offering a better delivery efficiency. Acute toxicity profile assessed by hypofractionation schedule VMAT treatments was safe.

**EP-1665**

**Scalp-Sparing focal radiotherapy for gliomas using VMAT or Helical Tomotherapy: a feasibility study**

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**Purpose or Objective:** Both transient and permanent alopecia have a huge psychological impact on patient’s quality of life. Sparing the scalp during focal cranial RT for gliomas is a challenging issue during the treatment planning process due to the fact that the scalp is often strictly adjacent to the cortical or subcortical target. In addition, clear constraints for this structure to be used during the inverse planning are not available in literature, most of them being very strict. We report our preliminary experience with scalp sparing technique for patients with high grade gliomas.

**Material and Methods:** Five patients previously treated with focal RT were reviewed. During the contouring process, the scalp volume was defined as a ring region of interest (ROI) including the tissue between the skin and the skull, up to a maximum thickness of 5 mm. The hairless skin of the face and the neck was excluded from the scalp ROI. The gross tumor volume (GTV) included the surgical bed plus any contrast enhanced lesion on a postoperative T1-weighted MRI scan. The clinical target volume (CTV) was obtained by adding an isotropic 2-cm margin to the GTV. CTV was then edited according to the anatomical barriers (meninges, ventricles, tentorium and midline except for lesion near to the corpus callosum). CTV was expanded by 2 mm to get the planning target volume (PTV). For the inverse planning, primary constraint for the scalp was Dmax<=16 Gy, secondary constraint was Dmax<=25 Gy, tertiary constraint was Dmax<=35 Gy. Tomotherapy and VMAT plans were generated for a prescription dose of 60 Gy in 30 fractions. Other intracranial organs at risk (optic chiasm, brainstem, cochlea, pituitary gland and hippocampus) were contoured.

**Results:** The primary constraint (Dmax<=16 Gy) for the scalp was unachievable. The secondary constraint (Dma25 Gy) was met only in a case both with Tomotherapy and VMAT. The tertiary constraint (Dmax<=35 Gy) was met in all the cases with Tomotherapy (the scalp volume receiving > 35Gy was always < 0.1cc) but only in two cases out of 5 with VMAT. Target coverage and sparing of the other organs at risk were acceptable in all the treatment plans.

**Conclusion:** Meeting the constraints for the scalp is not always feasible for cortical or subcortical targets that need to be treated with a total dose of 60 Gy. We are enrolling patients with gliomas treated with the above-mentioned scalp sparing technique in a prospective study in order to assess the clinical results in terms of transient and permanent alopecia.

**EP-1666**

A modified left-sided breast cancer irradiation in Tomotherapy: comparison to hybrid-IMRT technique

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**Purpose or Objective:** Sharpness of fall off of dose beyond the PTV edge is one of the key parameters of efficient cranial stereotaxy. This study presents the dosimetric data and dose fall off patterns of consecutive patients treated for cranial SRS on a linear accelerator.

**Material and Methods:** Thirty patients of brain lesions underwent frameless SRS at our centre between March 2013 and December 2014. All patients underwent radiotherapy planning contrast CT scan with 1 mm slices. VMAT planning was done for all cases (4mm MLC leaf size). From the center of the PTV volume, straight lines were drawn in the axial plane in anterior, posterior, medial, lateral, superior, inferior directions and in the direction of nearest organ at risk (OAR). Along each line the distance of the 80%, 50% and 20% isodoses from the edge of the PTV were measured. The distance required for dose fall of from 100% prescription dose (PTV edge) to 80%, 50% and 20% were noted. The final readings were converted to dose fall off percentage per mm (%/mm)

**Results:** OAR doses were validated according to TG-21 specified limits. The mean SD fall (%/mm) for 100%-80% was 7.5±2. For 100%-50% the fall rate was 5±1.3 and for 100%-20% it was 4.2±1.6. The mean of sharpest fall off rate (%/mm) was 10.6±5.8 for 100%-80%, 6.6±3.6 for 100-50 % and 5.9±7.5 for 100-20%. For an OAR distance > 2 cm from PTV edge (12 patients), the dose fall off pattern remained unaffected. For rest of the eighteen patients with OAR distance < 2 cm from PTV edge, the dose fall off became sharper in the direction of OAR.
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 SRS 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 doses 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 research 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