be partially attributable to the inclusion of patients with adenoscamous histology in the AC group, which is associated with worse prognosis. A multicentric prospective trial including solely AC histology is needed for better management of this entity.

8015 POSTER

Phase I Clinical Trial of S-1, Cisplatin and Concurrent Radiotherapy for Primary Cervical Cancer

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Background: Cisplatin based chemotherapy plus concurrent radiotherapy is widely used as the standard therapy for women with cervical cancer. S-1 is an oral fluoropyrimidine. A phase II study of S-1 monotherapy for recurrent or metastatic cervical cancer have been shown to be active against cervical cancer. S-1 has been also revealed to act as a radiosensitiser in preclinical models. A phase II study was conducted for locally advanced non-small cell lung cancer, and high response rates and tolerability were shown. In this study, we evaluated the maximum-tolerated dose (MTD) according to escalating dosage of S-1 in combination with a fixed dose of cisplatin and concurrent radiotherapy to patients with cervical cancer.
Materials and Methods: Eligible patients were 20−74 years old, had FIGO stage Ib − IVa cervical cancer, a performance status of 0−2, and no prior therapy. Patients were treated with cisplatin (50 mg/m^2) on day 1 and S-1 (twice daily) on day 1−14 repeated every 4 weeks for two cycles. The S-1 starting dose was 60 mg/m^2/day (level 1), and the dose was escalated to 80 mg/m^2/day (level 2) as the results of adverse events. Radiation therapy was consisted of both external radiation therapy and high-dose-rate intracavitary brachytherapy.
Results: Level 1 and 2 were studied with six patients enrolled, respectively. One patient in level 1 developed grade3 venous thrombosis. In level 2, two patients developed grade 3 hypoalbuminemia (one patient also had grade 3 venous thrombosis), and one patient experienced febrile neutropenia remained for eleven days. The adverse events of those four patients were predetermined dose-limiting toxicities in this study. Level 1 was determined as the MTD and recommend dose (RD). Eleven patients were evaluable for response: eight complete responses and three partial responses were obtained. Ten of eleven patients remained disease-free following treatment.
Conclusions: The use of S-1 with concurrent cisplatin and radiotherapy has acceptable toxicity and could be an active treatment for cervical cancer. This study is the first report of S-1 based chemotherapy and concurrent whole pelvic radiation in the world. We have started phase II study at the RD to evaluate the efficacy of this regimen.

8016 POSTER

Radiotherapy in Cervical Cancer With Positive Para-aortic Lymph Nodes

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Background: The survival outcome of patients with carcinoma of the cervix and positive para-aortic lymph nodes is poor. Retrospective studies of these patients have demonstrated a 5-year survival of about 30%. Treatment failures occur in the pelvis, the para-aortic region, and at distant metastatic sites. The purpose of this study was to evaluate the response to treatments, acute and late toxicity of treatments to cervical cancer patients with positive para-aortic lymph nodes in our department.
Material and Methods: Between 2003 and 2010, we selected patients diagnosed with cervical cancer and para-aortic disease extension treated with extended field radiotherapy (RT) in our department. Response to treatment was evaluated by imaging control and/or cervicovaginal cytology. Toxicities were evaluated accordingly *RTOG Toxicity Criteria*.
Results: Fifty-six patients were eligible, with clinical Stages between IB1 and IVA (FIGO). Median age was 50 years. Thirteen patients had biopsy-proven para-aortic lymph node, remaining patients had clinically imaging positive nodes. Most of the patients (92%) had squamous-cell carcinoma as histologic diagnosis. One (1.7%) patient had surgery before RT, twenty-one (38%) were treated with chemoradiation (cisplatin 40 mg/m^2 i.v. weekly in the first 6 weeks of RT). Twelve (21%) patients had external beam RT with low-dose-rate intracavitary brachytherapy. Ten (18%) patients received radiation treatment with intensity modulated radiotherapy (IMRT). All patients received a median dose of 45 Gy to the pelvis and para-aortic lymph nodes (1.8 Gy/Fr, at 15 or 18MV). We reported acute nausea and vomiting toxicity of at least grade 2 in 35% of patients, and bowel toxicity of at least grade 3 in 30% of patients. Acute toxicity was less reported in patients treated with IMRT, with no grade 3 bowel toxicity. The median duration of follow-up was 13.8 months. Late toxicity of large bowel and rectum of at least grade3 was reported in eight patients, and ureters complication in 4 patients. Nineteen patients (34%) had distant failure (ten patients had supra-clavicular node metastasis) during follow-up, and ten (18%) of patients with local recurrence failure.
Conclusions: Local and distant recurrences remain a problem in patients with para-aortic positive lymph nodes. IMRT provided treatments with less toxicity to surrounding structures. Nevertheless, long term follow-up and studies involving more patients with IMRT are needed to evaluate its respective clinical outcomes.

8017 POSTER

Distribution Patterns of Metastatic Pelvic Lymph Nodes Assessed by CT/MRI in Patients With Uterine Cervical Cancer

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Background: To investigate distribution patterns of metastatic lymph nodes on pretreatment CT/MRI images of patients with locally advanced cervical cancer.
Materials and Methods: We enrolled 114 patients with uterine cervical cancer who were diagnosed with pelvic node metastases by CT/MRI ($\geqslant$10 mm in shortest diameter). Pretreatment CT/MRI data were collected at 6 institutions. The FIGO stage was IB1 in 2 patients (2%), IB2 in 6 (5%), IIA in 3 (3%), IIB in 49 (43%), IIIB in 50 (44%), and IVA in 4 (4%) patients. The median cervical tumour diameter assessed by T2-weighted MRI was 55 mm (range, 10−87 mm). The anatomical distribution of the nodes was allocated on CT/MRI images by two radiation oncologists and one diagnostic radiologist.
Results: 272 enlarged nodes were assessed as significant and judged as metastatic. The incidence of metastatic nodes according to nodal region was 104/114 (91%) for the obturator (OB), 31/114 (27%) for the external iliac (EI), 16/114 (14%) for the internal iliac (II), 22/114 (19%) for the common iliac (CI), and 6/114 (5%) for the presacral (PS) region. The EI region was subdivided into four categories: lateral, intermediate, medial, and lower. The OB and II regions were subdivided into two categories: upper and lower. The incidence of metastatic nodes was extremely high in both the upper OB region and the medial EI region (111/114). In contrast, the incidence was low in the lateral EI, lower EI, lower OB, lower II and PS regions. All cases with metastatic nodes in the II, CI, PS, lateral EI, and lower OB regions had metastatic nodes in other pelvic nodal regions concomitantly. Lymph node metastases in these regions were significantly related to FIGO stage ($p = 0.017$) and number of metastatic lymph nodes ($p < 0.0001$). Metastases to these regions did not appear in cases with lower FIGO stage disease and a smaller number of metastatic lymph nodes.
Conclusions: We demonstrated distribution patterns of pelvic node metastases on pretreatment CT/MRI images of patients with locally advanced cervical cancer. Individualization of the pelvic node clinical target volume (CTV) based on such findings should be encouraged for external beam radiotherapy in patients with cervical cancer.

8018 POSTER

Prospective Study on Comparision Between 3D CT Based Volumetric Planning With Conventional Planning Using Orthogonal X-rays, in HDR Brachytherapy for Carcinoma Cervix − Jaslok Hospital and Research Centre Experience

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Background: Brachytherapy is an integral part of radiotherapy treatment in cancer cervix. Conventional planning compared with the image guided 3D

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 cm^3 of rectum (DRV2), 5 cm^3 of rectum (DRV5), 2 cm^3 of bladder (DBV2), 5 cm^3 of bladder (DBV5) and 2 cm^3 of sigmoid colon (DSCV2), 5 cm^3 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.

8019 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.

8020 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.

8021 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 adyuvant to surgery as well as radical option in more advanced tumours. Therapy programs are based on FIGO tumour stage and volume, grade, linfovascular 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