Implementation of Stereotactic Body Radiotherapy (SBRT) for Head and Neck Cancer (HNC)

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Background & Aim

SBRT offers the advantage of delivering conformal and precise ablative dose in fewer fractions, providing potential biological benefits over fractionated regimens.

Head and neck (HN) SBRT has been explored in several studies to achieve local control in reirradiation settings and as a treatment option for patients who are ineligible for surgery.

Aim: To report on our institutional early experience of HN SBRT treatments.

Method

- A retrospective planning study was conducted on 10 previously treated HNC patients.
- The SBRT Planning Target Volume (PTV) was based on the 70Gy PTV, with reirradiation constraints adapted from RTOG 3507(2).
- Plan dosimetry was assessed using Stereotactic planning indices (HI <1.4, CI <1.5, GI <5 (9)) and were all within tolerance.
- All treatment plans underwent departmental Stereotactic patient-specific QA, were measured and reported.
- After successfully demonstrating feasibility of the approach, a comprehensive protocol for H&N SBRT was subsequently developed for clinical implementation.
- The initial experience of clinical implementation is reported here.

Results

- Following planning/ dosimetry study, the technique was applied to clinical cases.
- 10 patients were treated (one who had 2 separate courses of HN SBRT).
- Patients received a prescribed dose of 25-45 Gy in 5-6 fractions, and underwent Planning CT, MRI, and PET scans.
- The Gross Tumour Volume (GTV) was determined from clinical examination, planning CT, PET and MRI, and in most cases, a 3mm isotropic expansion was applied to define the Planning Target Volume (PTV).
- Highly conformal treatment plans following departmental Stereotactic principles were created and reviewed by two Radiation Oncologists for approval.

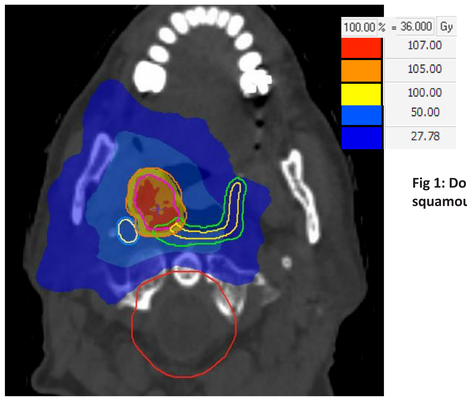

Fig 1: Dosimetry example of HN SBRT for tonsillar squamous cell carcinoma.

Sites	Number of Patients
Oropharynx	4
Nasopharynx	1
Oral Cavity	3
Larynx	1
Neck/SCF	1

Fig 2: Anatomical sites treated with HN SBRT

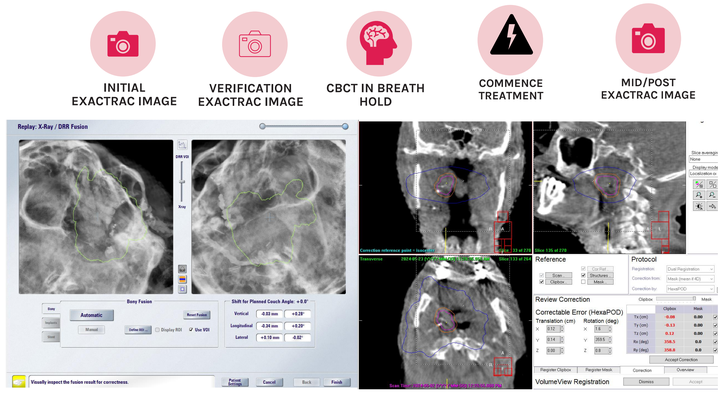

Fig 3: ExacTrac (kV) + Cone Beam CT (Soft Tissue) Imaging Workflow for HN SBRT.

- A hybrid Image-Guided Radiation Therapy (IGRT) technique utilising Cone Beam CT (CBCT) soft tissue matching and ExacTrac kV imaging was employed, with a 1.5mm and 1.5° imaging tolerance (see Figure 3).
- Of the six re-irradiation cases, three maintained local control at 12 months, two developed regional recurrence, and one experienced distant metastasis. In the two de novo cases, neither showed local recurrence.
- No Grade 3 acute toxicity events were observed post-treatment. Longer term follow up is required.

Conclusion

The implementation of H&N SBRT for 10 patients demonstrated its feasibility as an effective and safe treatment modality, characterised by minimal toxicity.

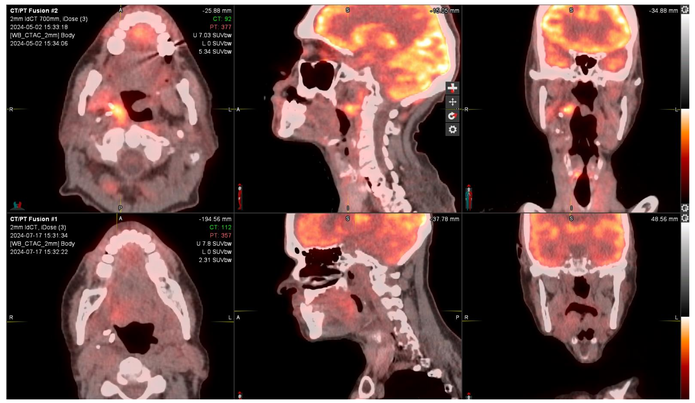

Fig 5: Pictured above, Pre Radiotherapy Treatment PET. Pictured below, 3 month follow up PET Post Radiotherapy.

References

1. Ng SP, Phan J. Stereotactic Radiotherapy and Proton Therapy for Locally Recurrent Head and Neck Cancer. Austin Head Neck Oncol. 2017;1(1):1002.

2. Wong, S. et al. Safety of reRT with SBRT plus concurrent and adjuvant pembrolizumab in patients with recurrent or new second primary head and neck squamous cell cancer in a previously irradiated field: RTOG 3507 Foundation (KEYSTROKE). International Journal of Radiation Oncology, Biology, Physics, Volume 106, Issue 5, 1224 – 1225