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Research Article

Pectoralis major myocutaneous island flap for reconstruction of head and neck defects

Varsha Hajgude[1]*, Meghraj J. Chawada[2]

[1]Department of General Surgery, Maheshwara Medical College, Hyderabad, Telangana, India
[2]Department of General Surgery, S.R.T.R. Government Medical College, Ambejogai, Maharashtra, India

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***Correspondence:**
Dr. Varsha Hajgude,
E-mail: varshahajgude@gmail.com

ABSTRACT

Background: Pectoralis major myocutaneous island flap for reconstruction has been used since many decades with success. There is need to evaluate the efficacy of pectoralis major myocutaneous island flap for reconstruction in head and neck surgeries. The objective of the study was to study reliability and usefulness of pectoralis major myocutaneous flap.
Methods: This study was carried out for a period of two years at T. N. M. College and Nair Hospital, Mumbai. During this period 12 cases were treated and evaluated. Institutional ethics committee permission was taken. Individual patient consent was obtained. History and clinical examination was carried out as per the protocol. In all cases routine investigations as well as additional investigations as per the case were done. Pectoralis major myocutaneous island flap (PMMC) was used for primary and secondary procedures.
Results: Age of patients ranged from 36-70 years. Majority of patients were between 51-70 years of age. In this study, males outnumbered females. The male to female ratio was 2:1. In the majority of cases, single paddle pectoralis major myocutaneous flap was used, whereas double paddle was used in only 2 cases. Donor site was sutured primarily in 8 cases. Split thickness skin grafting was done in 4 cases for donor site of D. P. flap. Superficial necrosis of skin Island was seen in one case. 50% of the patients did not have any complications. In five cases of cheek defect reconstruction, mouth opening was 2 finger breadths. There was no difficulty for swallowing of solids and liquids in 4 cases of pharyngocutaneous fistulae.
Conclusions: Pectoralis major myocutaneous island flap for reconstruction of head and neck defects was found to be very effective. Post-operative complications were rare.

Keywords: Reconstruction, Donor site, Complications

INTRODUCTION

Pickrell in 1947 originally described the pectoralis major muscle flap as local transposition flap.[1] He used this flap successfully for closure of chronic bronchial fistula.

Arnold and Pairolero, et al in 1979 used the pectoralis major muscle flaps to repair defects of anterior chest wall with or without an underlying autogenous free bone graft to prevent flailing of chest wall.[2]

In January 1979, Ariyan introduced the pectoralis major myocutaneous flap and its applications in head and neck reconstruction.[3] He used this flap in four cases of head and neck defects, following cancer surgery and he found this flap is more useful and versatile than deltopectoral flap.

In November 1979, Ariyan used pectoralis major myocutaneous flap in 14 cases of head and neck defects for reconstruction.[4] He concluded that pectoralis major myocutaneous flap is very reliable and can be transferred immediately without delay.

Cuono and Ariyan in 1980 reported the case of immediate reconstruction of a composite mandibular defect using pectoralis major osseomyocutaneous flap, incorporating a segment of the fifth rib.[5] 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.

In 1980, Maruyama used the pectoralis major neurovascular pedicled myocutaneous flap successfully for a soft tissue defect of cheek and combined with a selective neuroanastomosis, to provide dynamic muscle action.[6]

In 1980, Magee used pectoralis major paddle myocutaneous flap in 43 cases of head and neck defects for reconstruction.[7] He used a paddle of skin that actually was distal to the pectoralis major muscle and that was supplied by the fascia of the rectus abdominis and serratus muscle, with an advantage that the thinner and more pliable skin paddle than the paddle directly overlying the muscle. Also the donor site morbidity decreases with hiding the incision in the infra mammary area, particularly in females. The author concluded that this flap was extremely dependable and provides an added advantage of covering vital structures of neck and provides adequate length without excess bulk.

In 1985, Willian Morain presented a function sparing modification of the pectoralis major muscle flap in which only one or two long intercostals segments are transferred on their medial segment blood supply, leaving majority of the muscle in situ with intact innervations.[8] He used this procedure for neck and sterna defects successfully. But the disadvantage of this procedure was the limitation in size of the defect to be covered. A single intercostals muscle segment was usually no longer wider than 3-4 cm, thus imparting a corresponding limit to its usefulness.

In 1997, Kerwin Williams reported the case of retro-sternal esophagocolonic anastomotic leak repaired with pectoralis major myocutaneous flap with successful outcome.[9]

Hence present study was undertaken to study the reliability and usefulness of pectoralis major myocutaneous flap.

METHODS

This study was carried out for a period of two years at T. N. M. College and Nair Hospital, Mumbai. During this period 12 cases were treated and evaluated. Institutional ethics committee permission was taken. Individual patient consent was obtained. History and clinical examination was carried out as per the protocol. In all cases routine investigations as well as additional investigations as per the case were done. Pectoralis major myocutaneous island flap (PMMC) was used for primary and secondary procedures.

All patients were operated under general anesthesia. In case of primary reconstruction excision of the growth with radical neck dissection was done by a general surgeon or ENT surgeon. In case of secondary reconstruction, wound was debrided and cleaned thoroughly with hydrogen peroxide, betadine and saline before reconstructive surgery. Size and shape of the defect was measured and then planning of flap was done as follows:

Method of raising PMMC

The flap was raised with defensive approach as described by McGreger.[10]

Skin island single or double of required size was located inferiomedially to nipple and markings done for skin island and D. P. flap. Infiltration was done with saline with adrenaline; 15-20 cc solution was used. D. P. flap was raised first and then skin island was incised up to muscle level. Few sutures with chronic catgut 3.0 were taken for dermis and muscle to avoid disruption of the delicate musculocuatneous perforators. Medial and lateral skin flaps were raised to expose entire muscle. Free lateral edge of the muscle was identified and then with blunt dissection, muscle was elevated from the chest wall through bloodless areolar plane. As the muscle was mobilized medially, costal fibres were detached from their origin. The dissection was continued medially to detach sternal fibres of muscle. Entire flap was then elevated upwards, to identify lateral thoracici artery, pectoral branch of the thoracoacromial artery on the undersurface of muscle, at the upper border of pectoralis minor muscle.

Insertion of sternocostal portion of the pectoralis major muscle was cut 2 cm away from the humeral insertion. Thus the entire sternocostal portion of the muscle and skin island forms the true island myocutaneous flap. Vascular pedicle was not skeletanised to prevent injury or spasm of the vessel. In the infraclaviluar protion 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 large enough to accommodate the muscle comfortably and allow for postoperative muscle swelling without compromising blood supply.

Post operative management

Postoperatively position was given, to keep the neck in slight flexion on the side of reconstruction to avoid tension on the pedicle. All patients were on I.V. fluids for 48-72 hours then Ryle's tube feeding/gastrostomy feeding was started. Oral liquid started between 10th to 15th postoperative days. Oral hygiene maintained with condy's gargles. Every patient received antibiotics, analgesic and vitamins. Tracheostomy care was taken with intermittent suction of trachiostomy tube. Post operatively all patients were assessed for complications. Patients were followed up every month for 3 months and every 3 months for one year.

RESULTS

Age of patients ranged from 36-70 years. Majority of patients were between 51-70 years of age. In this study, males outnumbered females. The male to female ratio was 2:1.

Table 1: Types of cases where pectoralis major myocutaneous flap was used.

Type of cases	Number	Percentage
Carcinoma cheek	04	33.4
Carcinoma mandible	01	08.3
Carcinoma lower lip	01	08.3
Pharyngocutaeous fistula	06	50.0
Total	12	100

Maximum cases were of pharyngocutaneous fistula followed by carcinoma cheek.

Table 2: Distribution of cases as per the skin paddle type used.

Skin paddle type	Number	Percentage
Single	10	83.3
Double	02	16.7

In the majority of cases, single paddle pectoralis major myocutaneous flap was used, whereas double paddle was used in only 2 cases.

Table 3: Distribution of cases as per the donor site closure.

Donor site closure	Number	Percentage
Primary	08	66.6
Split thickness skin grafting for donor site of D. P. flap	04	33.4

Donor site was sutured primarily in 8 cases. Split thickness skin grafting was done in 4 cases for donor site of D. P. flap.

Superficial necrosis of skin island was seen in one case. 50% of the patients did not have any complications.

Table 4: Post operative complications.

Complications	Number	Percentage
Superficial necrosis of skin island	01	08.3
Orocutaneous fistula	03	25.0
Persistence of pharyngocutaneous fistula	01	08.3
Neck and axillary contracture	01	08.3
No complications	06	50.0
Total	12	100

Table 5: Results of reconstruction.

Function (cases)	Result	Number	Percentage
Mouth opening (n = 5)	2 finger breadth	05	100
Swallowing of solids and liquids (n = 6)	Able to swallow easily	04	66.7
Barium swallow (n = 6)	Adequate lumen	04	66.7

In five cases of cheek defect reconstruction, mouth opening was 2 finger breadths. There was no difficulty for swallowing of solids and liquids in 4 cases of pharyngocutaneous fistulae.

Table 6: Results of donor site (n = 10).

Function	Result	Number of cases
Donor site scar	Good	09 (90%)
	Poor	01 (10%)
Shoulder joint function	Normal	09 (90%)
	Restricted	01 (10%)

2 cases died during hospital stay due to some complications. So the number of cases for results of donor site was 10. Donor site scar was good in 9 cases, whereas shoulder joint function was approximately normal in 9 cases. In one case, axillary and neck contracture developed, during follow up period and he required secondary surgery in the form of release of contracture with split thickness skin grafting.

DISCUSSION

In the present study, we evaluated 12 cases of head and neck defects reconstructed with pectoralis major myocutaneous island flap. Maximum patients were in the age group of 51-70 years. This was in accordance with Se-min Baek, Sharzar L, Rees RS and Theogaraj.[11-14]

Maximum cases in the present study were males. The male to female ratio was 2:1. In the series of Se-min Baek male to female ratio was 7:1 and in Sharzar L series the male to female ratio was 5:1.[11-12]

PMMC was used in 12 cases of head and neck defects following cancer surgery, of which 4 cases were of carcinoma cheek, 1 case of recurrence of carcinoma mandible, 1 case of carcinoma lower lip and 6 cases of pharyngocutaneous fistulae. 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 temporal bone resections in 2 cases.[4] 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, 5 cases of intra oral defects with mandibular reconstruction.[11] Theogaraj, et al used this flap for stricture of esophagus and pharynx following cancer surgery in 6 cases and pharyngocutaneous fistula in one case.[14]

In the present study, primary procedure was done in 6 cases, while it was secondary procedure in 6 cases. In the series of Se min Baek the reconstruction was primary in all cases.[11] Theogaraj, et al used this flap as a secondary reconstructive procedure in 6 cases and primary in one case.[14]

In the present study we used single skin paddle of pectoralis major myocutaneous island flap in 10 cases whereas double paddle in 2 cases. Double paddle was used in cases of carcinoma cheek and in recurrence of carcinoma mandible with good results, as it does not require skin graft or D. P. flap for skin cover. But in remaining 4 cases of full thickness cheek defect, we could not use double paddle because of large size defect. Theogaraj, et al used single paddle for reconstruction of head and neck defects.[14] Ariyan used double paddle in one case of intra oral defect and single paddle in 13 cases.[4] Se min Baek used double island flap in 13 cases out of 133 cases of head and neck defects.[11]

In the present study, skin island of pectoralis major mycutaneous flap was used for lining of the defect in all cases. Cutaneous cover for the defect was given with STSG in 6 cases of pharyngocutaneous fistula, distal paddle of double island flap in 2 cases of full thickness cheek defect, and deltopectoral flap in 4 cases of full thickness cheek defect. 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.[11] Theogaraj, et al used PMMC in all cases and for skin cover he used STSG.[14]

In the present study, largest size of skin paddle used was 10 x 7 cm for a case of carcinoma cheek defect, while Ariyan used maximum sized skin paddle of 8 x 26 cm size.[4] Theogaraj, et al used largest skin paddle of 12 x 20 cm.[14] Withness used largest sized skin paddle of size 10 x 12 cm.[15]

In the present study, the donor site of pectoralis major myocutaneouw flap was closed primarily in 8 cases while in 4 cases donor area of deltopectoral flap was covered with STSG and rest of the part was sutured primarily in all cases. In the series of Leonard, Ariyan, and the ogaraj donor site was sutured primarily.[4,12,14] 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 3 cases, superficial necrosis of flap in one case, persistence of pharyngocutaneous fistula in one case, orocutaneous fistulae healed spontaneously within 3-4 weeks. Superficial necrosis of skin island was seen in case of cheek defect where double paddle was planned and distal paddle was undergone the superficial necrosis. It was managed conservatively with local dressings and antibiotics. Healing occurred within 2-3 weeks. Pharyngocutaneous fistula was persisted in one case, who developed post operatively severe wound infection and he was severely anemic and hypoprotenemic. He was on feeding gastrostomy. D. P. flap was planned to repair the fistula but patient refused the surgery. Late post operative complication was occurred in one case as axillary and 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.[11] In Theogaraj series orocutaneous fistula occurred in one case, which healed spontaneously.[14] In Withness series 2 cases developed orocutaneous fistulae out of 9 cases which healed spontaneously.[15]

We reconstructed the half of the circumference of the pharynx with single island pectoralis major myocutaneous flap. In cases where carotid artery was exposed, cover was given with muscle bulk of pectoralis major. In 4 cases the result was satisfactory as they were able to swallow solids and liquids without any difficutly within 3 weeks to 4 weeks post operatively. Their barium swallow showed adequate sized lumen. In one case where persistence of pharyngocutaneous fistula occurred, there was stricture distal to the fistula site. In Theogaraj series pharyngoesophageal reconstruction was done in 7 cases.[14] All patients were able to swallow within 2 weeks post operatively and there barium swallow was showing adequate sized lumen. In the Withness series cervical esophagus and pharynx was reconstructed as an immediate single stage procedure in 9 cases.[15] All cases were able to swallow liquids and solids within 2 weeks post operatively.

Mortality rate was 16.67% (2 cases). In case of carcinoma lower lip, where pectoralis major osseomyocutaneous flap was used, death occurred post operatively because of acute myocardial infarction. In

second case, where pharyngocutaneous fistula was reconstructed, the death was due to aspiration pneumonia.

CONCLUSION

Pectoralis major myocutaneous island flap for reconstruction of head and neck defects was found to be very effective. Post operative complications were rare.

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