Schafhauser W.
Klinik St. Hedwig, Division of Paediatric Urology, University of Regensburg, Regensburg, Germany

Rigid ureteroscopy and laser lithotripsy have been reported for successful treatment of ureteric calculi in children. Small calibre flexible ureteroscopes allow access to the entire collecting system, especially in anatomic variants like duplex systems. Flexible ureteroscopy and laser lithotripsy are successfully applied in adults for intrarenal, ESWL refractory calculi. Stone recurrence in childhood due to metabolic abnormalities makes minimal invasive stone treatment modalities more interesting than repeated major operations. We report the case of a 9 year old boy with hyperoxaluria, multiple bilateral, ESWL resistant stones, a duplex system on the left and bilateral stent placement. Stents were in place for 2 weeks. Calculi were collected with the flexible ureteroscope Ch 7,5 using nitinol baskets zero tip and repositioned into the renal pelvis. The basket remained in place as a guide wire and for stone fixation. The semirigid ureteroscope Ch 6 was inserted for laser lithotripsy using the frequency-doubled double-pulse Neodym:YAG (FREDDY)-laser under direct vision. After 3 operations the patient was stone free except two small residuals in excluded calyx diverticula. No intra- or postoperative complications occurred in a follow-up of 4 months. Minimal invasive stone treatment with ureteroscopy and laser lithotripsy can be extended to intrarenal stones in highly selected paediatric cases. Due to the technical demands and possible complications we found repositioning renal stones with the flexible instrument into the renal pelvis for laser fragmentation safer than in-situ laser application. High technical effort is needed for successful minimal invasive stone treatment in children.

Ch-10

Flexible ureteroscopy for pediatric renal stones: our experience

Dr. Cauda F., Squintone L., Sedigh O., Lace R., Bianchi M., Ferrando U.
"San Giovanni Battista" Hospital, Division od Urology 3, Turin, Italy

In paediatric patients with kidney stone, SWL has been the preferred first line treatment given its minimally invasive nature; nevertheless it has some drawbacks such as low stone free and high re-treatment rate, anesthesia and salvage urology procedures requirement. The refinement of miniaturized ureteroscopes and ancillary instruments has lead to the application of urology in the treatment of kidney stone in paediatric patients.

We report our experience in the treatment of renal stones in this kind of patients. We reviewed the charts of pediatric patients who underwent flexible ureteroscopy for kidney stones at our Institution, from June 2003 to December 2004. We used a flexible ureteroscopy 8 Fr (Dur 8 Elite ACMI®), introduced through a 9.5 Fr, 28 cm ureteral sheet (Flexor®). For lithotripsy we used Holmium laser with a 200µm probe for all patients. Stone fragment extraction were performed with nitinol basket 2.2Fr. An antibiotic prophylaxis was given. A 4.5 Fr double J stent was left in place for 1 month. Patient age, complications and stone free rate were evaluated. Six patients were treated; mean age was 4.4 years (range 6mo-8 years). Mean stone size was 1.5 cm (range 1-2.5 cm); one patient had a 1 cm ureteral stone associated with a kidney stone. Stone free rate at the end of the procedure was 66% (4/6 patients). In two cases minimal residual stone fragment were spontaneously expelled within six months of follow up. So, at six months of follow up stone free rate was 100%. Nor intraoperative nor postoperative complications were recorded. Ureteroscopy for the treatment of renal stones in pediatric patients has become feasible, safe and effective with the drawback of high operative times. In our experience this modality of treatment could be feasible as the first line treatment for kidney stones in this kind of patients.

Ch-11

The impact of pelvicaliceal anatomical differences as a risk factor predisposing to stone formation in patients with solitary upper caliceal stones?

Dr. Acar C., Gurocak S., Kupeli B., Alkibay T., Guneri C., Ozkan S.
Gazi University School of Medicine, Urology, Ankara, Turkey

The variations of pelvicaliceal anatomy have an impact on stone formation especially in lower caliceal stones. This suggests us that the differences of upper pole pelvicaliceal anatomy may also act on upper pole stone formation because these calices are mostly drained by a single infundibulum. In this study, our aim was to investigate the probable effect of pelvicaliceal anatomical differences on stone formation in patients with solitary upper caliceal stones. The clinical records of patients with solitary upper caliceal stone who underwent SWL between January 1996 and January 2004 were reviewed for this study. After excluding patients with hydronephrosis, major anatomic abnormalities, non-calcium stones, metabolic abnormalities, history of recurrent stone disease, multiple stones and previous renal surgery; 42 patients (24 male and 18 female) were enrolled into this study. 42 healthy individuals (22 male and 20 female) with normal intravenous pyelography (IVP) performed for lower urinary tract symptoms were accepted as the control group. Upper pole infundibulopelvic angle (IPA), infundibular length (IL) and width (IW) together with the other caliceal variables obtained from the whole pelvicaliceal anatomy of both the stone bearing and contralateral normal kidneys of the same patient and bilateral normal kidneys of healthy persons were measured from IVP . The mean age of patients with solitary upper caliceal stone and healthy individuals was 40,8±10,3 and 43,2±12,1 years, respectively. The mean stone size was 153,47 (20-896) mm^2. Among the probable pelvicaliceal anatomical variables, there was a statistical significance only in pelvicaliceal volumes between the stone bearing and the normal kidney of patients with upper caliceal stones and healthy individuals (2455,2±1380,2 and 1845,7±1454,8 mm3) (p:0,019). It has been shown that pathologic morphological parameters and abnormal urodynamic features leading to urinary stasis in the pelvicaliceal system are important factors in the formation of urinary calculi. Our results suggest that pelvicaliceal volume instead of other caliceal anatomic variables (IPA, IL, IW) may a significant risk factor for stone formation in upper calyx.

Ch-12

The impact of pelvicaliceal anatomical variation between the stone- bearing and normal contralateral kidney on stone formation in adult patients with lower caliceal stones?

Ass. Prof. Kupeli B., Tunc L., Gurocak S., Acar C., Guneri C., Ozkan S.
Gazi University School of Medicine, Urology, Ankara, Turkey

In this study, our aim was to investigate the probable effect of pelvicaliceal anatomical differences between lower caliceal stone bearing and normal contralateral kidneys on the etiology of stone formation. The records of adult patients with solitary lower caliceal stone were reviewed. After exclusion of patients with hydronephrosis, major renal anatomic anomalies, non-calcium stones, history of recurrent stone disease and previous renal surgery, 50 patients were enrolled into the study. Lower pole infundibulopelvic angle (IPA), infundibular length (IL) and width (IW) together with the other caliceal variables obtained from the whole pelvicaliceal anatomy of both the stone bearing and contralateral normal kidneys were measured from intravenous pyelography of the patients. Also, total pelvicaliceal volume was calculated by a previously described formula for both kidneys. There was a statistically significant difference between the stone bearing and contralateral normal kidneys in terms of infundibular width (p=0,029) and length (p=0,025) of the upper calyx, pelvicaliceal volume (p=0,011) and infundibulopelvic angle of middle calyx (p=0,023). There was not any difference between stone bearing and contralateral normal kidneys in terms of lower pole caliceal anatomy. These results show us that the etiology of stone formation is multifactorial and variations in pelvicaliceal volumes, middle and/or upper caliceal anatomy may play a subtle role in the beginning of nucleation process. From this point of view, lower pole seems to be the final instead of the initial stone localization during the process of stone formation.

Ch-13

Nephrolithiasis in patients with simple and parapelvic kidney cysts coburg 2005

Prof. Dutov V., Trapeznikova M., Urenkov S.
MONIKI, Urology, Moscow, Russian Federation

Indications to as well as results of modern treatment options in patients with nephrolithiasis and kidney cyst malformation remain still controversial. There're 37 (16, 9% to all anomalies) patients in our series with nephrolithiasis and homolateral simple renal cysts sized from 2, 8 cub. cm to 432, 2 cubs. cm (mean size 167, 9+-81, 2 cub. cm).

We've obtained 19 cases of stone disease in patients with parapelvic cysts (8,7% to all anomalies) sized from 1,0 to 48,4 cub cm. Stones (mean «square» was 1,53+-0,1 sq. cm) were localized in kidney pelvis (26,3%, upper or middle calyces (21,1%), lower pole (26,3%), upper ureter (15,8%) and distal ureter (10,5%). We thought, that ESWL in situ were possible in cases when simple cyst and stone were localized in the same projection with shock waves, but cyst' size weren't more than 25,0 cub. cm.

Otherwise we're of the opinion of two-step treatment. First of all under ultrasound control we made cyst puncture with contents aspiration and following injection of 96-grad. Ethanol in 1/3-3/4 primary cyst volume with 10-15 min. exposition. In cases with cysts' volume were more than 400, 0 cub. cm cyst puncture was accompanied with cyst drainage in 3-5 days. Stone disintegration was achieved after 1,65+-0,15 ESWL sessions and 1975+-195 shock waves per one procedures. We're apologies of ultrasound controlled ESWL. Kidney stone clearance was 74, 2% at discharge and 80, 6% six months later. Open surgery during last decade took place in 3, 0% cases only. ESWL was the first line of treatment in 89, 5% patients with parapelvic cysts. Cyst puncture wasn't usually necessary. Percutaneous punctures were made only in two cases with grate cyst size (more than 40, 0 cub. cm). To destroy kidney stone were made 1,7+-0,2 ESWL sessions with 1890+-110 shock waves (17,1+-0,4 kV) per one patient. Complications were developed in 35, 0% cases. Both at discharge and six months later stone-free rates were 64, 7% in whole group. Parapelvic cysts more significantly decrease the lower pole stone clearance (48,4%, p<0,01).

Ch-14

Endoscopical treatment of stones in horseshoe kidney: joined experience in 2 centres.

Dr. Cauda F., Frattini A., Squintone L., Sedigh O., Graziano M., Ferrando U.
"San Giovanni Battista" Hospital, Urology 3, Turin, Italy

The treatment of calculosis in horseshoe kidney reaches 100% stone free with the use of single or joint mininvasive approach (percutaneus, ureteroscopical or ESWL) in absence of anatomical obstruction. In presence of anatomical obstruction a surgical approach is indicated.

We evaluated our experience in treatment of horseshoe kidney with the use of percutaneus and flexible ureteroscopical treatment. in our 2 Centres we have treated 14 patients with calculosis in horseshoe kidney, 1-5 cm diameter of stones and without anatomical obstructions in the urinary tract.

We used ESWL in 4 patients, without any noticeable benefits.We use a percutaneous approach in 8 patients in face down position: 5 with standard PCNL for 2,5-4 cm stones and 3 with MIPP for <2,5 cm stones (whether rigid or flexible nephroscopy). 1 patient had bilateral stones (5 cm on the left side and 3 cm on the right side). In this patient we use PCNL face down position in the left side and PCNL supine position with flexible ureteroscopy in the right side. 4 patients had <1,5 cm stones, here we made flexible ureteroscopy alone. 1 patient underwent supine MIPP and flexible ureteroscopy. 8 patients were 100% stone free after the first treatment. The other 6 patients were submitted to ESWL: 4 patients were stone free (8 mm stones) after this treatment, 2 needed flexible ureteroscopy after treatment. Major complications were 2 great bleeding, which needed emotransfusions, and one kidney abscess, underwent to surgical conservative revision. we observed we failed when we used ureteroscopy alone, so we think that ureteroscopy alone doesn't represent gold standard approach in these patients. On the other hand, in horseshoe kidney the anatomical conformation, calyxes disposition and easy dislocation of stones, make optimal the joint approach, percutaneous with retrograde flexible ureteroscopy, in supine position. In any case flexible ureteroscopy must always be disposable in this kind of endoscopy

Ch-15

Nephrolithiasis in rare forms kidney anomalies patients

Prof. Dutov V., Trapeznikova M., Galko A., Beizerov J.
MONIKI, Urology, Moscow, Russian Federation

Diagnostic and treatment options in patients with stones and rare kidney malformations are still controversial. We' ve obtained data of nephrolithiasis in patients with the rare forms of the kidneys anomalies, such as autosomal dominant polycystic kidney disease {ADPKD), sponged medullar kidney, cracker-likeness kidney, iliac and pelvic kidney dystopies, caliceal diverticulum, kidney vessels anomalies, vesico-ureteral reflux (VUR) and infravesical obstruction (IVO), as well as bladder diverticulum or extrophy. There're 6 patients with ADPKD in our series during last ten years - 1, 8% to all patients with nephrolithiasis in anomalous kidneys (7 renal units). Supravesical obstruction was the main indication to ESWL (4) after trocar-nephrostomy 6-8 Fr under simultaneous ultrasound and roentgen control. Ureteroscopy with contact lithotripsy was an indication in case with negative calculus in distal ureter (4). Calculi in sponged medullar kidney were diagnosed in 5 (1,3%) patients (6 renal units). Indications to ESWL were due to obstruction at any urinary tract levels or persistent pain, hematuria and recurrent UTI.

There're only 2 (1, 0%) patients with calculi in caliceal diverticulum. Modern technologies in such situations we thought weren't non-invasive. So, indications to its applications are similar to the above patient' group.

We're obtained one of the casuistic cases of the renal anomalies – cracker-likeness kidney, when two renal rudiments were growing together by its middle portions just in renal hylus. Peculiarity of ESWL was due to deep stone localization, anterior pelvis orientation and anatomic topography.

Nephrolithiasis of the iliac (1; 0, 5%) and pelvis (2; 1, 0%) renal dystopies were able to treat only by ESWL with low energy regimes and throughout an abdomen access and under ultrasound control. Nephrolithiasis in cases of renal vessels anomalies – artery aneurysm (1; 0, 5%) and fibromuscular stenosis (1; 0, 5%) – were successfully treated by ESWL We've obtained data on 8 (3, 6%) patients with stone disease in association with VUR (5; 2, 3%) and IVO (3; 1, 3%). Stone removal by ESWL or PCNL was the first step and antireflux operation – the second one. The best treatment results of urolithiasis in association with bladder diverticulum or extrophy (2; 1, 0%) were achieved by combined ESWL and PCNL.

Author index