

plan generally overestimated minimal dose delivered to the target volume and underestimated maximal doses to the rectum and bladder. However in most cases brachytherapy is evaluated using orthogonal X-rays, qualitative assessment of 2D dose distributions, tumour and normal-tissue reference points, rather than dose volume information of the target or critical organs. We conducted a prospective study of CT-based volumetric dosimetry in 25 patients and compared with conventional 2D plan.

Materials and Method: The study was from August 2006-July 2009; HDR Brachytherapy was delivered after 45–50 Gy of external beam radiotherapy with weekly concomitant cisplatin delivering 7 Gy /week, 2 applications. Optimized Conventional orthogonal x-ray based plan (2D plan) were generated with dose prescribed to point A and transferred to CT images. CTV Coverage and actual doses received by 2 cm³ of rectum (DRV2), 5 cm³ of rectum (DRV5), 2 cm³ of bladder (DBV2), 5 cm³ of bladder (DBV5) and 2 cm³ of sigmoid colon (DSCV2), 5 cm³ of sigmoid colon (DSCV5) receiving the highest dose were determined from DVH and compared with dose received by bladder and rectal points obtained from 2D plan. Second part of study, CTV plan was generated to enclose the CTV with the 100% isodose line. Graphic optimization was used. The dose volume parameters Coverage index (CI), External volume index (EI), The Conformal index (COIN) were calculated from the DVH of the 2D and CTV plans. Statistical analysis was done with paired t test.

Results: Part1: Mean dose to B1 was 530±15.5 cGy. Actual doses to DBV2 & DBV5 were 1.75 & 1.42 times ≥B1 (P=0.0001). Mean R1 was 442.3±10.6 cGy, actual dose to DRV2 was 1.04 and to DBV5 was 0.86 times that of R1 (P=0.3976 for DRV2; P=0.0006 for DRV5). Mean DSCV2 was 506±10.3 cGy and DSCV5 was 407.9±10.1 cGy. Actual doses to DSCV2 & DSCV5 were 1.14 & 0.86 times that of R1 resp (P=0.0001 & 0.0126). Mean CI for 2D was 81±1.3 cGy and for CTV plan was 88±0.9 cGy (P=0.0001). Mean EI for 2D was 0.99±0.09 cGy and for CTV plan was 0.53±0.04 cGy (P=0.0001).

Part 2: Mean of DBV2 was 932.4±43.8 cGy in 2D and 750.5±17.7 cGy in CTV plan. DBV5 52±16.1 cGy in 2D, 614.4±15.3 cGy in CTV plan (P=0.0001). Mean DRV2 was 458.4±14.1 cGy in 2D, 437.4±15.8 cGy in CTV plan; mean DRV5 was 381.2±11.3 cGy in 2D and 359.3±13 cGy in CTV plan (P=0.0283 & 0.0034 resp). Mean DSCV2 was 488.1±16.7 cGy in 2D and 750.5±17.7 cGy in CTV plan; mean DSCV5 was 401.99±13.64 cGy in 2D and 750.51±17.70 cGy in CTV plan (P=0.0219 & 0.0221 resp).

Conclusion: ICRU rectal point dose may be a reasonable surrogate for the DRV2 but ICRU bladder point dose does not appear to be a surrogate for the DBV2. Sigmoid colon receives much higher dose than ICRU rectal point dose estimated in 2D plan. CTV coverage was superior in CTV plan, with lesser volume of normal tissue outside CTV receiving high doses indicating better tumour control probability with lesser side effects.

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POSTER

Internal Margins (IM) for Vaginal Vault in Postoperative Gynecological Malignancies – a Study of Eight Patients Using Daily CBCTs

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Background: The purpose of this study is to define the internal margin (IM) to account for organ motion in antero-posterior directions, in posthysterectomy gynaecological malignancies, after correction for set-up errors.

Material and Methods: Planning CT scans with barium marker at vaginal vault were taken for all patients after proper immobilization and under bladder filling protocol. Cone beam CT scans were taken before radiation and patients were aligned online according to bony anatomy. These shifts were used to compute Planning Target Volume (PTV) using Marcel Van Herk's formula. Then an offline analysis was done to compute Internal Margin (IM) in pertinent antero-posterior directions (anterior for bladder and posterior for rectum) to see the impact of organ motion on vaginal vault.

Results: Average anterior IM required for the whole study group due to bladder filling at a predetermined point was 0.55 cm. The maximum and standard deviation of this motion were 3.8 cm and 0.80 cm, respectively (Mean+2SD in anterior direction is 2.15 cm). Average posterior IM of the study group due to rectal filling at a predetermined point was 0.34 cm. The maximum and standard deviation of this motion were 2.1 cm and 0.44 cm, respectively (Mean+ 2SD in posterior direction is 1.22 cm). The PTV to account for set up errors as determined by bony anatomy was 0.63 cm laterally, 0.76 cm vertically and 0.94 cm in longitudinal direction.

Conclusions: Vaginal vault is a mobile organ in postoperative gynaecological patients and its position changes due to rectal and bladder filling. Internal margins (IM) required in antero-posterior directions can be very high and anisotropic. Further studies highlighting the issues of anisotropic

Internal Margins and individualization of PTVs might be a good idea. The process of individualization of PTVs remains a topic of further research.

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POSTER

Radiotherapy for Elderly Patients With Cervical Cancer

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Background: In Japan, the elderly population has been rapidly expanding. With an increasingly aging society, the number of elderly patients with various malignancies continues to increase. For cervical cancer, the most commonly afflicted age group is women in their late 30s to early 40s. However, incidence of cervical cancer increases again after age 70 and the mortality rate increases with age. Treatment modality for elderly patients with cervical cancer should be chosen carefully considering their concurrent medical problems and preservation of organ function and quality of life. Radiotherapy (RT) seems to be a less-invasive treatment modality and therefore RT is usually chosen for elderly patients. In this study, we retrospectively evaluated the preliminary survival outcomes and treatment-related for elderly patients with cervical cancer.

Methods and Materials: Between 2000 and 2009, 40 patients with cervical cancer aged 75 years old or older were treated with RT at our institution. Twenty-five patients were classified as FIGO stage I or II and 15 as stage III or IVA. Thirty-five patients were treated with radical RT (RRT), and 5 were treated with surgery plus adjuvant RT (S + ART). Among 35 patients of RRT group, 31 were treated with External beam radiotherapy (EBRT) combined with high-dose-rate intracavitary brachytherapy (HDR-ICBT), 3 were treated with received EBRT alone, and 1 were treated with HDR-ICBT alone. Among 5 patients of S + ART group, 2 were treated with EBRT combined with HDR-ICBT because of their positive vaginal surgical margins, and remaining 3 were treated with EBRT alone. The patients' median age was 78 years (range 75–89 years). Median total doses of EBRT and HDR-ICBT were 50.4 Gy (Range: 16.2–61.2 Gy) and 20.0 Gy (Range: 4.5–31.0 Gy), respectively. Concurrent chemotherapy (CCT) using a platinum-based regimen was performed on 5 patients (RRT: 3, S + ART: 2).

Results: Median follow up period was 20 months (Range: 1–85). Only 1 patient could not complete RT. Seven patients experienced recurrence: 4 locally, 1 in the para-aortic lymph nodes, 1 distantly, and 1 with only tumour marker (SCC Antigen) elevation. Nine patients died during the follow up period. Five patients died because of the primary disease and 4 died from other causes. The 3-year overall and disease-specific survival (OS and DSS) rates of all patients were 58% and 80%, respectively. Five patients experienced Grade 3 acute toxicity; 2 were treated with RRT (2/35), and 3 were treated with S + ART (3/5, 2 of them with CCT). Two patients experienced Grade 3 late toxicity; one was treated with RRT (1/35, with CCT) and the other was treated with S + ART (1/5). No Grade 4 or higher toxicity was experienced.

Conclusion: The number of elderly patients with cervical cancer is increasing, and RRT (EBRT combined with HDR-ICBT) provides good survival outcomes with acceptable toxicity. However, indications for the use of more aggressive modalities (RRT with CCT, S + RT with or without CCT) should be assessed carefully, even for patients who are in quite good health.

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POSTER

Radiotherapy Treatment in the Multidisciplinary Management of Endometrial Carcinomas: Institutional Experience and Results

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Introduction: Radiotherapy has a key role in the treatment of endometrial carcinomas as adjuvant to surgery as well as radical option in more advanced tumours. Therapy programs are based on FIGO tumour stage and volume, grade, lymphovascular infiltration and involvement of lower uterine segment.

Objective: To report the results and pattern of recurrence with multidisciplinary treatment for endometrial carcinomas in our Center in last 10 years. **Patients and Methods:** Records of 223 pts with histologically confirmed endometrial carcinomas treated between 4/2000 and 9/2010 have been reviewed. Clinical-pathological characteristics: median age 64 years (range 33–89 y), 199 cases were adenocarcinomas, 11 carcinosarcomas and 13 other histologies; histology grade I was in 66 tumours (30%), II in 108

(49%), III in 46 (20%) and unknown in 3. 144 pts were FIGO stage I (22%), 49 in II (22%), III in 25 and stage IV in 5 (2%). Treatments were done with Surgery (TH/BSO) plus radiotherapy (RT) EBRT/brachytherapy in 174 pts (78%), Surgery+EBRT in 16 pts (7%), EBRT/brachytherapy in 26 pts (12%) and EBRT in 7 pts (3%). In 93 pts completed surgical staging with pelvic and para-aortic lymphadenectomy was performed. EBRT pelvic doses were already 45 Gy with multiple conformed fields based on CT treatment planning and brachytherapy 450 cGy x 4 sessions.

Results: With a median follow-up of 78 months (range 6–136 m), the actuarial overall survival of the complete cohort of pts was 56 months and 71.3% are alive and free of disease, 142 pts (75%) in the group treated with surgery and RT and 17 with RT alone (52%); there were 10 loco-regional relapses (4.5%), 3 in the group treated with surgery and 7 with RT alone, with complete loco-regional control of disease in 188 pts (84%). Prognostic factor as stage, histology, tumour grade and treatments/lymphadenectomy will be analyzed. Toxicities according RTOG system were mainly grade I-II.

Conclusions: In our experience, radiotherapy treatment of endometrial carcinomas offers an excellent local control of disease with satisfactory overall survival with multidisciplinary management. New RT treatment approaches are warranted for advanced disease with increasing doses in combination with other systemic modalities and special surveillance for stage IC.

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POSTER

Identifying Late Side Effects of Pelvic Radiotherapy in Gynaecological Cancers – Experience From a Single Centre in Improving Survivorship From Pelvic Radiation Damage

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Background: In the pursuit of curing gynaecological malignancies with pelvic radiotherapy and brachytherapy, the effects of late bladder and bowel toxicity can have a significant impact on patients long term quality of life.

Method: A retrospective study was undertaken at our centre with the aim of identifying how many patients had developed new and/or persistent changes in their bladder and bowel habits after pelvic radiotherapy. A questionnaire was developed to identify late changes in bowel and bladder function. If patients answered yes to any of the symptoms, they were then asked how frequent this was. The level of frequency was coded as follows: 0 = never; 1 = less than monthly; 2 = more than weekly to monthly; 3 = every few days to weekly; 4 = daily (at least once a day or more); 5 = constantly. The questionnaire was sent to 109 patients who had completed pelvic radiotherapy with a minimum of 12 months follow up from treatment. Patients who had pre-existing bowel/bladder symptoms were excluded.

Results: 71% (77/109) of patients sent the questionnaire responded. The primary cancers treated were endometrium 57% (44/77), cervix 38% (29/77) and vulva 5% (4/77). 16% (12/77) had no problems after treatment. Of the 84% (65/77) of patients who had experienced changes in their bowel and/or bladder function, this varied from mild effects (e.g. two episodes of cystitis only) to more severe effects (e.g. opening bowels more than ten times in 24 hours). The frequency of patients suffering level 3–5 bowel symptoms was as follows: change in bowel habit 82% (63/77); pain/discomfort 77% (59/77); diarrhoea 60% (46/77); faecal incontinence 51% (39/77); mucus, sticky or slimy faeces 44% (34/77); rectal bleeding 8% (6/77). One patient has been treated for malabsorption. The frequency of level 3–5 bladder symptoms was as follows: urgency 84% (65/77); pain on micturition 78% (60/77); incontinence 50% (39/77) (5/39 wearing pads); recurrent infection 32% (25/77); haematuria 25% (19/77). Four patients had stomas (one colostomy, one urostomy and two had both).

Conclusion: This study has many limitations but recognizes that there is a significant number of patients suffering from late bladder and/or bowel toxicity which is under reported. Unfortunately, many patients have accepted these side effects as inevitable consequences of their cancer treatment. Many of these symptoms are treatable. More focus during follow up is required to pick up and treat these symptoms. The above results have led us to improve our service in pelvic radiation damage management. A multi-disciplinary team approach led by clinical nurse specialists, involving oncologists, gastro-enterologists and urologists has been developed. Managing lymphoedema and sexual dysfunction have also been incorporated. This service development is being prospectively audited. This study highlights the need to adopt a more focused approach on improving the quality of life and survivorship of patients cured from gynaecological cancers.

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POSTER

Comparison of FIGO 1988 and 2008 Classifications For Endometrial Carcinoma

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Background: The objective of this study was to compare FIGO 1988 and 2008 endometrial carcinoma classifications in terms of patient distribution and efficacy in predicting prognosis in patients receiving postoperative radiotherapy (RT).

Material and Methods: Medical records of 351 patients treated between 1994 and 2009 were analyzed. The majority of patients had TAH and BSO and routine lymphadenectomy. Radiotherapy was as vaginal cuff brachytherapy in intermediate risk and risk adapted external beam radiotherapy in high risk patients.

Results: Median follow-up time was 55 months (2.5–133 months). Five year overall (OS) and disease free survival (DFS) for the whole group was 83% and 88%, respectively. Stage migration was observed in 188 (54%) patients. Stage migration did not cause any detrimental effect in OS and DFS except patients who were staged as stage I in 2008 and Stage IIIA in 1988 systems. Stage I patients with positive peritoneal cytology in 2008 system showed 75% 5 year OS and DFS rates which is significantly lower than the other patients with stage I disease. In addition, the survival curves were overlapping for stage IA, IB and II in the new staging. However division of stage IIIC as IIIC1 and IIIC2 significantly affects the prognosis. Patients with stage IIIC2 tumour had 40% OS and 48% DFS rates compared to 69% and 66% in Stage IIIC1 patients (p=0.002).

Conclusions: The major improvement of FIGO 2008 is the subclassification of stage IIIC disease into IIIC1 and IIIC2. The positivity of peritoneal cytology per se seems to have an influence in prognosis in our patients.

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POSTER

Prognostic Significance of Human Papillomavirus DNA Finding in Primary Cervical Cancer and Pelvic Lymph Nodes in Cervical Cancer Patients

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Background: Human papillomavirus (HPV) is a crucial etiological factor for cervical cancer (CC) development. Clinical significance of the presence of HPV DNA in the primary tumour and in regional lymph nodes of CC patients is still under discussion. Though the revelation of HPV DNA in non-metastatic lymph nodes can be the early sign of subclinical metastatic regional spread and can be used as a genetic marker of prognosis.

Aims of study: The aims of this study were to evaluate the presence and viral load of HPV DNA in tumour and in regional lymph nodes and their prognostic value in CC patients.

Materials and Methods: 98 patients with invasive CC underwent radical hysterectomy and pelvic lymphadenectomy for stage Ia-Ib (FIGO) cervical cancer at N.N. Petrov Institute of oncology from 2000 to 2007 were included in this survey. A parallel histological evaluation and HPV status determination by polymerase chain reaction (PCR) were carried out in biopsies from the primary tumours and the regional lymph nodes. Cervical tissues of CC were analyzed for HPV DNA presence and viral load by HPV typing and quantification by real-time polymerase chain reaction. These results were compared with well-defined clinicopathological parameters and survival data. Statistical analyses were performed using SPSS. Inferential statistics used for tabular data included Fisher's exact tests, Pearson 2, odds ratios with 95% confidence intervals. All P-values were two-sided. Statistical significance was ascribed to P-values 0.05.

Results: Oncogenic types of HPV in primary tumour were detected in 86 from 98 (87.8%) CC patients. HPV 16 type were found in 82.56% cases, 33 type in 31.37%, 18 type in 24.42% cases. 31? 45 and 58 types were found rarely – in 10.47% for every. In 65 from 98 cases (75.58%) there were detected DNA of several types HPV. HPV presence in iliac lymph nodes was found in 33 from 98 patients. There were no lymph nodes with more than one HPV DNA type. Metastatic lesion of pelvic lymph nodes was found more often patients with HPV one type and low viral load (p < 0.05). The correlation between positive HPV DNA test in the lymph nodes and lymph node metastasis was highly significant