Conclusion: An important influencing factor remains vicinity to the OAR. It is possible to achieve falloff rates of 100-80% within a distance of 2 mm and a 100% to 50% fall within 7 mm. This data can help enable select patients for upfront STS versus fractionated SRT during initial assessment of patients.

EP-1668
Treatment planning study of c-IMAT versus s-IMRT in cervical and upper thoracic esophageal carcinoma
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Purpose or Objective: To compare and analyze the characteristics of static intensity-modulated radiotherapy(s-IMRT) versus constant dose rate and constant angle speed intensity modulated arc therapy(c-IMAT) in the treatment of upper thoracic and cervical esophagus cancer. By Delta4 verified the commissioning of c-IMAT implementation in the Varian Clinical 23IX accelerator.

Material and Methods: Eleven esophageal neoplasms patients treated with step-and-shoot s-IMRT at our hospital, were replanned using c-IMAT. The plans were generated with Oncentra ver4.1 planning system, PTV were prescribed to 60 Gy in 30 fractions. Planning objectives for PTV corresponding with the IMRT plans, were at least 95% planning target volumereached the prescription dose and V110 no more than 10%. The maximum dose of spinal-cord was constrained below 45 Gy. Pared-sample T-test were applied to dose volume values for PTV and OAR from DVH.

Results: There were no significant differences between s-IMRT and c-IMAT in PTVmin, D90, D95, D98, V90, V95, V100, V105, V110, D max or total lung V10, V20, V25, V30 and average lung dose (all P>0.05). However, the differences were significant in terms of D2, D50, V105. PTVaverage, Hi and Ci of PTV, V5 and V15 of the total lung (all P<0.05)(see table1 and figure1). And treatment times were reduced significantly with c-IMAT(81s vs. 238.4s, p < 0.05), while, MU increased by a factor of 1.2, s-IMRT is 513.5MU versus c-IMAT is 624.1 MU (P=0.000). For the gamma Index (±3%, ±3mm), the s-IMRT (94.0±0.9 %) is higher than c-IMAT(91.9±1.1%), but all can meet the clinical demands (≥ 90%).

Conclusion: In Varian Clinical 23IX accelerator designed c-IMAT plan can achieve similar or better dosimetry with s-IMRT, having better PTV homogeneity and conformal index, much less treatment time advantage, and so the c-IMAT plan can be implemented smoothly and quickly into a busy cancer center, but the total MU and the average does of lung increased compared with s-IMRT. Hence in the treatment of upper thoracic and cervical esophagus cancer patients an evaluation of weight loss must be performed during treatment for C-IMAT.

EP-1669
The reaserch of postoperative endometrial carcinoma delivered with CDR-CAS-IMAT on Varian 23IX
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Purpose or Objective:

Introduction Postoperative endometrial carcinoma patients with large volume of target area and the shape of the target area is concave, treatment with IMRT is time consuming. Treated with VMAT can produce similar or better dose distributions, also can reduce treatment time and the monitor units (MU)[1,2]. However, VMAT can only be implemented on the new generation accelerators such as the Varian RapidArc and Elekta Synergy, which prevents most existing linacs from delivering in VMAT. R Zhang et al.[3] had been proposed an alternative planning approach for VMAT using constant dose-rate and constant gantry speed arc therapy (CDR-CAS-IMAT) implementation on Varian 23EX for thoracic esophageal carcinoma, the results showing that the treatment times compared with the IMRT technology were decreased significantly can be reached to 62.9%.

Objective The purpose of this study is to investigate using CDR-CAS-IMAT on Varian 23IX, by comparing with the IMRT to evaluate the performance of CDR-CAS-IMAT on postoperative endometrial carcinoma patients and then provide guidance for clinical treatment.

Material and Methods: 30 postoperative endometrial carcinoma patients treated with IMRT on Varian 23IX were replanted using CDR-CAS-IMAT. The plans were generated on Oncentra v4.1 planning system, PTV was prescribed to 50.4
Results: The results showing that postoperative endometrial carcinoma can be implemented CDR-CAS-IMAT plans on conventional Varian 23EX Linac for smoothly and quickly at busy cancer center. Comparing with the IMRT technology CDR-CAS-IMAT plans can meet the clinical demand (see Figure1), gives comparable OAR and improved CI of PTV (see, Table 1), can reduction treatment time ((48.6±7.8s) Vs. (42.2±46.7s), MU((785.7±78.5)MU Vs. (927.4±79.1)MU) and high dose irradiated volume; while increase the low dose irradiated volume of healthy tissues and the volume of the bladder and bowel irradiated 40 Gy and 30Gy, respectively. This point needs to pay attention to implementation in clinical. There were no significant differences in other statistical index.

Conclusion: Endometrial carcinoma patients with CDR-CAS-IMAT on Varian Clinical 23EX Linac can get equivalent or superior dose distribution compared with the IMRT technology. CDR-CAS-IMAT have much less treatment time and MU can reduce the uncertainty factor and patient discomfort in treatment.

References

EP-1670
Impact of flattening filter free photon beam on Rapid-arc radiotherapy for gynecological malignancies
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Purpose or Objective: Aim of this study was to determine the dosimetric impact of flattening filter free beam (FFFBB) of 6 and 10 MV energies on rapid-arc (RA) radiotherapy planning for gynecological malignancies.

Material and Methods: RA plans were generated using double arc for a cohort of ten patients using 6 and 10 MV FFFBB. Plans were generated to deliver a dose of 50.4 Gy in 28 fractions for Planning target volume (PTV) and ALARA were used as an objective for Organs at risk (OARs). Plans were analysed for PTV Coverage, conformity index (CI), homogeneity index (HI), dose to OAR's, integral dose to normal tissue (NTID) and total no. of monitor units (MUs).

Results: The volume of PTV receiving prescription dose were 95.03± 0.09% and 95.09± 0.10%, HI were 1.062±0.008 and 1.066± 0.008, CI were 1.007± 0.016 and 1.012± 0.013, mean NTID were 272.2± 37.1 and 261.1± 33.2 (liter-Gy), MUs number were 629.6±31 and 647.2±44 for FFFBB using 6 and 10 MV respectively. There were no statistically significant (p<0.05) difference found in mean doses to bladder, rectum, bowel and both femoral heads for FFFBB using 6 and 10 MV respectively. There were significant (p < 0.05) difference found in HI, MUs number and NTID for FFFBB using 6 and 10 MV respectively.

Conclusion: FFFBB of 6MV was found superior in comparison to 10MV for RA planning in case of gynecological malignancies. It offers better HI, CI, less number of MUs (2.6%) and delivers more NTID (4.3%) for similar target coverage and OAR's sparing.

EP-1671
Stereotactic body radiotherapy for early-stage lung cancer with flattening filter free beams
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Purpose or Objective: The purpose of this study is to investigate the treatment plan dosimetry and delivery efficiency between the single-arc and double-arc techniques using stereotactic body radiotherapy with flattening filter free beams for early-stage lung cancer.

Material and Methods: Nineteen patients were included in this investigation, and each patient was arranged single-arc (SA) and double-arc (DA) techniques using the Eclipse 10.0 treatment planning system. The prescription dose was 48 Gy/4 fractions and the photon beam energy was 6 MV flattening filter-free (FFF) beams from Truebeam linear accelerator. The treatment plans were appraised by Radiation Therapy Oncology Group (RTOG-0915) criteria for planning target volume (PTV) coverage and organs at risk (OAR) sparing. All plans were normalized to 100% of prescribed dose at least covering 95% of the PTV. Treatment efficiency was evaluated via monitor units (MUs) and treatment times were compared.

Results: The PTV volumes range from 20.46 to 88.37 cm3. Compared to the SA and DA plans, there was no significant difference in PTV coverage, except the maximum dose in the PTV. The maximum dose of SA technique was slightly higher than that of DA technique. The mean PTV conformity index (CI) for SA and DA was 1.06±0.05 and 1.01±0.03 respectively.