Combined Transfacial and Endoscopic Approach to Resect a Posterior Pharyngeal wall Tumour in the Setting of Absolute Trismus

Gary R Hoffman[1*], **Nigel G Maher**[2] **and Robert L Eisenberg**[3]

[1]Department of Maxillofacial Surgery, John Hunter Hospital, University of Newcastle Medical School, Australia

[2]Melanoma Institute Australia, John Hunter Hospital, Australia

[3]Department of Otorhinolaryngology, John Hunter Hospital, Australia

[*]**Corresponding author:** Gary R Hoffman, Department of Maxillofacial Surgery, John Hunter Hospital, Lookout Road, New Lambton Heights 2305 NSW, Australia, Tel: 0061-2-4921-3000; E-mail: garyhoffman_au@hotmail.com

Introduction

Direct surgical access to the central and lateral subcranial skull base and deep recesses of the midface (including nasopharynx and retromaxilla) remains a challenge. Absolute trismus creates an even greater degree of difficulty in such cases. A heterogeneous group of tumours can arise in these regions and often clinically present late [1]. Advances in imaging technologies have vastly improved our understanding of the nature and extent of these pathologies.

Surgical resection in the Head and Neck can be achieved by using closed or open approaches. The former has been revolutionized by endoscopic approaches with the assistance of navigational technology. The later has been enabled by an understanding of the arterial vascular supply to various elements of the craniofacial skeleton, which has allowed for its safe dismantling by osteotomy. Miniplate and screw fixation has provided the ability for accurate and stable reassembly. Irrespective of the approach, the surgical management of pathology in the head and neck requires a detailed knowledge of the regions complex anatomy, as well as upholding oncological principles in the context of the tenets of preserving both form and function.

Case Report

We present the case of a 66-year-old male who has developed three upper aerodigestive tract (UADT) primary carcinomas over an eight-year period. In November 2003 he was diagnosed with a squamous cell carcinoma (SCC) of the right tonsillar fossa. His treatment consisted of a course of chemo-radiotherapy. He remained well post treatment.

In mid 2007 he developed osteoradionecrosis (ORN) of the left mandible. Management included multiple debridements and hyperbaric oxygen therapy. He was refractory to this treatment and by November 2008 he had developed a pathological ORN-related fracture of the left mandible.

In February 2009 he was scheduled for left mandibular resection and free fibula microvascular reconstruction. After induction of anaesthesia, it was discovered at laryngoscopy that he had a mass arising from the epiglottis in the left vallecula. This was biopsied and reported as invasive SCC.

He was returned to theatre one week later and underwent total laryngectomy, bilateral neck dissection, left mandibular resection and free fibula reconstruction. He remained well and under continued regular review. His dysphagia and trismus necessitated dietary supplementation via ongoing gastrostomy feeding.

In December 2011 he had begun to develop increased trismus and caked secretions over the posterior pharyngeal wall, with a clinical suspicion of further malignancy. A PET scan was considered equivocal, not withstanding low-grade avidity apparent in the mid pharynx. He developed increasing dysphagia to solids, increasing trismus and pooling of hypopharyngeal secretions.

His symptoms continued to worsen and on clinical examination (with the benefit of magnetic resonance imaging) he was noted to have developed a 4cm mass lesion on the posterior pharyngeal wall, centred at the level of the soft palate involving both nasopharynx and oropharynx (Figure 1). He proceeded to surgery with a hemimaxillotomy-cheek pedicle, combined with soft-palate division to enable endoscopic stereotactic assisted en bloc resection of the tumour with marginal clearance (Figure 2). He recovered uneventfully (Figure 3). However, four months after this episode of surgery he developed a fourth separate UADT cancer (floor of mouth). He commenced palliative chemotherapy and remained alive for a further year, at which time he regrettably succumbed to his disease.
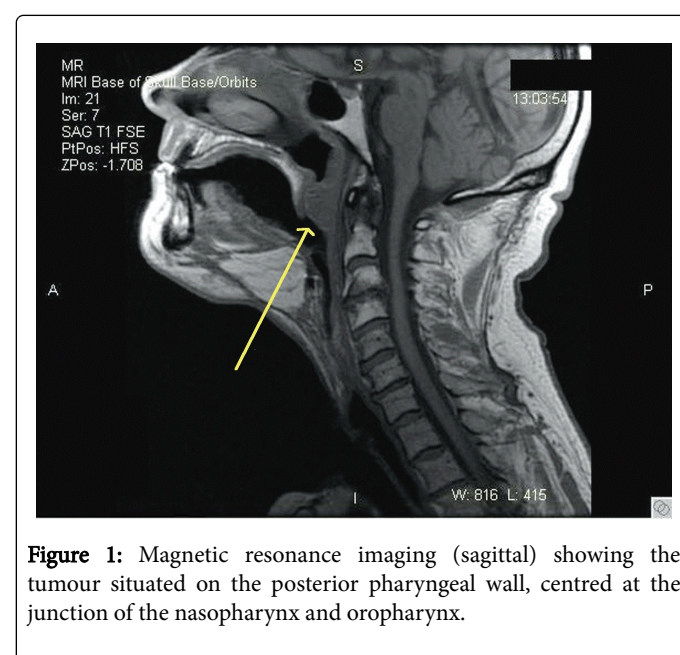

Figure 1: Magnetic resonance imaging (sagittal) showing the tumour situated on the posterior pharyngeal wall, centred at the junction of the nasopharynx and oropharynx.

Figure 2: Intraoperative photo demonstrating the access achieved by a hemimaxillotomy cheek pedicle (after Altemir) to the tumour (shown by arrows).
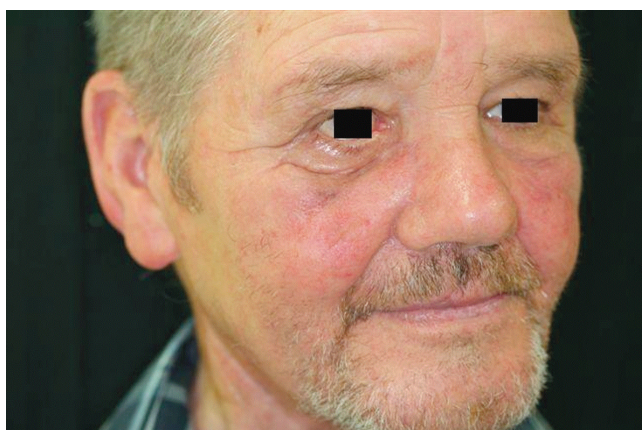

Figure 3: Postoperative photo approximately 3 months after surgery.

Discussion

In a medical and dental context, the term trismus has been applied to any condition that results in a limitation of mouth opening. Trismus can be reasonably classified as being due to either neoplastic (primary pathology or resultant treatment) or non-neoplastic causes. The literature has outlined various approaches to potentially alleviate the distressing signs and symptoms of this process.

Increasingly, oncology patients are presenting with metachronous tumours in the UADT due to field change, often in the setting of previous chemo-radiotherapy and or surgery, especially as a consequence of organ preservation philosophy. The emergent problem, when it occurs in the setting of absolute trismus, requires consideration of novel solutions to provide surgical access to facilitate an adequate enbloc marginal resection.

Transoral approaches to the midface have been based on the Le Fort I osteotomy – a horizontal supra-apical osteotomy of the maxilla combined with down fracture. It provides excellent access to the nasopharynx and mid to upper clivus [1-4]. When combined with a mid-palatal split, inclusive of the soft palate, access to the entire clivus and cranio-vertebral junction is achievable [2,4].

The midface degloving technique provides good bilateral exposure to the maxilla and paranasal sinuses without facial scarring [5]. However access to the skull base and retromaxilla requires further resection/modification [2,5].

To obtain greater exposure to the deeper recesses of the midface, Altemir proposed transfacial access combined with osteotomy [6]. This approach involves a Weber Ferguson cutaneous incision, and osteotomizes the hemimaxilla. This provides a pedicled osteomyocutaneous block that could be swung either as a unilateral or bilateral cheek-bone flap. Clauser et al. [7] detailed further versions of cheek-nose-bone pedicled flaps as developed by Curioni [7].

Temporal approaches provide good access to the infratemporal, antero-lateral skull base, lateral orbit and retromaxillary regions [1,3,4]. The transzygomatic approach involves a coronal flap with preauricular skin incision, pedicled zygomatic arch/body osteotomy and temporalis reflection, either superiorly or inferiorly, depending on the site of the lesion [3,4]. The approach described by Fisch and Pillsbury in 1979 [8] incorporates a post-auricular incision, and may be preferred should the internal carotid artery wish to be traced into the skull base [4,8]. The main advantages in these lateral approaches include the lack of visible facial scars, minimal functional anatomy disturbance, and their versatility [1,4].

Transoral endoscopic approaches, which can also include both laser surgery and robotic surgery, are emerging as safe and effective tools for tumour resection in the oropharynx [9]. Paradigms for treating oropharyngeal cancer have generally favoured chemo-radiotherapy over surgery, due to acceptable locoregional control from chemo-radiotherapy and operative morbidity [9,10]. However the ability to surgically instrument the oropharynx and safely provide tumour clearance without facing the complications from chemo-radiotherapy remains attractive and therefore these techniques warrant further research. A review of 11 papers using transoral endoscopic approaches to treat oropharyngeal cancer between 2003-2011 revealed a local control rate of between 83.6%-98%, and a 2 year overall survival rate (given with chemotherapy or radiation when indicated) of between 80.6%-94% [9].

Frameless stereotactic localisation technology is now routinely used in many units (including ours) when approaching skull base lesions endoscopically. With increasing experience these endoscopic exposures have been able to be extended caudally to encompass the upper cervical vertebrae and pharynx [11].

Guidelines for the use of transoral endoscopic approaches to the oropharynx have suggested that trismus and lesion extension to the nasopharynx are contraindications for their application (alone) [9]. Particularly for transoral laser microsurgery, line-of-sight is necessary to instrument the region. This may be further constrained by conditions such as limited neck extension and a retrusive mandible. However with the continued development of flexible instruments and fibreoptic lasers, greater application of laser microsurgery is expected [9]. Robotic approaches to the oropharynx have the advantage of providing a 30-degree maneuverable scope that affords a wide field of vision [9]. Nonetheless, robotic surgery requires local tissue retraction

(via a mouth gag) to allow adequate instrumentation [9]. A literature search using keywords on Ovid Medline from 1950-2015 for: "oropharyngeal neoplasms" and "trismus", "oropharyngeal cancer" and "trismus", and "trismus" and "endoscopy", revealed no papers documenting surgical access solutions to oropharyngeal neoplasms in the setting of trismus.

In our case, a transoral approach was considered, but was deemed impossible due to the absolute trismus from prior surgeries, radiation induced fibrosis and tumour inflammation. Lip-split mandibulotomy was contraindicated due to the previous radiation, history of ORN, earlier free fibula reconstruction and tumour location. Coronoidectomies were thought to hold little benefit due to the fibrosis secondary to radiation. With a 'hostile neck' due to the previous neck dissection, fibula free flap anastomosis and radiation, a pharyngotomy approach was also deemed impossible. Furthermore, transnasal endoscopic approaches alone would not enable the ability to instrument the oropharynx.

The pedicled maxillary swing, based on the Altemir technique, with splitting of the palate, exposed the entire nasopharynx and oropharynx but only down a deep and narrow cleft (Figure 2). Endoscopic techniques then enabled both the ability to appropriately instrument the area and the broad visualization to provide three-dimensional clearance. The entire skull base and pharynx from clivus to hypopharynx and from carotid to carotid was visualised. Use of frameless stereotactic technology provided confident localisation of the internal carotid arteries posterolateral to the eustachean tubes. Use of endoscopy also avoided firstly, the need to extend the osteotomy over the nose, and secondly, the need to raise a contralateral hemimaxillotomy-cheek pedicle for improved access.

Clearly, innovative technologies using transoral robotic (TORS) and endoscopic endonasal approaches (EEA) to facilitate surgery of the head, neck and skull base are continuing to evolve [12,13]. Research to date on this subject is best summarized as involving (1) cadaveric modeling to assess the feasibility of these approaches to access the deep recesses of the midface and sub skull base [14]; (2) comprehensive meta-analysis and systematic review [15] and (3) clinical outcome studies [16].

However, despite the emergent success of these technologies and approaches, we believe that there are still situations that arise when the surgeon may have to rely on (novel) open approaches to both access and marginally resect pathology in these locations.

Conclusion

We believe that this combined approach to access and resect an upper aerodigestive tract tumor to be a practical solution in the setting of absolute trismus. We also believe that the cross-fertilization of advances in techniques between our respective disciplines empowers us to address and solve other complex problems of surgical access in head and neck and skull base disease.

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