

Outcome of Pectoralis Major Mayocutaneous Flap in Reconstruction of Maxillofacial Defects

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Introduction: The aim of the present study was to evaluate outcomes and complications related to pectoralis major mayocutaneous (PMM) flaps in the reconstruction of maxillofacial defects. **Materials and Methods:** Subjects who underwent pectoralis major mayocutaneous flaps to reconstruct maxillofacial defects due to trauma or tumor resection were studied. Complications were considered in two stages: early and late. A modified version of the University of Washington Quality of Life questionnaires, version 4, was used to evaluate the functional outcome of patients who underwent free flap or PMM flap reconstruction. The survey is composed of 6 domains: pain, appearance, activity, swallowing, chewing, and speech. We scored domains on a scale ranging from 0 (worst) to 100 (best). We considered scores higher than 70 in the normal range for appearance, activity, swallowing, chewing, and speech. **Results:** Thirty-one subjects were studied. The most common defect sites were oral floor (48.3%) and buccal soft tissue (32.2%). The least common was neck (19.3%). Immediate complications consisted of dehiscence in 3 cases (9.6%) and flap necrosis in 2 cases (6.4%). Late complications included dehiscence in 3 cases, partial necrosis of skin without muscle necrosis in 1 case, and donor site infection in one case. The most common complications seen in both stages were dehiscence (19.3%) and necrosis (9.6%). In the immediate phase, patients mostly complained of pain. In the late stage, pain significantly decreased. Activity, swallowing, and speech improved in the late stage. **Conclusion:** Our study indicated a significant improvement in patients' functional outcomes after discharge from the hospital. The pain was a major complaint of patients immediately after reconstruction with PMM flap, which should be considered as a significant concern for maxillofacial surgeons.

Keywords: Pectoralis Major Mayocutaneous Flap; Reconstruction; Mandible; Defect

Introduction

The pectoralis major myocutaneous (PMM) flap is one of the most popular flaps used in the reconstruction of maxillofacial defects. The PMM flap was initially described by Ariyan in 1971 (1). In the time it has become one of the most practical flaps used in the reconstruction of maxillofacial defects (2). The PMMC flap is a versatile, reliable, and single staged flap with a high success rate in the reconstruction of the maxillofacial defects (3). The PMM flap has been used for immediate or even delayed reconstruction of facial defects. Free tissue transfer techniques have become increasingly reliable with apparent benefits in oral function along with

fewer complications, though PMM flaps may still be chosen for advanced diseases (4). The PMM is a useful flap in maxillofacial reconstruction, due to the proximity of the region with acceptable reach to different areas of the face, oral cavity, and the pharynx. The reliability of free flaps in the maxillofacial and neck reconstruction has decreased the use of the PMMPF flap in comparable situations. However, the flap still has a place in the maxillofacial reconstruction, mostly after resection of locally advanced tumors. Also, the flap can still be applied as a salvage flap after the failure of free flaps or when microvascular surgery is not accessible (5).

This study aimed to evaluate outcomes and complications related to the PMM flaps in the reconstruction of maxillofacial defects.

Table 1. Prevalence of defect sites

	Oral floor	Bucal soft tissue	Neck	N
Tumor resection defects	14 (66.6%)	3(14.2%)	4(19%)	21(67.7%)
Traumatic injuries defects	1 (10%)	7 (70%)	2(20%)	10 (32.2%)

Table2. Patients functional outcome and pain in the immediate stages and late stages

	Sever Pain	Good appearance	Normal activity	Normal swallowing	Normal chewing	Normal speech
Immediate stage	26(83.8%)	28(90.3%)	8(25.8%)	20(64.5%)	8(25.8%)	18(58%)
Late stage	5(16.1%)	17(87%)	29(93.5%)	29(93.5%)	26(83.8%)	30 (96%)
Chi-square test	P<0.05	P>0.05	P<0.05	p<0.05	p<0.05	P<0.05

Materials and Methods

This is a cohort retrospective study. We studied subjects who underwent the creation of PMM flaps for reconstruction of maxillofacial defects between 2010 and 2018. All patients signed informed consent, following the accepted ethical standards formulated in the Declaration of Helsinki. Patients received operations 1 of 2 centers.

We studied complications due to PMM flap in the early and late stages. Subjects eligible for the study if they received a PMMflap after trauma or tumor resection. Patients that had previous free flap reconstruction or other flap usage and psychological disorders were removed from this study. Early complications defined as complications during hospitalization consisted of infection, dehiscence, partial or complete necrosis, and donor site morbidity. Late complications referred to complications that occurred three months after discharge from the hospital. These included late infection, dehiscence, partial or complete necrosis, and donor site morbidity.

We used a modified version of the University of the Washington Quality of Life questionnaire (UWQOL) version 4 to evaluate the functional outcome of patients who underwent free flap or PMM flap reconstruction(6). The questionnaire is composed of 6 domains: pain, appearance, activity, swallowing, chewing, and speech. The domains are scored on a scale ranging from 0 (worst) to 100 (best). We considered scores higher than 70 to be in the normal range for appearance, activity, swallowing, chewing, and speech. We considered scores higher than 70 to indicate that pain to interfere with normal activity. We scored the individual domains according to the UW-QOL guideline(7).

Surgical Technique

The initial skin incision was made along the previously marked pectoral skin island deep through the subcutaneous fat to the pectoral fascia around the marked area. The incision was extended inferiorly to the fascia was oblique to contain more

perforators from the muscle. The skin island was stiffened to the muscle with continuous absorbable sutures to keep the skin island during operation and postoperative healing. The next skin incision was made as a lower limb of a deltopectoral flap, which extends from the lateral edge of the pectoralis skin island to the anterior axillary fold. The prepectoral skin was elevated to the plane above the pectoral fascia. The lateral border of the pectoralis major muscle was identified, finger dissection was done between major and minor pectoral muscles, and the neurovascular pedicle (pectoral branch of the thoracoacromial artery) was identified. The plane between the pectoralis major and minor muscles was then developed. The thoracoacromial pedicle is seen as running on the undersurface of the pectoralis major muscle. After dissecting the flap of the chest wall, a subcutaneous tunnel was formed under the skin between the neck and chest, and the flap passed underneath the skin bridge. The flap covered the defect and sutured in two layers. The donor defect was then closed.

Statistical Analysis

The statistical analyses were performed using the statistical package SPSS for Pc, version 19 company. (IBM, USA). The Chi-square test was used to evaluate subjects' functions in the immediate and late phase of the treatment.

Results

We studied 31 patients who underwent the PMM flap. Patients were between 28 and 70 years, with the mean age of 49.2 ± 18.3 years. The study consisted of 19 males (61.2%) and 12 females (38.7%). Twenty-one patients (67.7%) had maxillofacial defects due to tumor resection (Figure 1,2), and other patients (32.2%) had defects due to traumatic injury (Figure 3). The majority of defects were reconstructed immediately with PMM flap (28 cases or 90.3%), and only 3 cases (9.6%) were reconstructed after a delay.



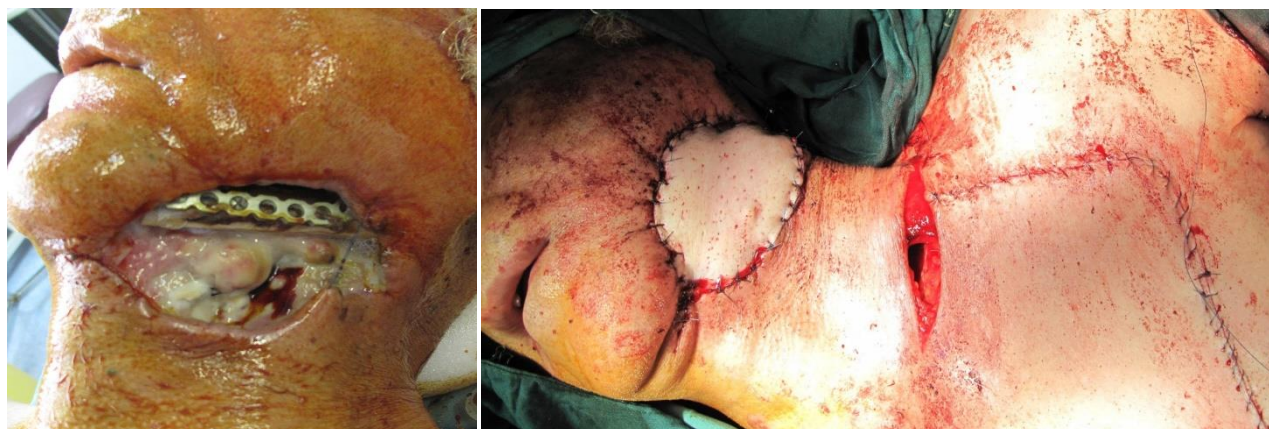


Figure 1. A) A defect due to dehiscence after primary resection and reconstruction; B) Inter-operative view of the patient during reconstruction using PMM flap



Figure 2. A) Buccal defect due to tumor resection and failure of previous intervention to repair it. The patient received radiation; B) Reconstruction site with PMM flap.



Figure 3. A) Traumatic defect on the mandible and neck due to the explosion; B) Reconstruction of the defect with PMM flap

The mean hospitalization time was seven days. The hospitalization time was higher than 18 days for patients with complications. The PMM flap was used to restore defects on the oral floor, buccal soft tissue, and neck. The most common defect sites were the oral floor (48.3%) and buccal soft tissue (32.2%). The neck (19.3%) was the least defect site (Table 1).

Squamous cell carcinoma (SCC) was the most common etiology of tumor resection (14 cases or 66.6%); sarcoma (4 cases or 19%); and mucoepidermoid carcinoma was third with 3 cases (14.2%). In the SCC patients, 8 cases had stage IV diseases (57.1%), and six patients were in stage III (42.9%). Patients with traumatic injuries included 7 cases of gunshots and 9 cases of explosion wounds. Immediate complications were dehiscence in 3 cases (9.6%) and flap necrosis in 2 cases (6.4%). Late complications consisted of dehiscence in 3 cases (9.6%), partial necrosis of skin without muscle necrosis in one case (3.2 %), and donor site infection in one case (3.2 %). The most common complication seen in both stages were dehiscence (19.3%) and necrosis (9.6%). In the immediate stage, patients complained

mostly of pain (83.8%) and chewing problems (74.2%). Nearly half of the patients had normal speech (58%). In the late stage, pain significantly decreased. Only five patients had severe pain (16.1%). Analysis of the data showed significant changes in the late-stage rather than the immediate stage for pain, speech, normal activity, swallowing, chewing, and speech (Table 2).

Discussion

PMM flaps have been the workhorses for head and neck reconstruction since 1971 (1). It has been a popular technique for reconstruction surgery for many reasons, including availability, reliable vascularity, and technical simplicity (8). It also adds bulk to the neck and effectively covers exposed vessels with muscular mass after neck dissection (9). However, free tissue transfer technique has become firmly established as the preferred method of reconstruction in many maxillofacial units (10). The availability of the skin paddle has limited the technique's ability to be used for larger defects and most patients have an unaesthetic



neck contracture band in the future. At this time, the development of a microsurgical procedure for complex defects has led to their use in a majority of reconstructive centers (11).

Surgeons need to be trained in using free tissue flaps so that they can be familiar with the sensitivity of the techniques. Another disadvantage is long operation time which sometimes may include a two-stage surgery requiring specific microvascular equipments. The PMM flap is mainly used as the preferred option following salvage surgical procedures for advanced or recurrent disease and extensive metastatic neck disease. The skin of the neck and parotid region is ideal because of the proximity of the donor site (12). In our case study the most common defect site was the oral floor (48.3%).

Gunjan *et al.*, studied 200 cases of PMM flaps. Their study did not show any flap necrosis, and 20 patients had a postoperation infection (13).

Shah *et al.*, (14) reported in 211 patients undergoing PMMF reconstruction, total and partial skin flap necrosis were more frequent (32%). Flap necrosis incidence in our series was 9.6%, which was less than in the series of Shah *et al.* (14) 32%. One of the most important factors that affect partial skin necrosis is subcutaneous fat thickness (15). The thicker subcutaneous fat layer leads to more difficult flap handling, easy separation of the skin from the muscular layer and the disturbance of the underlying tissue's blood supply (15).

The advantages of the PMMF consists of flap's reliability is excellent. PMMFs have been reported that a 2% or less total flap failure rate and a 7 to 9% partial flap failure rate (16).

The bulkiness of the flap provides good carotid protection and enhances cosmesis in the resected mandible and neck. The cutaneous portion could be split to cover both intraoral and cutaneous defects. The tubing of the PMMF can cover total cervical esophageal reconstruction in one stage. Moreover, it is a good option when the quality of the recipient bed or a history of irradiation is concerned. Generally, the donor site is closed primarily (11). It was showed that prophylactic use of PMMF reduces the incidence of pharyngocutaneous fistula after salvage total laryngectomy (17).

The bulk of the pectoralis major muscle even after denervation is a disadvantage of PMMF.

Patients may be unsatisfied with the hair of the skin of PMMF. In females, the breasts is distorted after harvesting a PMMF. Pain and restricted

neck motion can occur due to secondary contraction because of radiotherapy, insufficient denervation during transposition, or atrophy (18).

Conclusion

Our study showed a considerable decrease in complications and the length of hospital stay compared to previous studies. A significant improvement could be expected in patients' functional outcomes after discharge from the hospital. Surgeons should be aware that the patient's primary complaint is usually pain, and they should minimize hospital stays if patients are an appreciated condition.

Conflict of Interest: 'None declared'.

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