¹Clinic for Maxillofacial Surgery, University Clinical Center in Sarajevo, Sarajevo, Bosnia and Herzegovina

²Clinic for Plastic and Reconstructive Surgery, University Clinical Center in Sarajevo, Sarajevo, Bosnia and Herzegovina

Corresponding author: Dino Dizdarevic, MDD. Clinic for Maxillofacial Surgery, University Clinical Center in Sarajevo, Sarajevo, Bosnia and Herzegovina. E-mail: drdinod@gmail.com

Elongated Miofascial Temporal Flap in Comparison with Standard Surgical Procedure of Temporal Muscle Reconstruction

Dino Dizdarevic¹, Tarik Masic¹, Edi Muslic²

ABSTRACT

Introduction: Flap of the temporal muscle (m. temporalis) with its natural position, its mass and its length, compared with other bound and free microvascular flaps, is the method of choice for covering the middle part of the face after the removal of large tumor masses. **Material:** The study included a sample of 36 patients who were surgically treated due to malignant process at the middle face level with the performed partial, total or bilateral maxillectomy at the Clinic for Maxillofacial Surgery, University Clinical Center in Sarajevo. The sample is divided into three groups. **Methods:** The usual procedure of lifting the temporal flap in the first group, at the second extension of the coronoid process. A group of three-elongated myofascial flap, which includes lifting the muscle along with deep temporal branches of maxillary artery with deep temporal fascia, its two layers and associated stem of the superficial temporal artery. **Results:** Statistical analysis of the length indicated that in group III the mean length was 9.83 cm, group II- 8.25, and group I- 6 cm. The longest segmental lobe in group three provides safer work and the length of the lifted lobe with double vascular stem. This provides coverage of defects that cross over the median line of the middle face. The results coincide with the comparative world studies. **Conclusion:** For large defects at the middle part of the face that overlap the median line, an extraordinary solution is elongated myofascial flap with double vascular supply, with a larger flap mass and a length of about 9.83 cm.

Key words: Middle facial level, Temporal muscle flap, elongated myofascial temporal flap, double vascular stem.

1. INTRODUCTION

Reconstruction of the middle part of the face is very often performed with the flap of temporal muscle. Its natural position, vascular stem, allows a good tissue replacement in case of surgical removal of malignant process at the face midsection (1-3).

In cases where the defect is larger, two temporal limbs were used, which requires long lasting surgery as well as large donor morbidity of this facial area.

With the evolutionary development of the surgical procedure, it was concluded that the resection of the tendon from the coronoid process, the flap is elongated by about 2 cm, of possible 7 cm, depending on the need and the type of surgical lift. With this knowledge, it is quite easy to cover larger defects as well so the procedure has become much more comfortable in terms of the angle of rotation of the vascular stem without fear of vascular insufficiency (4, 5).

Further scientific development of the surgical procedure, placing emphasis on vascular supply, resulted in the elongated myofascial flap, which involves the lifting of muscle together with a deep temporal fascia, its two layers and the preserved stem of the superficial temporal artery and vein, which provides safer work and the length of the lifted flap with double vascular stem.

Figure 1. Schematic presentation of temporal flap vascular supply

© 2017 Dino Dizdarevic, Tarik Masic, Edi Muslic

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

In this way, we get a flap covering the defects over the medial line with better quality of blood supply and higher mass (7, 8).

2. MATERIAL AND METHODS

The study included a sample of 36 patients who were surgically treated due to the malignant process at the face mid-level with the performed partial, total or bilateral maxillectomy at the Clinic for Maxillofacial Surgery, University Clinical Center in Sarajevo, from 2013 until today. Depending on the size of the defect or the type of maxillectomy performed, we applied a certain surgical procedure:

- In partial maxillectomy with the defect of the palate—the usual procedure for the lifting of temporal muscle with the preserved zygomatic arch.
- In total maxillectomy, the usual procedure with extension in the sense of releasing the tendon from the coronoid process.
- In the bilateral maxillectomy the elongated myofascial flap with double vascular supply.

Figure 2. Schematic presentation of defect level

Access to temporal muscle is achieved by bicoronal or hemicoronal incision. After the preparation the scalp is lowered to the supraorbital line.

The dissection continues in the superficial fat tissue, following a deep layer of deep temporal facias until the level of the zygomatic bone, where after the show zygomatic arcus it is cut and descended to periost. The superficial temporal fatty tissue is lifted untouched and thus is achieved the preservation of the temporal branch of the facial nerve.

The electrocutionist draw a contour of the muscle, with a rasp the muscle is peeled off the bone, bearing in

Figure 3a and b. Original photographs from the Maxillofacial Surgery Clinic, UCCS a. Display of lifted temporal lobe; b. Visualization of the zygomatic arch.

Figure 4. Maxillary artery with two temporal branches supplying temporal muscle.

mind a strong attachment to the bone in order to preserve the vascular supply.

By removing the arch, it is possible to elevate and achieve the complete mobilization of the temporal muscle with the maximum angle of rotation. The same procedure was used to explore the coronoid process, and the possibility of muscle trauma during rotation is reduced.

It should also be borne in mind that when removing the tendon from the coronoid process, the instrument should be close to the bone so that there is no injury to the vascular stem.

3. RESULTS

The results show statistically significant differences between the groups, and the mean values of the length in centimeters (cm), show the mean length of flap 6 ± 0.74 cm in the group I, 8.25 ± 0.62 cm in group II and in group III 9.83 ± 0.83 cm.

In 86% of cases the flaps survived, 13.9% refers to the partially survived flap with secondary correction, while it survived in 100% in group III, indicating that it is the safest way to use the flap.

Graph 1. Comparison of lobe length in three different procedures

4. DISCUSSION

The surgical procedures of removing the temporal flap depend on the size and position of the defect, whether it will be used partially and fully mobilized and with the elongation of the coronoid process.

Also, the elongated myofascial flap is applied in large defects of the face mid-level with double blood supply, which saves operating time compared to procedure when removing two flaps for reconstruction and provides lower donor morbidity.

Graph 2. Percentage of flap survival in relation to the surgical procedure used.

Graph 3. Numerical presentation of the flap survival in relation to the surgical procedure used

The results show statistically significant differences between the groups, and the mean values of the length in centimeters (cm), show the mean length of flap 6 ± 0.74 cm in the group I, 8.25 ± 0.62 cm in group II and in group III 9.83 ± 0.83 cm.

This indicates that the use of elongated myofascial temporal flap provides the longest mobilized flap with two supply stems, which is the method of choice for large middle face defects.

Abubakar et al. (5) presented a series of 11 patients in English literature between 1987 and 2000 using temporal muscle for repairing defects in the oral cavity. They showed a very low percentage of complications with this flap (1.6%), and that the technique of surgery was very safe with minimal surgical risk.

Throughout our study, in 86% of cases the flaps survived, 13.9% refers to the partially survived flap with secondary correction, while in 100% it survived in group III, which is the safest way to lift the flap.

David P Tauro et al. (6) practiced a relatively new and simple technique for the transposition of the temporal myofascial flap into the oral cavity without fracturing the zygomatic arch, eliminating all the complications and disadvantages of conventional technique involving a deliberate fracture of the zygomatic arch.

By comparing this study with our group, I and the group that applies to this surgical procedure, we absolutely agree with the conclusions of this study, with a timely indication of the use of the same in relation the defect to be covered.

5. CONCLUSION

For large defects of the middle face that overlap the median line, an extraordinary solution is the elongated myofascial flap with double vascular supply, with a larger flap mass and a length of about 9.83 cm.

Compared to the two standard procedures, with the above-mentioned measurements, and the monitoring of operated patients, we have come to the conclusion that double vascular stem with elongated myofascial flap is more secure for both the patient and the surgeon.

It provides full mobility with the maximum angle of flap rotation, without fear of vascular ischemia, as double vascular supply is provided.

By measuring the length of the flap, we obtained a mean value of 9.83 centimeters, which is the longest and most massive of the three surgical procedures used.

This allows it to cover defects over the median line, which automatically excludes the use of two flaps, which has been the practice so far.

By relying on this, we can conclude that there is a shorter surgery and the success rate of the surgery is higher, which allows faster patient recovery.

The aforementioned goes into support of the elongated myofascial flap, which according to our research is the method of choice for covering large middle-level facial defects.

- **Conflict of interest:** none declared.
- **Authors contributions:** All authors participated in every step of research and gave final approval of the version to be submitted.

REFERENCES

1. Bradley P, Brockbank J. The temporalis muscle flap in oral reconstruction. A cadaveric, animal and clinical study. *J Maxillofac Surg.* 1981; 9: 139-45.
2. Koranda FC, McMahon MF, Jernstrom VR. The temporalis muscle flap for intraoral reconstruction. *Arch Otolaryngol Head Neck Surg.* 1987; 113: 740-3.
3. Huttenbrink KB. Temporalis muscle flap: An alternative in oropharyngeal reconstruction. *Laryngoscope.* 1986; 96: 1034-8.
4. Abdul-Hassan HS, von Drasek Ascher G, Acland RD. Surgical anatomy and blood supply of the facial layers of the temporal region. *Plast Reconstr Surg.* 1986; 77: 17-28.
5. Abubakar AO, Abouzgia MB. The temporalis muscle flap in reconstruction of intraoral defects: An appraisal of the technique. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2002; 94: 24-30.
6. Tauro DP, Mishra M, Singh G. Temporalis myofascial flap transfer into the oral cavity without zygomatic arch osteotomy. *Natl J Maxillofac Surg.* 2013; 4: 229-31
7. Clauser L, Curioni C, Spanio S. The use of the temporalis muscle flap in facial and craniofacial reconstructive surgery: A review of 182 cases. *J Craniomaxillofac Surg.* 1995; 23: 203-14.
8. Gupta AK, Jain S. Temporalis muscle sling revisited: A technique to restore ocular sphincter function. *Ann Plast Surg.* 1994; 33: 496-9.