Reconstruction of Orbital Suprastructure Maxillectomy Defects by Temporalis Myofascial Flap

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Abstract Oncological surgery being radical is often mutilating in form and function especially in the maxillary/orbit region reconstruction of maxillo-orbit defects are challenging due to the complex three dimensional anatomy. Free flaps are de-rigueur but a technical resource with constraints. The temporalis myofascial flap (TMFF) is a locally available, safe and reliable flap which can be used for the reconstruction of various orbital and supramaxillary facial defects. To study the use of the temporalis myofascial flap in the reconstruction of various orbital and supramaxillary facial defects. Temporalis myofascial flap was harvested and successfully used in reconstruction of three patients who had undergone orbital exenteration with or without suprastructural maxillectomy. There was no morbidity related to flap loss. Temporalis flap (TMFF) can be considered as a first line reconstructive option for limited resection of upper maxilla with palatal preservation. Its proximity to the oral cavity, palate and mid third face and the technical ease makes the TMFF valuable for reconstruction. The techniques and outcomes of TMFF are discussed.

Keywords Temporalis myofascial flap · Maxilla · Orbit

Introduction

Oncological surgery in the maxillary/orbit region requires extensive soft tissue and bone resection. Maxillo-orbit defects are inherently complex and require reconstruction to offer the patient, better aesthetics. A large number of local, pedicled and microvascular free flaps have been employed for the reconstruction of these defects. The temporalis myofascial flap (TMFF) is a safe and reliable flap that has been used for the reconstruction of various maxillofacial defects [1, 2].

Case 1

70 Years old male presented with history of right orbital swelling since 3 months. The right eye was proptosed with restriction of right medial rotation however his visual acuity was normal. Biopsy was suggestive of squamous carcinoma (SCC). CT scan PNS and orbit revealed a mass lesion with bone destruction of the medial wall of maxillary antrum involving the (R) nasolacrimal duct. The rest of the sinuses, the hard and soft palate was uninvolved. The patient underwent (R) orbital exenteration with suprastructural maxillo-ethmoidectomy. The approach was via a Weber Fergusson incision incorporating the subconjunctival incision and excision of the upper lid for margins. (R) Orbital exenteration with suprastructural maxillo-ethmoidectomy was done (Fig. 1). Temporalis major myofascial flap was raised (Fig. 2) followed by lateral orbitotomy which involved making an opening in the lateral orbital wall to provide access to deliver the flap (Fig. 3) and cover the defect. The overlying skin was closed primarily. He had an uneventful postoperative recovery.

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Fig. 1 (R) orbital exenteration with suprastructural maxillo ethmoidectomy done (Case 1)

Fig. 2 Temporalis myofascial flap was raised

Case 2

47 Years old lady presented with (R) orbital swelling since 2 months. There was a fungating mass from the right orbit without vision. Biopsy revealed it to be a malignant melanoma. PETCT scan showed only localised disease involving the orbital contents while the maxillary and ethmoid structures were intact. The approach was Weber Fergusson incision with excision of the lower lid and a

Fig. 3 Lateral orbitotomy to deliver the flap in the orbit

planned Mustarde's advancement (Fig. 4). She underwent (R) orbit exenteration with suprastructure maxillectomy for margins. TMFF was harvested (Fig. 5) and a lateral orbitotomy done (Fig. 6) to tunnel the flap in and fill the defect. The skin was closed primarily. Her immediate postoperative recovery was uneventful.

Case 3

45 Years old pt presented with left orbital swelling since 3 months. There was proptosis of left eye. CT scan revealed proptosis of left eye and biopsy was suggestive of chondrosarcoma. Underwent Left orbital exenteration. Temporalis flap was harvested and rotated. Left lateral orbital wall was removed (Fig. 7) to transpose the flap and fill the defect.

Technique of Temporalis Myofascial Flap

A hemicoronal skin incision is marked commencing in a preauricular skin crease just below the level of zygoma and going superiorly placed within the hairline for cosmetic reasons. The skin and the subcutaneous tissue are elevated exposing the lateral orbital wall anteriorly, the parietal bone superiorly and the zygomatic arch inferiorly. The

Fig. 4 Weber Fergusson incision with Mustarde's advancement (Case 2)

Fig. 5 Harvesting of temporalis myofascial flap

temporalis muscle and fascia will be based on the deep temporal arterial blood supply and the hence the superficial

Fig. 6 Lateral orbitotomy done to tunnel the flap in and fill the defect

temporalis artery and vein are ligated and divided. This improves the mobility of the Temporalis myofascial flap. The attachment of the superficial temporalis fascia is divided from the zygomatic arch and the thereafter the Temporalis myofascial flap is elevated off the temporal fossa exposing the squamous temporal bone. Lateral wall of orbit is drilled out making a tunnel for the flap to be transferred to the orbit. If this step is difficult due to thickness of the flap then the lateral orbital wall can be removed and repositioned after the flap is transferred. The issues are with the mobilisation of the flap. It is important to take care to ligate the superficial temporalis artery and vein, detach the fascial attachment to the zygoma and free all its attachment from the temporal bone which will allow proper mobilisation and transfer of the flap.

The similar hemicoronal approach will provide access to the supra orbital structures such as the lacrimal gland and the orbital roof. These all structures apart from the orbit, suprastructure of the maxilla, ethmoids and the frontal sinus can be resected. The dural defect if any can be reconstructed with the temporalis fascia. The entire defect can be covered with the temporalis flap.

While closing the skin the temporalis fascia overlying the muscle is hitched to the frontalis muscle and to the skin over the lids. This prevents the temporalis flap from sinking

Fig. 7 Removal of left orbital wall (Case 3) to allow the flap to fill the defect

into the defect. On the long term the muscle usually atrophies to cause the defect to be more prominent which may require a prosthesis for improving the cosmesis.

Discussion

Use of temporalis myofascial flap was first reported by Bakamjian [3]. Maxilla is a critical structure of the midface as it plays a crucial role in facial appearance and provides the lateral wall of nasal cavity, hard palate and the floor of orbit. Many reconstructive options are presently available for reconstruction of maxilla.

Microvascular flaps are now preferred for reconstruction as they can be adapted to get the optimal form and function. Free flaps are reliable and offer flexibility and can be used for extensive soft tissue and bone defects [4]. However currently it has limited availability as there is need for highly skilled technical expertise and not suitable in patients with comorbidities. In these kinds of patients a safe and rapid reconstruction is preferable. Common regional flaps for reconstruction of midfacial defects are cervicofacial rotation flap, forehead flap and temporalis muscle flap [5]. Temporalis muscle has been used in facial

reconstruction with minimal donor site morbidity. It has been used in the obliteration of dead space following orbital exenteration, in augmentation of facial contour following major maxillofacial resection and in intraoral reconstruction [6].

The advantage of the temporalis myofascial flap (TMFF) is that it is locally available next to the site of resection, is a well vascularised flap which can be raised easily and quickly from the temporal fossa and transposed to repair a wide range of surgical defects in the maxilla, orbit with minimal donor site morbidity [6]. TMFF has an efficient blood supply which enables flap rotation through large area [7] and gives satisfactory cosmetic results. TMFF has a constant vascular supply from the deep temporal and middle temporal vessels that are located on the deep surface of the muscle. The flap is reliable and the operative time to harvest it is short. One of the drawbacks of temporalis muscle flap is its short arc of rotation but it can be increased by some modifications in surgical procedure like fenestration of the lateral orbital wall, resection of coronoid process and division of zygomatic arch [1]. In our cases fenestration of lateral orbital wall was done in the 1st and 2nd case and lateral orbital wall was removed in the 3rd case.

In our cases the defect was in the suprastructure of the maxilla and orbit and the resultant defect would have required a free flap for cover. The TMFF provided a rapid reconstruction and cover of the defect adequately. There was no morbidity of the flap. It does result in a hollow over the temporal region which can be covered with hair styling. The defect can be corrected with a medpore implant which fills the temporalis hollow.

Use of TMFF in Indian literature has been studied in a few studies [8, 9]. In a study of 20 patients [8] temporalis myofascial flap was used for reconstruction of various types of maxillofacial defects arising as a result of ablative surgery for tumors and aggressive cysts, as an interposing material in TMJ ankylosis surgery. Temporalis myofascial flap was found to be a versatile option for reconstruction of moderate to large sized maxillofacial defects, the muscle can provide abundant viable and vascular tissue, with minimal to no functional morbidity or aesthetic deformity. Yadav et al. [9] have described use of Temporalis myofascial flap to reconstruct palate maxillary defect by creating a tunnel underneath the zygomatic arch and posteriolateral wall of the maxilla. The myofascial flap was pulled through the tunnel and guided anteriomedially into the defect intraorally. Nayak and Swain [10] described reconstruction of maxillary defect by TMFF following excision of ameloblastoma. In our study we in 3 cases did a lateral orbitotomy approach in placing the flap for reconstruction.

Conclusion

Temporalis myofascial flap is a suitable solution for reconstruction of the maxilla-orbit defects. It is easy to learn and provides a rapid reliable reconstruction with less morbidity. It should be in the armamentarium of a head and neck surgeon while planning oncological resection of the maxilla-orbit defect.

Summary

- Reconstruction of maxilla-orbit defects is difficult and challenging.
- Temporalis myofascial flap is suitable for reconstruction as it is well vascularised, easy to raise and close to defect site.
- Temporalis myofascial flap use is advantageous in those defects where the palate is preserved and in individuals who cannot withstand long duration surgery or where the technical knowhow for free flaps is unavailable.

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