

Health related quality of life in ureteral stone patients: post-ureterolithiasis

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Received: 22 December 2010 / Accepted: 21 March 2011 / Published online: 3 April 2011
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Abstract Ureteral stones disease is among the most painful and prevalent among urologic disorders that can substantially impact health-related quality of life (HRQoL), particularly in patients with a history of recurrent stones. The aim of the study is to assess the QoL in patients with ureteral calculi after surgical intervention and identifying the most significant factors that could impact their QoL. The target population included two groups: post-lithotripsy patients and comparator group comprising healthy individuals selected from the general population. Both groups were matched for age and gender. The study continued through a period of 9 months. An observation period of 4–10 months following the last surgical intervention was applied before interviewing patients. Information regarding socio-demographics, medical data and presence of co-morbidities were recorded. The Medical Outcome Study Short-Form 36-item survey (SF-36) was used to assess HRQoL for both groups. Based on the SF-36 questionnaire, there were no significant differences between patients and healthy volunteers in the mean scores for eight of the

HRQoL domains, except for pain and social functioning subscales. Patient's age, distal ureteral stones and ureteral stent, in addition to DM and low back pain appeared to significantly affect the HRQoL of patients. In conclusion, the promising end point in the management of urolithiasis is improvement of HRQoL. The results of the current study support the notion that urinary stone disease is not a life threatening disease and patients can return to normal life after surgical intervention. Prospective studies are warranted for elucidating the factors influencing HRQoL in ureteral stone patients to optimize patient care.

Keywords Ureteral stones · Quality of life · Ureterolithiasis

Background

The prevalence of urinary calculi is estimated to be 1–5% worldwide. It is the third most commonly encountered cases in urology clinics after urinary tract infection and prostate diseases [1–4]. Not only it is one of the most costly urological diseases in terms of treatment, but also has a high recurrence rate of approximately 50%, which has a negative impact on the quality of life of the patient and in turn on the health care system [5, 6]. Ureteral stone is among the most painful and prevalent among urologic disorders. The figures are increasing in both developed and developing countries due to environmental and dietary changes [7].

Quality of life (QoL) is an estimate of leading a life free of impairment, disability or handicap [7]. The concept of health-related QoL (HRQoL) is multidimensional and includes psychosocial, physical and emotional status as well as patient autonomy, and is applicable to a wide

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variety of medical conditions [8]. Patients with urinary stones represent an ideal group for the investigation of HRQoL, considering features of this disease such as its high prevalence, peak incidence in a socially active population, severe symptoms and high recurrence rate. The present study was aimed at assessing the QoL in patients with ureteral calculi after intervention and identifying the most significant factors that could impact their QoL.

Subjects and methods

Ureteral stone patients were identified through the survey conducted in the main university hospital in Riyadh, Saudi Arabia, during a period of 9 months (January–September 2009). All patients admitted to the urology department who underwent surgical removal of ureteral stones during the period of study were included. One hundred and thirty-three patients were invited to participate. The target population included two groups: post-lithotripsy patients and comparator group comprising healthy individuals selected from the general population or from the relatives accompanying patients at different outpatient clinics, for each patient two health controls were selected matched for age and gender. We included this comparator group because of the absence of population norms in the local community. An observation period of 4–10 months following the last surgical intervention was applied before interviewing the patients. All patients were interviewed in person by trained interviewers when they visited the hospital for follow-up examination. Information regarding socio-demographics, medical data and the presence of comorbidities, including, diabetes mellitus (DM), hypertension, gout and back pain, were recorded. Data concerning number and type of lithotripsies and history of recurrent stones were retrieved from the records. The Medical Outcome Study Short-Form 36-item survey (SF-36) [10] was used to assess HRQoL for both groups. This questionnaire consists of 36 self-administered questions that quantify HRQoL using eight multi-item scales, each evaluating a different domain of HRQoL: physical function (PF), role limitations because of physical health problems (RP), bodily pain (BP), general health perception (GH), vitality (VT), social function (SF), role limitations because of emotional problems (RE), and mental health (MH). Subscale scores are calculated according to standard procedures, yielding score values between 0 and 100 such that higher scores indicate a better quality of life. Persons in the comparator group, who suffered from a renal disease, experienced stone formation or any other major disease that could affect his QoL, were excluded from the study. The study was approved by the Institutional review board of the designated hospital.

Statistical analysis

The mean and standard deviation were calculated for the SF-36 scores and subscores in the study population. Data analysis was divided into two parts: first, SF-36 subscale scores for the participants were compared between the two study groups using multivariate analysis of variance (MANOVA). MANOVA was used also to explore the impact of different socio-demographic, medical and other related factors on the QoL of the patients in the second part of analysis. The final model included all variables that could affect QoL of stone former patients, post-recovery. The alpha level for MANOVA test was set at 0.05. Significant statistics ($p < 0.05$) were followed by post hoc analyses to determine which subscales were showing group differences, and which specific groups were significantly different from one another.

Results

Out of the total of 330 subjects, 110 were patients who had undergone urinary stone fragmentation and 220 were healthy volunteers. Twenty-three stone patients were excluded because they either refused to participate in the study or they did not report to the hospital for follow-up. The observation period of recovery after the last lithotripsy ranged from 4 to 10 months with a mean of 7.23 ± 2.1 months. The patients' age ranged from 19 to 80 years (41.45 ± 10.80), two-thirds (66.4%) were males, the percentage of DM (type 2), hypertension, gout and low back pain among them was 6.4, 4.5, 9.1 and 19.1%, respectively.

Health related quality of life: SF36 profile

Based on the SF-36 questionnaire, there were no significant differences between patients and healthy volunteers in the mean scores for eight of the HRQoL domains, except for pain and social functioning subscales (Table 1). For the latter two domains, the mean scores for post-ureteral stone fragmentation patients were significantly impaired. The overall test statistic was significant ($p < 0.001$) for the eight subscale scores, indicating that there was a correlation between group membership (ureteral stone patients or comparator group) and HRQoL.

The impact of socio-demographics, co-morbidities and other related clinical variables on HRQoL of patients is shown in Table 2. Patient's age, distal ureteral stones and ureteral stent appeared to significantly affect the HRQoL of patients. Similarly, DM (type 2) and lower back pain were also found to have a significant impact on HRQoL, while other co-morbidities had no influence on patients' QoL.

Table 1 Comparison of SF-36 subscales between ureteral stone cases ($N = 110$) and healthy volunteer controls ($N = 220$)

SF-36 Subscale	Group	Mean	SD	<i>F</i> statistic	<i>P</i> value
Physical functioning (PF)	Ureteral stone cases	44.18	11.80	3.87	0.05
	Comparator group	42.15	12.56		
Role physical (RP)	Ureteral stone cases	43.91	9.94	0.88	0.34
	Comparator group	45.02	10.57		
Bodily pain (BP)	Ureteral stone cases	44.96	8.97	20.1	0.00
	Comparator group	49.80	9.81		
General health (GH)	Ureteral stone cases	47.72	9.59	2.17	0.14
	Comparator group	49.28	9.33		
Vitality (VT)	Ureteral stone cases	54.95	11.43	1.4	0.23
	Comparator group	53.55	9.61		
Social functioning (SF)	Ureteral stone cases	41.62	10.31	5.37	0.02
	Comparator group	44.42	10.86		
Role emotional (RE)	Ureteral stone cases	41.39	12.43	0.15	0.69
	Comparator group	41.94	12.74		
Mental health (MH)	Ureteral stone cases	47.90	11.99	3.17	0.07
	Comparator group	45.65	10.91		

Table 2 Factor affecting HRQOL of ureterolithiasis patients: MANOVA general *F* test

Factor	<i>F</i> statistic	<i>P</i> value	Partial eta squared
Age	3.25	0.01	0.09
Sex	0.86	0.55	–
Distal ureteral stone	3.60	0.00	–
Presence of stent	2.86	0.03	0.11
Hypertension	0.32	0.93	–
Obesity	2.1	0.13	–
DM (type 2)	3.67	0.001	0.13
Recurrent stone (multiple procedures)	0.23	0.78	–
Gout	1.2	0.41	–
Back pain	3.98	0.04	–

scores. Eta square describes the proportion of total variability attributable to each factor.

Discussion

Stone diseases can substantially impact HRQoL, particularly in patients with a history of recurrent stones who are at a risk of requiring repeated surgical procedures, consultation visits, hospitalization and days lost from daily work. Although there is ample literature describing QoL in patients with other urologic disorders, a few studies have assessed QoL in stone patients after a surgical intervention, despite the documented high rate of life-time recurrence. The present study revealed that there was no significant difference in the mean scores of six of the eight HRQoL

subscales between patients with ureteral stones and the comparator group of healthy volunteers. However, the mean scores for social functioning and pain subscales were significantly impaired. Kurahashi et al. [11] have reported similar results, except for pain subscale. These authors concluded that urinary stone is not a life-threatening disease and if properly treated, the HRQoL of patients undergoing stone fragmentation compared with health controls is not seriously impaired particularly after recovery from urinary stones, when patients are likely to have a positive view of life. On the other hand, we have earlier reported [12] a significant improvement in HRQoL subscales in patients when compared with healthy controls. In that study, such an improvement was ascribed to response shift, an accommodation process that involves modifying internal standards and values [13.] The latter study reported also a significant impairment in the scores of pain subscale. Ureteral stones are usually stones from the kidney that have moved into the ureter. The pain is caused by the stone passing down the ureter and is so severe and the patient becomes very restless and uncomfortable [7]. Patients presenting with pain are more likely to have stones located in the ureter [14].

Patient's age, the presence of stone in the distal part of the ureter, stent, together with DM and low back pain were found to significantly influence the HRQoL of ureteral stone patients in the present study. Bensalah et al. [15] detected various factors that impact QoL in patients with urolithiasis, the most important of them being body mass index, age and the number of surgical procedures. Ureteral stents are commonly associated with significant discomfort and have been shown to alter QoL, the urinary symptoms and pain associated with indwelling ureteral stents interfere with daily activities and result in

reduced QoL in up to 80% of patients. In addition, stents are associated with negative function capacity and reduced utility values [16–18].

The distal part of the ureter (the last 2 cm) is located in the bladder wall. The irritation caused by the stone in the bladder wall causes urinary urgency, dysuria and frequent urination which disturb the patient, causing irritability and anxiety. As the stone passes the proximal ureter distally, it is commonly associated with sharp intermittent pain radiating along the inguinal canal into the corresponding groin and genitals. Moreover, the distal part of the ureter being narrower, the stone stays there for a longer time, aggravating the discomfort symptoms.

An interesting finding in our study is the non-significant effect of multiple surgical procedures or repeated session on patients' QoL, which was in accordance with the results of Kristina et al. [19]. On the other hand, this factor was associated with negative impact on HRQoL in many other studies [12, 15, 20].

A number of confounding variables that contribute to stone formation themselves influence QoL, such as DM, hypertension, gout, lower back pain and other metabolic abnormalities associated with stone diseases. A failure to integrate these factors into the analyses could yield misleading results. Among these factors, DM and back pain were found to significantly impact patients' HRQoL in the present study. Other studies have revealed a significant impact of other co-morbid conditions [19, 20].

The promising end point in the management of urolithiasis is improvement of HRQoL. The results of the current study suggest that after stone fragmentation ureteral stone formers have a favorable HRQoL comparable to healthy individuals, which supports the notion that urinary stone disease is not a life-threatening disease and patients can return to normal life after surgical intervention. Stent and presence of stone in the distal ureter appeared to be among the most significant factors that influence patients' QoL and this has important implications for clinical practice, surgical intervention and future stent research. Further prospective studies are warranted to elucidate the determinants of QoL and to optimize patient care.

The potential limitations of the present include the following. First, the follow-up period was probably not long enough. In addition, being a cross-sectional, retrospective study, we could not evaluate the baseline HRQoL before stone development. Third, stressful life events that could influence the HRQoL and negatively impact the participants' perception of their own health status were not assessed. Lastly, Saudi Arabian population norms are not available which limited the calculation of summary composite scores.

Acknowledgments This work was funded by Princess Al Johara Al Ibrahim for Cancer Research, Prostate Cancer Research Unity, Saudi Arabia. We thank Dr. Anuradha Alahari for copy editing the manuscript.

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