EP-1593

Transition from Paris dosimetry system to 3D image-guided planning in interstitial breast brachytherapy

R. Kabacinska[1], J. Lasota[1], A. Wronczewska[2], A. Lebioda[2], J. Terlikiewicz[2], R. Makarewicz[2]
[1]*Oncology Center, Department of Medical Physics, Bydgoszcz, Poland*
[2]*Oncology Center, Brachytherapy Department, Bydgoszcz, Poland*

Purpose/Objective: The purpose of this study is to evaluate our first experience with 3D image-guided breast brachytherapy (BT) and to compare dose distribution parameters between Paris dosimetry treatment plans and image-based treatment plans.

Materials and Methods: First, 49 consecutive breast cancer patients treated with high dose rate (HDR) interstitial brachytherapy were selected for the study. All patients received 10Gy boost dose after whole breast irradiation. Every patient underwent computed tomography and the planning target volume (PTV) and organs at risk (OAR) were outlined. Two treatment plans were created for every patient. First, based on a Paris dosimetry system (PDS), and the second one, imaged-based plan with graphical optimization (OPT). The reference isodose in PDS implants was 85%, whereas in OPT plans the isodose was chosen to obtain proper target coverage. Dose and volume parameters (D90, D100, V90, V100), dose at OARs, total reference air kerma (TRAK) and quality assurance parameters: dose nonuniformity ratio (DNR), dose homogeneity index (DHI), external volume index (EI) and conformal index (COIN) were used for a comparison of both plans.

Results: One-, two-, three-plane implants were used. The mean number of catheters was 7, but the mean for first 20 patients was 5 and almost 9 catheters for the next 29 patients. The volume of PTV ranged from 13,6 cm^3 to 163,4 cm^3 (mean: 58,2 cm^3). The mean value of isodose selected for prescribing the dose for OPT plans was 73%. The mean D90 was 88,2% and 105,8%, the D100 was 59,8% and 75,7%, the V90 was 88,6% and 98,1%, the V100 was 79,9% and 98,9% and the TRAK was 0,00375 Gym^{-1} and 0,00439 Gym^{-1} for the PDS and OPT plans respectively. The mean DNR was 0,29 and 0,42, the DHI was 0,71 and 0,58, the EI was 0,15 and 0,23 and the COIN was 0,68 and 0,76 respectively. All differences are statistically significant.

Conclusions: The target coverage in image-guided plans (OPT) was significantly higher than in plans based on Paris dosimetry system (PDS), but the dose homogeneity was worse. Also value of TRAK increased because of change of prescribing isodose. Our first experience proved, that more number of needles allows to obtain better dose distribution.

Electronic Poster: Brachytherapy track: Gynaecology

EP-1594

Evaluation of toxicity in postoperative endometrial brachytherapy

I. Membrive Conejo[1], A. Reig Castillejo[1], P. Foro Arnalot[1], X. Sanz Latiesas[1], N. Rodriguez De Dios[1], J. Quera Jordana[1], E. Fernandez-Velilla Cepria[1], O. Pera Cegarra[1], M. Algara Lopez[1]
[1]*Hospital de la Esperança, Radiation Oncology, Barcelona, Spain*

Purpose/Objective: The aim of our study is to describe the technique used in our center to plan and administer treatment with high dose rate (HDR) brachytherapy using CT simulation and 3D dosimetry to evaluate the dose in organs at risk by dose-volume histograms. Also describe the acute toxicity observed since the beginning of this modality of treatment in our center (6 years).

Materials and Methods: The unit used to administer the treatment is a Varian Gammamed Plus, and the applicator used in all cases is a vaginal cylinder with diameters of the segments between 20 mm and 35 mm. Planification and dosimetry was performed using Brachyvision software.

The planning and treatment protocol is as follows:

- Physical examination and determination of the applicator to be used.
- Bladder catheterisation.
- Vaginal cylinder placement.
- CT simulation.
- Determination of PTV (vaginal cylinder + 5 mm margin) and the volumes of organs at risk.
- Dosimetry.
- Administration of treatment.

We used 2 different schedules:

From September 2008 to September 2012:

- Treatment after external radiotherapy (46 Gy): 15 Gy in 3 sessions separated at least 48 hours.
- Treatment with exclusive brachytherapy: 30 Gy in 6 sessions separated at least 48 hours.

From October 2012 to November 2014:

- Treatment after external radiotherapy (46 Gy): 14 Gy in 2 sessions separated at least 48 hours.
- Treatment with exclusive brachytherapy: 28 Gy in 4 sessions separated at least 48 hours.

Toxicity was recorded according to RTOG criteria before every session.

Results: From September 2008 to November 2014 we treated 261 patients with this technique. All patients completed treatment with the planned dose. In no case was necessary to chamge the treatment schedule because of toxicity.

The average duration of the planning was 30 minutes.

All the treatments were complementary after surgery. The postoperative histology was adenocarcinoma in 210 patients (80.5%), papillary serous carcinoma in 19 patients (7.3%), sarcoma in 14 patients (5.3%) , carcinosarcoma in 10 patients (3.9%), and clear cell carcinoma in 8 patients (3%).

In 50.5% of the cases the treatment was performed as a boost after external radiotherapy and in the other 49.5% was exclusive brachytherapy.

The toxicity observed in both schedules is summarized in table 1.
Table 1:

	5Gy x 6	5Gy x 3	7Gy x 4	7 Gy x 2
Number of patients	85	86	46	39
Proctitis grade				
0	98%	97.7%	100%	97.5%
1	0%	2.3%	0%	2.5%
2	2%	0%	0%	0%
3	0%	0%	0%	0%
4	0%	0%	0%	0%
Vaginitis grade				
0	87.2%	91.9%	97.9%	97.5%
1	5.8%	5.8%	2.1%	2.5%
2	7%	2.3%	0%	0%
3	0%	0%	0%	0%
4	0%	0%	0%	0%
Cystitis grade				
0	89.5%	83.8%	95.7%	89.9%
1	5.8%	4.6%	4.3%	7.6%
2	4.7%	11.6%	0%	2.5%
3	0%	0%	0%	0%
4	0%	0%	0%	0%

Conclusions: The treatment planification of HDR brachytherapy with CT images and 3D dosimetry allows to know the dose received in the volume of the organs at risk and also a good optimisation of the treatment.
The treatment was very well tolerated and there was no grade 3-4 toxicity in our patients.

EP-1595

Toxicity in adjuvant vaginal cuff brachytherapy in endometrial cancer: our experience

A. Spera[1], V. Figlia[1], T. Bruno[1], V. Gruppuso[1], L. Pollara[1], G. Caminiti[1], G. Ferrera[2], M. Bono[2], G. Mortellaro[2], F. Sciumè[2], G. Evangelista[2]
[1]*Università degli Studi di Palermo, Scuola di Specializzazione di Radioterapia, Palermo, Italy*
[2]*Ospedale A.R.N.A.S.-Civico, UOC Radioterapia, Palermo, Italy*

Purpose/Objective: Toxicity evaluation of exclusive adjuvant vaginal cuff High Dose Rate Brachytherapy (HDR-BT) in patients with endometrial cancer.
Materials and Methods: From 2009 to date, 53 patients were treated in our institution with HDR-BT, with a median age of 65 years. 52 patients underwent hysterectomy for endometrioid cancer and 1 for transitional cell carcinoma. FIGO and grading staging were 14-IA, 35-IB, 4-IIA, 8-G1, 31-G2, 14-G3. No patients received external-beam radiation therapy or chemotherapy. Before Computed Tomography (CT) simulation, women underwent a gynecological examination in order to determine the size of the vaginal cylinder that will fit the patient. CT simulation was performed with 2.5 mm CT slice thickness with empty rectum and the treatment cylinder in the vaginal cavity. Before CT scan patients drank 500 cc of water after voiding bladder ; this preparation was repeated before each fraction in order to reproduce bladder's filling conditions used for the planning. Upper 3-3.5 cm of the vaginal vault were treated. Patients received five fractions each of 600 cGy for a total dose of 3000 cGy prescribed at 0.5 cm from the applicator surface. During the radiation therapy course, patients received supportive therapy with hyaluronic acid vaginal suppositories. A low-fat diet with the addition of lactobacilli was suggested. Use of vaginal dilators was not prescribed. Gastrointestinal (GI) and Genitourinary (GU) toxicity were evaluated by RTOG score. Late toxicity effects were also analysed in 26 patients with a median follow-up of 37 months by using the RTOG late-effect score. According to our protocol, gynaecological exams were scheduled every 3 months for two years and then every 6 months up to five years.
Results: Eighteen patients experienced acute GU toxicity: 10 Grade 1 (G-1), 6 G-2, and 2 G-3. Regarding early GI toxicity, 9 cases of G-1 toxicity and 2 of G-2 occurred.Four patients experienced GU late toxicity: 3 G-2 and 1 G-3. No one complained of GI late toxicity. Ten patients presented vaginal stenosis during the gynaecological examinations. This side effect made the patients' follow-up difficult because of greater difficulty in viewing the vaginal vault; also four women complained of dyspareunia
Conclusions: In our experience, vaginal-vault HDR-BT treatment is well tolerated, with a very low GI toxicity score. Vaginal stenosis appears to be the principal disorder observed in long-term follow-up. In order to improve this safe technique, we think that could be reasonable to prescribe the use of the vaginal dilator not in all patients, but only in those women in which the stenosis occur.

EP-1596

Radiobiological evaluation of HIPO inversely planned pulsed-dose-rate brachytherapy for cervical cancer

L. Matias[1], T. Palmqvist[2], J. Wolke[2], J. Nilsson[2], C. Beskow[3], I. Toma-Dasu[1]
[1]*Stockholm University and Karolinska Institutet, Medical Radiation Physics, Stockholm, Sweden*
[2]*Radiumhemmet Karolinska University Hospital, Medical Radiation Physics, Stockholm, Sweden*
[3]*Karolinska University Hospital, Department of Gynecologic Oncology, Stockholm, Sweden*

Purpose/Objective: The aim of this study was to assess through radiobiological evaluation the ability of the hybrid inverse planning optimization (HIPO) system to produce dose distributions comparable or superior to the clinically accepted ones devised using graphical optimization (GRO) for cervical cancer patients treated with pulsed-dose-rate brachytherapy.
Materials and Methods: Six cervical cancer patients treated with external radiotherapy and pulsed-dose-rate brachytherapy were included in this study. The patients received 50 Gy (25 x 2 Gy) as external radiotherapy and 24 Gy (3 x 8 Gy) as pulsed-dose-rate brachytherapy planned using GRO performed in Oncentra® Brachy treatment planning (Nucletron, an Elekta Company). An alternative brachytherapy plan was made in HIPO using volumetric