Judicious utilisation of surgical and advanced radiotherapy resources to manage triple trouble: a case of synchronous dual malignancies with severe cervical spine deformity

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DESCRIPTION
A 63-year-old man with a 20-year history of right torticollis and atlantoaxial rotational deformity (figure 1) presented with complaints of a non-healing painless ulcer over the right lateral aspect of tongue and difficulty swallowing for the preceding 3 months. On examination, an ulceroproliferative growth was noted on the right lateral border of tongue, involving the floor of mouth, outer alveolar border of mandible and crossing the midline without reaching the base of tongue. There was no palpable cervical lymphadenopathy bilaterally. An edge biopsy from the lesion revealed squamous cell carcinoma (SqCC) and a staging workup was initiated. Routine haematological investigations and chest X-ray were normal, however, a direct fibreoptic endoscopy revealed another exophytic growth in the left pyriform fossa (PFS) and a biopsy revealed SqCC. The

Figure 1 (A–D) Multiplanar 3D volume rendered, DRRs from the CT dataset, in AP, lateral and top-down views, demonstrate right lateral deviation of the cervical spine. Each cervical vertebra has been rendered in a separate colour to highlight the deformity (C1-white, C2-yellow, C3-cyan, C4-green, C5-purple, C6-orange, C7-brown). (E) 3D top-down view of the first two cervical vertebrae (atlas in white, axis in yellow) demonstrates rotatory subluxation at the atlantoaxial joint without anterior displacement (Fielding and Hawking Type 1 deformity). 3D, three dimensional; AP, anteroposterior; DRR, digitally reconstructed radiographs.

Figure 2 MRI and patient positioning images. (A) Axial STIR MRI image demonstrates hyperintense nodular tumour at the floor of mouth on the right side with destruction of the adjacent mandible. (B) Another axial image from the same series shows the nodular hyperintense tumour in the left pyriform sinus. (C–D) Frontal and lateral images of the patient at the time of radiotherapy treatment positioning. Since the cervical spine was deviated in the right lateral direction, the patient was positioned with the intent to provide the most comfortable and reproducible treatment position. First, the neck rest was inverted to provide support to the head. An oropharyngeal airway was placed to provide separation between the tongue and hard palate, as well as to provide ready access in case suctioning of secretions had to performed. Finally, a custom perforated thermoplastic cast was made (not shown here) with openings for the nose, oropharyngeal airway and tracheostomy tube. The patient underwent a treatment planning CT of the face, neck and upper thorax and was simulated on Siemens Somatom Sensation Open (Siemens Healthineers, Erlangen, Germany) with a slice thickness of 2 mm. STIR, short TI inversion recovery.
The patient underwent an MRI (face and neck) (figure 2a-b), and the case was discussed in our multidisciplinary tumour (MDT) board meeting. The patient was staged as synchronous dual primary of the head and neck, and each site was staged separately (tongue, cT4acN0cM0, AJCC stage IVa; PFS, cT2cN0cM0, AJCC stage II).

The specific issues discussed in the MDT were: (1) appropriate management of the dual primaries; (2) challenges posed by the spinal deformity on intraoperative anaesthesia and postoperative care and (3) difficulties in radiotherapy target delineation due to unusual anatomy.

The management options discussed in MDT were: (1) surgical resection for both lesions; (2) surgical resection of the tongue lesion and definitive radiotherapy to the PFS lesion or (3) definitive chemoradiation to both lesions. Surgical resection of both lesions was excluded due to the extensive nature of the required surgery, and definitive chemoradiation was excluded due to inferior local control rates in oral cavity SqCC.1 The patient underwent a hemiglossectomy, central arch resection and bilateral neck dissection along with an elective suprasternal tracheostomy (prior to the procedure) to facilitate airway management during surgery and the postoperative period. Histopathological evaluation revealed well-differentiated SqCC (depth of invasion...
9 mm), with microscopically involved margin (R1 resection) and no involvement of the mandibular bone, lymphovascular invasion, perineural invasion or nodal metastases (0/72 nodes). The final staging was pT3pN0cM0 (AJCC stage III). After an uneventful recovery, he was planned for adjuvant radiotherapy to tongue (based on the risk posed by depth of invasion, pT3 descriptor and R1 resection). Along with delivering adjuvant radiotherapy to tongue, he was also planned for definitive radiotherapy to PFS SqCC. Radiotherapy planning was challenging as the patient’s spine deformity precluded standard immobilisation (figure 2C,D) and target delineation was complicated as the unique position meant that delineation guidelines had to be adapted with close collaboration with a diagnostic radiologist (figure 3). Radiotherapy planning and treatment delivery (via Image Guided Volumetric Modulated Arc Therapy) was performed on Varian Eclipse v13.5 and Varian TrueBeam v2.5 (Varian Medical Systems, Palo Alto), respectively.

The patient tolerated treatment well, with Radiation Therapy Oncology Group grade 2 acute mucositis and xerostomia. Two months after treatment completion, the patient achieved a complete radiological response (figure 4) in the PFS primary and has remained recurrence free for 1 year, with no late side effects.

**Contributors** IA is the treating junior consultant (radiotherapy), author of the paper, responsible for drafting the manuscript and revising it. He is the guarantor. RL is the associate consultant (diagnostic radiology), responsible for drafting the imaging-related portions of the manuscript. He also assisted in radiotherapy treatment planning. KSC is the supervising treating consultant (radiotherapy) and participated in article formulation, editing and oversight. SR is the supervising treating consultant (surgical oncology) and participated in article formulation, editing and oversight.

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**REFERENCES**
