

Role of Pectoralis Major Muscle Pedicle Flap in Reconstruction of Orofacial Region

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ABSTRACT

Background: The pectoralis major myocutaneous flap has been used for decades for reconstruction of oral and orofacial region defects. There was a need to evaluate this flap as regard reliability and efficacy. The aim of this study to evaluate the reliability and efficacy of this flap for oral and orofacial reconstruction.

Methods: The study was done in the department of maxillofacial surgery, faculty of medicine, Assiut University, the period was 2 years, 7 cases of orofacial defects (6 cases of oral cancer; and one case of traumatic soft tissue loss) were treated by pectoralis major myocutaneous flap. A written consent was taken for each patient. Full history, complete clinical examination and routine investigations done for very patient, some patients needed additional investigations. In all cases the flap used for primary reconstruction.

Results: In this study the males were more than females (5/2), the age range was from 41 to 67 years. For all patients we used single paddle pectoralis major muscle myocutaneous flap for primary reconstruction of the orofacial defect. Superficial necrosis of the skin island occurred in one patient and healed spontaneously. 2 cases had orocutaneous fistula and managed conservatively. The difficulty in swallowing improved gradually for all patient. The whole flap survival rate was perfect (100).

Conclusion: We found that pectoralis major muscle myocutaneous flap is a good option for orofacial reconstruction; it could be a suitable alternative if free flap is not available.

Keywords

Orofacial surgery, Flap, Malignant tumors,

Introduction

Restoration of normal oral function following extensive orofacial surgery depends on variety of factors which include reconstruction of complex osseous, dental and soft tissue anatomy. To achieve optimal function and aesthetics is therefore a challenge to oral and maxillofacial surgeon [1].

Over the past two decades, there has been a steady advance in the available surgical techniques for reconstruction of orofacial

defects after ablative surgery. The use of myocutaneous flaps has been a huge step forward in head and neck oncological surgery, as it allows covering extensive resection, which is necessary to comply with the demands of radical removal of malignant tumors and at the same time, achieving acceptable morphological and functional restoration [2]. Pickrell in 1947 originally described the pectoralis major muscle flap as local transposition flap. He used this flap successfully for closure of chronic bronchial fistula [3].

Cuono and Ariyan in 1980 reported the case of immediate reconstruction of a composite mandibular defect using pectoralis major osteomyocutaneous flap, incorporating a segment of the

fifth rib. The viability of rib was confirmed post operatively with technetium scanning at 3 months. This observation supports the existence of vascular network interconnecting muscle and underlying compact bone [4]. In 1997, Kerwin Williams reported the case of retrosternal esophagus colonic anastomotic leak repaired with pectoralis major myocutaneous flap with successful outcome [5]. The main advantages of this flap are its reliable vascularity and good viability, protection of carotid artery and acceptable cosmetic appearance in cases where bulk of tissue is required. In addition, this flap can easily be used in irradiated areas and even a large cutaneous island of donor site closed primarily [6].

Methods

This study was carried out for a period of two years at maxillofacial department, faculty medicine, Assiut University. During this period 7 cases (5 males and 2 females) were treated and evaluated. The cause of the defect was post resection due to oral cancer for 6 patients (Figure 1), and post traumatic for one patient. Individual patient written consent was obtained. Full History and complete clinical examination was carried out as per the protocol. For all patients routine investigations and additional investigations as per the case were done. Pectoralis major myocutaneous flap (PMMC) was used for primary reconstruction in all cases. All patients were operated under general anesthesia. For patients having oral cancer, excision of the growth with radical neck dissection was done by a maxillofacial surgeon, and for the patient with trauma careful debridement was done. Careful evaluation of the defect as regard size and shape and then planning of flap was done.



Figure 1: Lift mandibular alveolar SCC.

Surgical technique

The flap was raised with defensive approach as described by McGreger [7]. At first the landmark for the vascular pedicle of the flap was drawn, identification of the acromion, xiphoid, medial end of the clavicle. A line is drawn from the acromion to xiphoid. A second perpendicular plane on the first plane and bisects the midpoint of the clavicle is drawn. The course of the thoracoacromial artery corresponds to a line from midpoint of the clavicle to medial portion of the acromion to xiphoid line (Figure 2). Skin island of measured size was located inferomedially to nipple (or inferiorly to nipple in females) and markings done for

skin island and deltopectoral flap. Deltopectoral flap was raised first and then Skin Island was incised to muscle level. 2.0 sutures with vicryl were taken for dermis and muscle to avoid disruption of the delicate musculocutaneous perforators (Figure 3).



Figure 2: Flap design.



Figure 3: Flap elevation.

Rising of Medial and lateral skin flaps to expose entire muscle. Identification of the free lateral edge of the muscle and then, muscle was elevated from the chest wall through bloodless areolar plane with blunt dissection. Then the muscle was mobilized medially, and the costal fibres were detached from their origin. Then dissection was continued medially to detach sternal fibres of muscle. Then the flap was elevated upwards, to identify lateral thoracic artery, pectoral branch of the thoracoacromial artery on the under surface of muscle, at the upper border of pectoralis minor muscle. 2 cm away from humeral head, cutting of the insertion of sternocostal part of the muscle. Thus the entire sternocostal portion of the muscle and skin island forms the true island myocutaneous flap.

Great care was done to avoid skeletonization of the vascular pedicle to prevent its injury or spasm. In the infraclavicular portion of the pectoralis major muscle the fibres run transversely across the vascular axis. The muscle was cut so as to maintain desired

width of this vascular pedicle. Then flap was translocated to the recipient site with muscle pedicle under the neck skin, by making a subcutaneous tunnel. The tunnel should be wide enough to accommodate the muscle at ease and allow for postoperative muscles welling without compromising blood supply.

Post-operative management

All patients received the usual postoperative medications (antibiotics, analgesics, vitamins). The postoperative position was to keep the neck in slight flexion on the ipsilateral side of to avoid tension on the pedicle of the flap. All patients were on I.V. fluids for 24 hours, then feeding through Ryle's tube started (Figure 4). Full fluid and semifluid oral diet started two weeks postoperatively. Patients were assessed for early postoperative and late complications. Follow up was once per month (Figure 5).



Figure 4: Immediate post-operative.



Figure 5: One month post-operative.

Results

This study included 7 patients (5 males and 2 females), their ages ranged from 41 to 67 years.

In all patients, pectoralis major myocutaneous PMMC flap used for closure of defect caused by either post resection of malignancy

in 6 patients, or due to trauma in one patient. For 6 patients the defect was intraoral and for one patient the defect was extraloral. The average operating time was 90-120 minutes. The donor site was closed directly in all patients, but two patients developed suture dehiscence, one was partial and healed spontaneously, but the other one had complete disruption of the wound and managed by partial thickness skin graft. The donor site scar was good in 5 patients, but was poor in 2 patients and managed conservatively using skin ointments.

All patients had difficulty swallowing in the first month after discharge, but improved gradually later on.

One case developed partial superficial skin necrosis (that case of skin reconstruction). One patient complained of intraoral hair growth, but this disappeared spontaneously after 4 months. For all patients the mouth opening was more than 2 fingers after 3 months. The flap survival was perfect for the 7 patients (100 percent).

One patient developed local recurrence (a case with retromolar squamous cell carcinoma) after 7 months, and subjected to further evaluation, then sent to radiotherapy. Two patients developed orocutaneous fistula, one healed spontaneously after 20 days, the other one persisted for 45 days with gradual narrowing upto complete closure.

One patient developed neck contracture four months postoperative, and managed by surgical release under local anesthesia.

Discussion

In this study we evaluated 7 cases with orofacial defects due to resection of oral cancer in 6 cases and due to trauma in one patient. Their ages ranged from 41 to 67 years. Most of cases in the present study were males. The male to female ratio was 5:2.

PMMC was used in 7 cases of head and neck defects following cancer surgery in 6 patients, of which 2 had retromolar carcinoma, 2 had tongue carcinoma, 1 had cheek carcinoma and 1 had mandibular alveolar carcinoma, the last case was with traumatic defect due to motor car accident with mandibular comminuted fracture. Ariyan used this flap in 14 cases of which 4 cases were of oropharyngeal resections, 2 cases of cervicofacial resections, 2 cases of orofacial resections, 3 cases of exenteration and radical temporalbone resections in 2 cases [8]. Se min Baek, et al. used this flap in 133 cases of which 57 cases were of intra oral defects, 13 cases of intra oral and cutaneous defects, 58 cases of circumferential pharyngoesophageal defects, and 5 cases of intra oral defects with mandibular reconstruction [9]. Theogaraj et al. used this flap for stricture of esophagus and pharynx following cancer surgery in 6 cases and pharyngocutaneous fistula in one case [10].

In the present study, PMMC used for primary reconstruction in all cases, also in the series of Se min Baek the reconstruction was primary in all cases [9]. Theogaraj et al. used this flap as a secondary reconstructive procedure in 6 cases and primary in one

case [10].

In the present study we used single skin paddle of pectoralis major myocutaneous island flap for all patients. Theogaraj et al. used single paddle for reconstruction of head and neck defects [10]. Ariyan used double paddle in one case of intra oral defect and single paddle in 13 cases [8]. Se min Baek used double island flap in 13 cases out of 133 cases of head and neck defects [9].

In the present study, Skin Island of pectoralis major myocutaneous flap was used for lining of the defect in 6 cases, and for cutaneous cover in one case. Se min Baek used PMMC island flap in 123 cases and distal paddle of double island was used for skin cover of the defect in 13 cases [9]. Theogaraj et al. used PMMC in all cases and for skin cover he used STSG [10].

In the present study, largest size of skin paddle used was 7 x 5 cm for a case of retromolar carcinoma, while Ariyan used maximum sized skin paddle of 8 x 26 cm size. Theogaraj et al. used largest skin paddle of 12 x 20 cm [10]. Withness used largest sized skin paddle of size 10 x 12 cm [11].

In the present study, the donor site of pectoralis major myocutaneous flap was closed primarily all cases but dehiscence occurred in 2 cases, one was partial and managed conservatively, the other one was complete and managed by a partial thickness skin graft. In the series of Leonard, Ariyan, and the ogaraj donor site was sutured primarily [8,10,12]. Thus donor area can be sutured primarily with good cosmetic appearance and minimum morbidity.

In the present study, we had postoperative complications like orocutaneous fistula in 2 cases, superficial necrosis of flap in one case (1/7), orocutaneous fistulae healed spontaneously within 45 days. Superficial necrosis of skin Island was seen in case of skin defect, it was managed conservatively with local dressings and antibiotics. Healing occurred within 15 days.

Late post-operative complication was occurred in one case as neck contracture, which required release of contracture. In Se min Beek series total necrosis of flap was occurred in 2 cases, superficial necrosis of skin paddle was seen in 13 cases, orocutaneous fistula was seen in 20 cases, out of 133 cases [9]. In Theogaraj series orocutaneous fistula occurred in one case, which healed spontaneously [10]. In Withness series 2 cases developed orocutaneous fistulae out of 9 cases which healed spontaneously [11].

In our study, we used the PMMC flap for reconstruction of lateral pharyngeal wall in 2 cases, for reconstruction of tongue and oral floor in 2 cases, for cheek reconstruction in 1 case, for mandibular alveolar reconstruction in 1 case, and for skin and subcutaneous tissue reconstruction in 1 case. In cases where carotid artery was exposed, cover was given with muscle bulk of pectoralis major.

In all cases, there was difficulty in swallowing, specially the two patients with lateral pharyngeal reconstruction but gradually improved for all patients.

Mortality rate was 0, but one case with retromolar carcinoma, developed local recurrence and sent for radiotherapy.

So inspite the recent advances in reconstruction like the free flaps, these conservative pedicled flaps still remains a choice for immediate reconstruction and are the work horse in the head and neck reconstruction, especially if the resources for free vascularized tissue transfer not available.

Summary and Conclusion

We found that, the use of pectoralis major muscle myocutaneous flap for reconstruction of the defects of the orofacial region is very effective, with acceptable postoperative complications and it could be a valuable alternative to free vascularized tissue transfer.

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