

# Pectoralis Major Rib Osteomyocutaneous Flap in Primary Mandibular Reconstruction for Oral Cavity Carcinoma in Geriatric Population: Is it Better than Fibular Free Flap?

Nitin Khunteta

## ABSTRACT

Oral cavity cancer in geriatric population is amongst the common cancer seen in our part of world. Squamous Cell Carcinoma is the commonest histology. Generally they come with locally advanced cancer, with multiple comorbid conditions. The morbidity of Radical resection and osteomyocutaneous free flap reconstruction is higher than younger age group. This high morbidity can lead to mortality also in this age group.

One stage reconstruction of the mandible with soft tissue of the oral cavity and face with pectoralis major Rib osteomyocutaneous (PMROC flap) pedicle flap is one of good option than free flap. PMROC Flap reconstruction is a shorter duration procedure, less morbidity, good cosmetic and functional outcome.

In this article we will discuss our experience of four cases.

**Keywords:** Comorbidity, Free tissue flaps, Geriatric, Head and neck neoplasm, Hemi-mandibulectomy, Oral cavity cancer, Pectoralis major rib osteomyocutaneous flap (PMROC), Postoperative complications

*Journal of Mahatma Gandhi University of Medical Sciences and Technology* (2018): 10.5005/jp-journals-10057-0069

## INTRODUCTION

Reconstruction of composite mandibular defect of oral cavity is of paramount importance for rehabilitation of the patient following ablative surgery for head and neck neoplasm. It is very important to maintain the form and function of the Mandible along with good cosmetic outcome.

Geriatric population with carcinoma of the oral cavity are usually smokers, alcoholic with multiple comorbid conditions. Geriatric population is predisposed to atherosclerotic disease, in this population free flap micro-vascular surgery has higher morbidity and even mortality.

Fibular Osteocutaneous micro-vascular free flap is generally the mainstay of mandibular reconstruction but has more chances of complications in geriatric population.<sup>1</sup>

The PMROC Flap in geriatric population is able to give the anatomical, functional and aesthetic aspects of the mandible and at the same time it is safe, reliable, predictable, single stage procedure with minimal morbidity and almost no mortality.

## MATERIAL AND METHODS

We describe four cases series of Squamous Cell Carcinoma Lower Alveolus, age more than 70 years, multiple co morbid conditions, long duration Beedi Smoker. Locally Advance disease. In all these cases composite resection was done. Reconstruction in the first case was done by free fibla flap, which failed for which PMROC flap was done. Due to free flap failure his postoperative period was turbulent. Rest of the cases were also high risk for free flap failure hence in these cases PMROC flap was done. In all these three cases the recovery was smooth without any complications.

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**How to cite this article:** Khunteta N. Pectoralis Major Rib Osteomyocutaneous Flap in Primary Mandibular Reconstruction for Oral Cavity Carcinoma in Geriatric Population: Is it Better than Fibular Free Flap? *J Mahatma Gandhi Univ Med Sci Tech* 2018;3(1):17–20.

**Source of support:** Nil

**Conflict of interest:** None

## RESULTS

In this case series all the four were male, age more than 70 yrs. Beedi smoker since last more than 40yrs. Suffering from Lower alveolar SCC locally advanced disease. Except one, rest all had multiple comorbid conditions. In all cases mandibular composite resection was done (Table 1).

First case fibular free flap reconstruction was done which developed venous necrosis on 2nd day and salvaged by PMROC Flap. Seeing this experience in the rest of the cases PMROC Flap reconstruction was done. We did not encounter any peri and postoperative complications. Three patients completed there adjuvant radioterapy protocol without any morbidity (Table 2).

**Table 1:** Case Series

Cases	Case 1	2	3	4
Age, Sex, KPS (%)	75 year, M. 80%	70 year, M. 90%	78 year, M. 80%	83 year, M. 80%
Comorbid Condition	No Beedi smoker	DM, HT, COPD Beedi smoker	DM, HT, CAD. Beedi smoker	DM, HT Beedi smoker
Diagnosis & Stage	SCC Right lower Alveolus cT3 N1 M0	SCC Anterior Alveolus cT4 N1 M0	SCC Left Lower Alveolus cT2 N1 M0	SCC Right Lower Alveolus cT4a N1 M0
Surgery done	Composite Resection, MND, Fibular Free Flap. Free flap necrosis fol- lowed by PMROC Falp. Tracheostomy.	Composite Resection, B/L MND (Anterior Arch com- mando) PMROC Flap Tracheostomy	Composite Resection, MND PMROC Flap Tracheostomy	Composite Resection, MND PMROC Flap Tracheostomy
Duration of Stay in Hospital	15 Days	7 Days	7 Days	9 Days
Adjuvant Treatment Completed Successfully	yes	yes	yes	Not taken
Complications	Free Flap Necrosis	No	No	No
2-Follow Up (months)	15	9	12	11
PostTreatment.	No Recurrence	No Recurrence Died Of Heart Attack	No Recurrence	No Recurrence

*Abbreviations:* DM, Diabetes; HT, Hypertension; CAD, Coronary Artery Disease; COPD, Chronic Obstructive Pulmonary Disease; SCC, Squamous Cell Carcinoma; cTNM, Clinical TNM; B/L, Bilateral; MND, Modified Neck Dissection; PMROC Flap, Pectoralis Major Rib Osteomyocutaneous Flap; Mths, Months

**Table 2:** The comparison of the PMROC Flap and Fibular free flap for Mandibular reconstruction

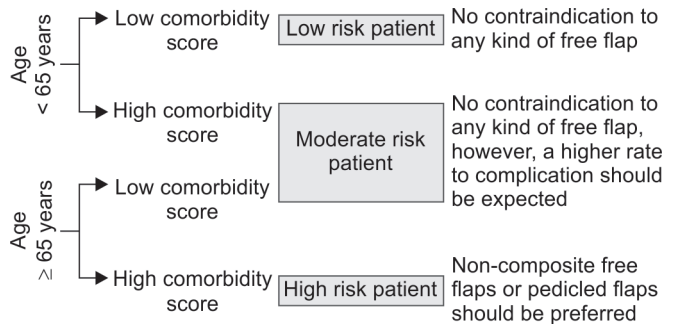
	PMROC flap	Osteocutaneous fibular free flap
Advantages	<ul style="list-style-type: none"> <li>Short duration surgery.</li> <li>Short learning curve.</li> <li>Replaces adequate mucosa, soft tissue, and bone for reconstruction.</li> <li>Contour of the mandible is better secured for longer duration.</li> <li>Gives carotid coverage.</li> <li>Decreased cost of treatment.</li> </ul>	<ul style="list-style-type: none"> <li>Osseointegrated dental implants can be done</li> <li>Any defect size can be filled</li> </ul>
Disadvantages	<ul style="list-style-type: none"> <li>Osseointegrated dental implants cannot be done.</li> <li>Large defect size cannot be filled.</li> </ul>	<ul style="list-style-type: none"> <li>Technically demanding.</li> <li>Increased operating time</li> <li>Functional disability at donor site.</li> <li>Decreased ankle strength, toe flexion, and chr. Ankle pain.</li> </ul>
Complications	<ul style="list-style-type: none"> <li>Pleural tear.</li> <li>Pulmonary Complications.</li> </ul>	<ul style="list-style-type: none"> <li>More chance of flap failure.</li> <li>More redo surgeries.</li> <li>Pulmonary Embolism.</li> </ul>

**DISCUSSION**

The term *geriatrics* comes from the Greek γέρων *geron* meaning “old man”, and ιατρός *iatros* meaning “healer”. Geriatrics is sometimes called medical gerontology. Gerontology, which is the study of the aging process itself.

The aged body is different physiologically from the younger adult body, and during old age, the decline of various organ systems becomes manifest. The decline in physiological reserve in organs makes the elderly develop some kind of diseases and have more complications. Co-morbidities present a challenge in providing care to elderly. There is an alarming high rate of diabetes mellitus, hypertension, CAD, COPD among elderly (Fig. 1).

It is well known that cancer-related morbidity and mortality are linked to age, with about 60% of all tumors arising in patients of 65 years and 70% of all cancer-related deaths occurring in this age group.<sup>2-5</sup> A large number of head and neck cancer (HNC)



**Fig. 1:** Flow chart, Type of risk and type of flap

occur after the sixth decade. This finding was underlined in a retrospective HNC review showing that 12% of patients with HNC are of 70 years of age<sup>7</sup>; different single-institution reports in





**Figs 2A to C:** Photographs (A) intraoperative photo of PMROC Flap at defect site; (B) PMROC flap reconstruction after 3 weeks of surgery; (C) Donor site after 3 weeks of Surgery

Europe documented that 6% to 32% of HNC patients are between the ages of 70 and 75 years. Squamous cell carcinoma is the most common histology (95% of cases) among HNC in this age group, most frequently involving the larynx, oropharynx, and oral cavity.<sup>7,8</sup> In India the oral cavity cancer incidence is much more than Europe in geriatric population.

Oral cavity cancer where mandibular composite resection is done leads to difficulty in mastication, deglutition, speech, maintenance of adequate airway, shape and contour of lower face. It is very important that in geriatric population the reconstructive procedure goals of mandibular reconstruction should be restoration of mastication, deglutition, speech, maintenance of adequate airway, along with shape and contour of lower face (Figs 2A to C).

He Y, 2013<sup>10</sup> stated in his article about options for reconstruction for soft tissue and bone defect in oral cavity cancer include:

- Pedicled flaps with or without reconstructive plate: pectoralis myocutaneous flap<sup>1</sup>, latissimus dorsi flap and trapezius flap.
- Free flaps with or without reconstructive plate: radial forearm flap<sup>3</sup> and rectus abdominis flap.
- *Double flaps or flow-through flaps:* radial forearm or rectus abdominis combined fibula flap and anterolateral thigh combined fibula flap.
- *Composite vascularized osteomyocutaneous flaps:* fibula flap and scapular flap.
- Composite myocutaneous flap with bone: latissimus with scapular and pectoralis major-rib flap.

Hwang K et al.<sup>10</sup> reviewed 41 papers. Overall complication rates of free flap increased significantly with age ( $p < 0.001$ ;  $y = 0.457x + 13.464$ ; 40.9% at 60 years, 45.5% at 70 years, and 50.0% at 80 years). Flap survival rates increased significantly ( $p < 0.001$ ;  $y = 0.025x + 93.876$ ). Donor site complication rates also increased significantly with age ( $p < 0.001$ ;  $y = 1.238x - 63.700$ ; 10.9% at 60 years, 23.0% at 70 years, and 35.3% at 80 years). The Kaplan-Feinstein index (KFI, OR = 7.944, 9.563), the Adult Comorbidity Evaluation-27 (ACE-27, OR = 5.854), the American Society of Anesthesiologists score (ASA, OR = 4.397), and the Index of Coexistent Diseases score (ICED, OR = 3.584) had statistically significant impacts on flap survival ( $p < 0.05$ ). Diabetes (OR = 4.562) and chronic obstructive pulmonary disease (OR = 2.300) had statistically significant negative impacts on the flap survival rate ( $p < 0.05$ ). Elderly patients had significantly higher Charlson Comorbidity Index (CCI) and ASA scores ( $p < 0.001$ ).

This review article clearly states that in geriatric population the complications related to free flap surgery increases with age.

Alberto Grammatica, et al.<sup>11</sup> In this state of art review the author proposed an algorithm for reconstructive HNC surgery in the elderly.

PMROC FLAP was harvested first time in 1979 by Ariyan.

It has many advantages in this age group for mandibular reconstruction.

N. Brian Shunyu, et al.<sup>12</sup> Seventeen patients of oral cavity cancer involving the alveolus who underwent hemi-mandibulectomy were reconstructed using 5th rib osteo-pectoralis major myocutaneous flap. The average duration for flap reconstruction was 1 hr. In this series the Complication rates were negligible. In 3 patients, pleural tear occurred which were successfully repaired intraoperatively with no post-operative complications.

Fifteen patients had completed post-operative radiotherapy and there were no any post-operative radiotherapy related complications. Ten patients have completed more than 2 years follow up. All the patients have good oral continence, taking semi-solid diet and all have satisfactory cosmetic appearance.

There were two failures in our series. These failures occurred in initial cases.

The article concluded that the advantages of PMROC flap are; short learning curve, short time to perform, micro-vascular surgery is avoided, no serious procedure related complications and with familiarity of the procedure failure can be easily avoided with predictable outcome. Post-operative radiation therapy does not cause any problem to this flap.

## CONCLUSION

- It is a very good option in geriatric population with multiple co-morbid conditions and in patients with previous irradiation on oral cavity and neck.
- 5th rib Osteo-Pectoralis Major Myocutaneous Flap is a quick, easy to learn, one stage reconstructive procedure with a good predictable cosmetic and functional outcomes.
- Patients have good oral continence, good jaw alignment and good aesthetic appearance.
- No donor site morbidity.

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