Discussion

Anterior Cranial Base Reconstruction with a Reverse Temporalis Muscle Flap and Calvarial Bone Graft

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This article describes a small series of five cases of anterior cranial base reconstruction using a reverse temporalis muscle flap. In four out of the five cases, an autologous split calvarial bone graft was used while in the remaining one case, hydroxyapatite bone cement was used. This one case may be rather confusing to readers. The technique, though it is not a totally new member of the reconstructive armamentarium, it has not been reported widely since it was first described by Kim and Park [1] in 1995 more than one and a half decades ago. Therefore, this series may be worth revisiting, thus highlighting the message again.

As stated by the author(s) of this article, most surgeons would embarked on microsurgical reconstruction for this kind of defect, as evidenced in large series by Cordeiro and Santamaria [2], Califano et al. [3], Chiu et al. [4], and many more. This approach has been a gold standard for many to reconstruct a large base of skull defect.

The temporalis muscle flap has been used in craniofacial reconstruction for more than a century, and one of the earliest reported cases was credited to Golovine, who reported the technique in a *French Ophthalmology Journal* in 1898 (quoted from Speculand [5]). The anatomy and blood supply of this flap has been described extensively in the literature [6]. Despite being in the locality, being expendable, and lending itself well to craniofacial reconstruction, there are shortcoming of this flap, especially its reach and bulk when the defect is situated more centrally in the midline. Several maneuvers have been attempted to deal with these problems such as resection of the coronoid insertion, and various way of transferring the flap by performing osteotomy or ostectomy.

Kim and Park [1]'s introduction of the reverse temporalis muscle flap had added an extra dimension to the application of the temporalis muscle flap to significantly lengthen the flap's reach. Chen et al. [7] have described the anatomical basis of its blood supply, which originates from the superficial temporal artery instead of the deep temporal arteries via their intercapillaries' connection near the origin of the muscle.

One of the extra advantages of reverse temporalis muscle flap worth mentioning is the possibility of harvesting a vascularized split calvarial bone graft, which may not be possible with regularly used free tissue transfer such as rectus muscle or anterolateral thigh flaps. However, this will add additional technical challenges in the design and inset of the flap. Nevertheless, it would be a more novel approach to this problem. We have published a paper highlighting the unique advantage of the vascularized split calvarial bone graft technique in a child. In our case, the split calvarial bone graft was raised based on the superficial temporal vessel, of which the same vascular pedicle was used in the reverse temporalis muscle flap. A computed tomography scan performed four years after the procedure had shown good graft integration and growth [8]. Other advantages of vascularized calvarial bone graft are greater resistance to infection, no or minimal bone resorption as the osteocytes remain viable and numerous [9]. In the article discussed here, the authors mentioned some of the advantages of calvarial bone graft over other sources of autologous bone graft and synthetic or bio-engineered bone replacement on top of the points mentioned above.

In this series, the authors had mentioned several times that one of the advantage of this technique is that the flap was harvested from one surgical field and which supposedly would have shortened the operative time, as it is a pedicle flap. However, on the other hand, having the flap raised from the same region precluded the two team approach that could have shortened the operative time. Most surgeons would agree that raising free tissue transfer in a second surgical field will allow for a two team approach and most flaps can be completely raised by the time neurosurgical resection is done.

Although the conventional temporalis muscle flap or its reverse modification are proven to be reliable with low complication rates, one of the well-known setbacks of this flap is donor site depression, which may be disfiguring and distressing. Previous reports have advocated temporal implant and even free tissue transfer [10-12]. The authors in this article have used simple techniques like micro-fat grafting and dermo-fat grafting under local anesthesia with acceptable results.

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