Reconstruction of Maxillary Defect and Orocutaneous Fistula by Free Latissimus Dorsi Myo Cutaneous Flap

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Abstract

Many different pedicled or free flaps used for coverage of post oncological defects in cases of oral malignancies. Here we are presenting case of patient with maxillary defect with orocutaneous fistula in operated case of maxillary SCC and two attempts of previous reconstruction by temporalis muscle flap and forehead flap; which were unsuccessful. We reconstructed defect of patient with help of Latissimus Dorsi free flap taken from ipsilateral chest. We modified it and made the skin paddle as Bipaddle, the inner one was used to reconstruct the palate and the outer one was used to close the orocutaneous fistula and muscle was used to fill the soft tissue defect. Latissimus Dorsi free flap is the versatile option used in this case of post-recurrent maxillary carcinoma with orocutaneous fistula. Its robust blood supply, bulkiness, skin paddle, large vascular pedicle length and diameter makes it a workhorse flap for reconstruction of defects.

Keywords: Latissimus dorsi flap • Radical maxillectomy • Orocutaneous fistula • Microvascular reconstruction

Introduction

With the advent of microsurgical techniques free flaps have been used immensely to cover the post excisional oral malignancy defects. Free flaps are more compliant than pedicled flaps and also serve an option of using pedicled flaps when it fails. Latissimus Dorsi flap is a versatile flap for the reconstruction. It can be transferred as a pedicled /free flap for complex defect's reconstruction. Its robust blood supply by thoracodorsal artery makes it an excellent option for free flap reconstruction [1].

Here we present a case done in 2003. Patient had Squamous cell carcinoma of maxilla, for which he underwent for maxillectomy and was reconstructed by temporalis flap. But the flap failed and after the failure of temporalis flap, forehead flap was done but the results weren't as expected. The end-result after multiple surgeries was open palate and orocutaneous fistula connecting right maxilla to skin. Palate was also communicating with maxilla and the outer skin leading to miserable condition of patient. Patient developed Recurrence and we were asked to reconstruct maxilla and hard palate and closure of orocutaneous fistula. Very few options were left pedicled flap or Free flaps. Vascularised Latissimus Dorsi free flap was planned for the reconstruction of the complex oral malignancy defect. In 2003 Free Anterolateral thigh flap was a new surgery and we were not acquainted with it. At the end of surgery, we were able to reconstruct the maxilla and and close the oro-cutaneous fistula with the help of Latissimus Dorsi free flap taken from ipsilateral chest. We modified it and made the skin paddle as Bipaddle, the inner one was used to reconstruct the palate and the outer one was used to close the orocutaneous fistula muscle was used to fill the soft tissue defect.

Case Presentation

45-years-old male patient, an operated case of carcinoma of Maxilla with orocutaneous fistula with right maxillectomy and hard palate defects. Patient had multiple failed surgeries. He developed recurrence and as oncoplastic surgeons we were asked to reconstruct the right maxilla and orocutaneous fistula.

The defect size was measured, amount of the skin coverage required and also the soft tissue reconstruction in maxillary cavity was calculated. Complex reconstruction was required of hard Palate, maxillary defect and closure of orocutaneous fistula. Local flap options were already failed. PMMC1 and DP flap was not considered as the mandible was intact and nasolabial flap was small and not meeting our requirements. Hence free flap was the only option. Free Radial artery forearm flap, Rectus abdominis, Latissimus Dorsi, Gracilis etc were taken into consideration. In 2003 ALT was not popularized [2,3]. So, LD myocutaneous flap was planned as bulk and skin both were required. Other free flaps were not used as they were not meeting the requirement.

We decided for Latissimus Dorsi Flap [4,5]. As it has Muscle to fill the defect as well as Myocutaneous segment which could be used to cover the orocutaneous fistula and to form skin skin-lined Hard palate. The onco surgeon excised the tumor recurrence and the resulting defect was big cavity including Maxilla and outer skin of cheek. Latissimus Dorsi muscle was elevated from back and it was used to cover the maxilla and the orocutaneous fistula [6,7]. Vascular anastomosis was done with facial artery and Common facial veins. Post operatively flap survived without any problems, we were able to reconstruct palate as well as the orocutaneous fistula. Later on, patient was able to drink and eat properly. He was quite satisfied with the reconstruction (Figure 1).



Figure 1. Preoperative picture of patient showing maxillary defect and orocutaneous fistula.

Surgical technique

Latissimus Dorsi flap is elevated from back in lateral position.

Markings of LD: Midpoint of Axilla, Angle of Scapula Posterior Ilic spine, Mid spine.

Tissue: Muscle flap. May be harvested with a skin paddle.

Innervation: The thoracodorsal nerve.

Blood supply: Thoracodorsal artery via the subscapular artery.

Artery: Can be up to 2 mm or 5 mm if harvested up to the subscapular artery.

Vein(s): Comparable to the artery. A single venae commitans. Pedicle length: Up to 15 centimeters.

Operative procedure

The patient is placed in the left lateral position. The ipsilateral side was taken. The latissimus border was outlined with a marking pen. The incision marked extending from the axilla along the posterior axillary fold, then inferiorly and medially over the latissimus muscle. Skin paddle was marked as per the requirement. We were careful as we wanted to close the defect primarily. So, length and width of skin paddle was limited.

Anterior and posterior flaps were raised superficial to the muscle to expose the latissimus as per the required size. The superior edge of the latissimus is identified at the inferior angle of the scapula. Skin paddle is tagged to the muscles to avoid any shearing force. Serratus muscle is identified. The required amount of muscle elevated with a skin paddle. The insertion of muscle in the back was divided from the midline, Inferiorly, the insertions from iliac crest are freed with electro cautery. The required amount of Flap elevated. We tried to keep the length of the vascular pedicle as long as possible.

After release of the medial and inferior muscle, the dissection proceeds underneath the muscle toward the axilla. The muscle takes origin on the iliac crest inferiorly and the thoracolumbar fascia posteriorly near the midline. It inserts into the humerus where it acts as a humeral adductor and internal rotator. The posterior axillary fold is made up of the most superior aspect of the muscle. It is inserted into the Bicipital groove on humerus. The nerve supply is via the thoracodorsal nerve, a branch of the posterior cord of the brachial plexus. The latissimus muscle blood supply is via the subscapular artery, a branch of the third part of axillary artery. The subscapular gives circumflex scapular branch posteriorly which supplies scapula and then serratus branch which supplies Serratus Anterior Muscles. Then it enters the muscle as thoraco dorsal artery. We can get around 10 cms-15 cms of pedicle length. The subscapular artery can be from 2 to 4 millimeters in size, while the thoracodorsal artery ranges from 1 to 3 millimeters. The venae commitans are usually slightly larger. Typically, there is single venae commitantes and the thoraco dorsal nerve runs along with it.

The pedicle can be approached directly by dissecting the latissimus from the axilla, or from the undersurface of the muscle in a distal to proximal approach. The artery divides in the muscle, so the muscle can be split longitudinally to form a bilobed or two-tongued flap. LD has a dual blood supply from the Thoracic Intercoastal and Lumbar artery. It is a Type V type muscle.

The vessels to the latissimus and serratus become clear as the axilla is neared. The branch to serratus and the circumflex scapular branch were ligated as more length was needed. The nerve divided and the bleeding checked over the flap and it was raised and divided. And was transferred to recipient area of maxilla.

The wound closed in layers over suction drains. Inset of the flap done in Bi paddle fashion. One skin paddle formed the Hard palate while another one was used to close the orocutaneous fistula.

Muscle was used to fill up the maxillary cavity.

Post operatively Flap survived well. Scratch tests were positive on both the skin paddle. Post-operative phase was uneventful. Patient was discharged after the tenth day. There was no weakness of the shoulder joint or any other functional problems.

We followed up patient for initial two years. He was totally fit and fine enjoying his routine life. Fifteen years after surgery we suddenly came across the same patient. He was free of disease. His flap has settled well. He was eating and talking routinely (Figures 2-4).



Figure 2. Intraoperative picture showing LD Flap.



Figure 3. Postoperative picture showing final look after flap inset.



Figure 4. Final pre-operative and postoperative look.

Discussion

The Latissimus Dorsi muscle is the largest muscle in the body, up to 20 by 40 centimeters, which allows coverage of extremely large wounds. Despite its size, no significant donor functional deficit results from removal of the muscle. It is the largest flap that can be harvested on a single pedicle, and can even be combined with the serratus anterior, scapular or Para scapular flaps to create a flap complex that can cover massive wounds. In the normal population, the muscle is quite thin (less than 1-centimeter-thick), allowing it to be draped over irregular surfaces with ease. With the rectus muscle and radial forearm flap, it represents one of the workhorse7 flaps in reconstructive microsurgery. Once reinnervated using the thoracodorsal nerve, the latissimus can be used for functional muscle transfer.

Advantages of LD flap:

- A good amount of muscle can be taken along with skin.
- Long vascular pedicle.
- 2.5 mm to 3.0 mm diameter of vessels size
- Good and easy elevations
- Workhorse flap
- Very little amount of donor site morbidity
- Routinely used flap for other parts of the body.

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- Donor site gets closed primarily
- Both inner and outer defects could be covered by a single LD flap
- The patient can take radiation after free flap reconstruction.

The advent of micro-vascular free tissue transfer has facilitated the reconstruction of increasingly complex head and neck defects. There are multiple donor sites available, each with its own advantages and disadvantages. However, the subscapular system, including the thoracodorsal system, provides the widest array of soft tissue and osseous flaps, as well as chimeric options. Its advantages include a long pedicle, independently mobile tissue components, relative sparing from atherosclerosis, and minimal donor site morbidity. The soft tissue flaps available from the thoracodorsal system include the Latissimus Dorsi, and Thoracodorsal Artery Perforator flaps, while the Tip of Scapula provides the osseous component.

Presenting here, a case of Carcinoma maxilla in 2003, operated with radical maxillectomy with reconstructed with failed Temporalis and forehead flap. At that time forehead was one of the reconstructive flaps. After multiple failed attempts, patient landed up in recurrence and orocutaneous fistula. It was planned for radical maxillectomy and reconstruction of defect.

Pedicled flap PMMC1 and DP was difficult to use as the mandible was present. Local flaps like Temporalis and Forehead were already used. Other free flaps like radial/gracilis and rectus abdominis was considered but the defect needed bulk also along with skin [8,9]. Fibula was not considered as we do not want to reconstruct bone. So in the end it was decided to use free LD flap for reconstruction [10,11].

Defects of the midface and maxilla are often the most challenging problems faced by the Onco reconstructive surgeon. Resections of critical structures nose, eyelids, and lips with the maxilla are difficult to reconstruct. The algorithm for reconstruction of these defects is usually based on the extent of maxilla that is resected. A classification system for maxillectomy defects is the most useful way to approach these reconstructions. A vast majority of extensive defects involving the maxilla and midface require free flap reconstructions. The type of flap selected is based on the extent of skin, soft tissue, and bone that is resected with minimum functional loss of shoulder [12,13].

As per Peter Coedeiro smaller volume defects with large skin surface requirements are best reconstructed with the radial forearm fasciocutaneous or osteocutaneous flaps. Larger softtissue volume and skin surface can be provided by the rectus abdominis myocutaneous flap. Our defect needed big volume as well as skin lining for palate and for orocutaneous fistula. So we decided on Latissimus Dorsi flap instead of Rectus abdominis flap.

Eric Santamaria *et al.* gave algorithm for maxillary defects as Type I limited Maxillectomy, Type II as sub-total maxillectomy Type III as Total maxillectomy and Type IV as Orbito Maxillectomy. Using this classification, reconstruction of maxillectomy and midfacial defects may be approached considering the relationship between volume and surface area requirements, that is, addressing the bony defect first, followed by assessment of the associated soft tissue, skin, palate, and cheek-lining deficits. In their experience, most complex maxillectomy defects were best reconstructed using free tissue transfer. The rectus abdominis and radial forearm free flap in combination with immediate bone grafting or as an osteocutaneous flap reliably provide the best aesthetic and functional results.

In literature Urken *et al.* has described the Lattissimus Dorsi flap as free or pedicled flap in Head and Neck defects. Jacono et al has also described LD as a pedicled flap for head and Neck reconstruction. Fu Chen Wei 4and Samir maridini6 described various ways of reconstruction of maxilla with ALT and Fibula flap [14-17].

Conclusion

Latissimus Dorsi free flap is the versatile option used in this case of post recurrent maxillary carcinoma with orocutaneous fistula. Its robust blood supply, bulkiness, skin paddle, large vascular pedicle length and diameter makes it a workhose flap for reconstruction of defects. With the advent of microsurgical techniques complex defects could be covered easily, with LD flap.

Hence LD free flap is one of the options for maxillary defect reconstruction as in our case.

References

- 1. Ariyan. S. "The Pectoralis Major Myocutaneous Flap: A Versatile Flap for Reconstruction in the Head and Neck." *Plast Reconstr Surg.* 63.1 (1979):73-81.
- 2. Varvares. M. A. "Success of Multiple, Sequential, Free Tissue Transfers to the Head and Neck." *Laryngoscope.* 115.1 (2005):101-104.
- 3. Owens, N. "A Compound Neck Pedicle Designed for the Repair of Massive Facial Defects: Formation, Development and Application." *Plast Reconstr Surg.* 15.5 (1955): 369-389.
- 4. Urken, M. L. "Atlas of Regional and Free Flaps for Head and Neck Reconstruction." *J Craniofacial Surg.* 6.5 (1995): 424.
- Jacono, A. A., and A. L. Moscatello. "Pedicled Myocutaneous Flaps in Head and Neck Surgery." *Oper Tech Otolaryngol.-Head Neck Surg.* 11.2,(2000):139-142.
- Germann, G., and M. Öhlbauer. "Latissimus Dorsi Flap." Fl Reconstr Surg. (2009): 287-319.
- Cannady, S. B. "Free Tissue Transfer for Head and Neck Reconstruction: A Contemporary Review." *JAMA Facial Plast Surg.* 16. 5 (2014):367-373.
- 8. Copelli, C. "Management of Free Flap Failure in Head and Neck Surgery." *Acta Otorhinolaryngol Ital.* 37.5 (2017): 387.
- Kovatch, K. J. "Current Practices in Microvascular Reconstruction in Otolaryngology-Head and Neck Surgery." *Laryngoscope*. 129.1 (2019):138-45.
- Gabrysz-Forget, F. "Free versus Pedicled Flaps for Reconstruction of Head and Neck Cancer Defects: A Systematic Review." *J Otolaryngol.-Head Neck Surg.* 48.1 (2019): 13.
- Wilkman, T, et al. "The Pedicled Latissimus Dorsi Flap in Head and Neck Reconstruction: An Old Method Revisited." J Reconstr Microsurg. 30.3 (2014): 163-70.
- Spear, S. L., and C. L. Hess. "A Review of the Biomechanical and Functional Changes in the Shoulder Following Transfer of the Latissimus Dorsi Muscles." *Plast Reconstr Surg.* 115.7 (2005): 2070-2073.
- Brumback, R. J. "Functional Evaluation of the Shoulder After Transfer of the Vascularized Latissimus Dorsi Muscle." *JBJS*. 74. 3 (1992): 377-382.
- 14. Cordeiro, P. G., and C. M. Chen. "A 15-Year Review of Midface Reconstruction After Total and Subtotal Maxillectomy: Part I. Algorithm and Outcomes." *Plast Reconstr Surg.* 129.1 (2012): 124-136.
- Ong, H.S., et al. "The Pedicled Latissimus Dorsi Myocutaneous Flap in Head and Neck Reconstruction." *Oral Maxillofac Surg Clin N Am.*, 26.3 (2014): 427-434.
- Cordeiro, P.G., and Santamaria, E. "A Classification System and Algorithm for Reconstruction of Maxillectomy and Midfacial Defects." *Plast Reconstr Surg.* 105.7 (2000): 2331-2346.
- McCarthy, C.M., and Cordeiro, P.G. "Microvascular Reconstruction of Oncologic Defects of the Midface." *Plast Reconstr Surg.* 126.6 (2010): 1947-1959.

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