Original Article

# Modified Technique of Pectoralis Major Myocutaneous Flap Inset for Buccal Mucosa Reconstruction

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## ABSTRACT

### BACKGROUND

Conventional technique of flap inset in buccal mucosa reconstruction is by direct suturing of cutaneous margin of Pectoralis Major Myocutaneous (PMMC) flap to hard and soft palate mucosa and margin of floor of mouth with simple interrupted sutures. We have done a prospective study of the efficacy of anchoring the upper margin of PMMC flap to the hard palate by a modified method in reconstruction of buccal mucosa defects following tumour excision. This is to prevent disruption of suture line from the mucoperiosteum of hard palate and resultant oro-cutaneous fistula.

### METHODS

This hospital-based prospective study was carried out in the Department of Plastic Surgery at Bangalore, India for a period of 18 months (2015–2017). Patients (N=48) with buccal mucosa defects requiring reconstruction with PMMC flap either with conventional (n=24) or modified method (n=24) following tumour excision were included. Clinico-demographic profile of the patients including age, gender, size of defect, staging of illness, site and type of reconstruction, disruption of suture margin in the hard palate, development of oro-cutaneous fistula (OCF), day of starting oral feeds, removal of Ryle's tube and post-operative average length of stay in the hospital were recorded.

### RESULTS

Disruption of suture line in hard palate and Oro-cutaneous fistula were statistically significant in study group in both the variables (*P*-0.033, *P*-0.033). The median days on which patients were started with oral clear liquids and removal of Ryle's tube were also statistically significant between study and control groups. Post-operative average length of hospital stay which is the outcome of favourable results in the study group was found to be statistically significant (*P*-0.021) between the groups.

### CONCLUSION

Overall, modified technique of anchorage of PMMC flap can be considered as a reliable technique in buccal mucosa reconstruction because of its stability, lower complication rates and shorter length of hospital stay.

### KEYWORDS

Pectoralis major myocutaneous flap; Anchorage; Buccal mucosa; Oro-cutaneous fistula

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## INTRODUCTION

Malignant tumours of the head and neck region have a higher incidence in Asia especially India due to abuse of tobacco, alcohol, chewing areca nut and keeping quid for long hours, poor dental hygiene, illiteracy, and ignorance[1]. Majority of our patients present in late stages which invariably require major reconstruction[2,3]. The common pedicled flaps used in head and neck reconstruction are tongue flap, forehead flap, pectoralis major myocutaneous flap (PMMC), and trapezius flap[4, 5].

Myocutaneous flaps revolutionised the reconstruction of defects in head and neck oncological reconstruction. In particular, the PMMC flap has emerged as a versatile flap in the reconstruction of surgical defects in cervico-maxillo-facial area[6]. Owing to its tissue bulk, rich blood supply and anatomical proximity to the sites to be reconstructed it is the most dependable flap. However, PMMC flap is known for its complications like oro-cutaneous fistula (OCF) formation, bulkiness of the adipose tissue and muscle, scarring, high potential of marginal or distal flap necrosis with partial flap loss and donor-site morbidity[7].

Most commonly employed is the conventional technique of flap inset which involves suturing of cutaneous margin of PMMC flap to hard/soft palate mucosa, teeth, gingivobuccal complex and margin of the floor of mouth with 2.0 absorbable suture material with simple interrupted sutures. Literature aiming to provide a stable PMMC flap inset with newer techniques/modifications is scarce, and our study intends to address this knowledge gap.

We have assessed the efficacy of modified technique of PMMC flap inset to the alveolus of hard palate by making drill holes in the bone and passing sutures through these holes to prevent disruption of suture line and oro -cutaneous fistula.

## MATERIAL AND METHODS

A hospital-based prospective study was carried out in the Department of Plastic Surgery at Bangalore, India for a period of 18 months (2015–2017) in patients with post tumour excision buccal mucosa defects requiring reconstruction with PMMC flap. Patients underwent inset of PMMC flap either by conventional (n=24) or modified method (n=24). Patients undergoing reconstruction of mucosal lining and skin cover with double flaps i.e., PMMC flap with another flap (deltopectoral flap, forehead flap), etc. were also included. Patients with prior chest wall trauma or surgery (mastectomy, breast implants, subclavian lines, cardiac pacemaker, etc.), patients with defects too large or outside the potential reach of reconstructive tissue were excluded. Morbidly obese patients and congenitally absent pectoralis muscle (Poland syndrome) were also exempted.

Informed consent for participation and photography of patients for records and scientific publication were taken before study initiation. The study protocol was approved by the institutional Ethics Committee (Ref. No:-STD-1/EC/01/2016 dated 27/01/2016). All patients were strictly followed up for three months after discharge from hospital.

After completion of ablation surgery, the size, shape and situation of the defect to be reconstructed were assessed. Surface markings were done and PMMC flap was harvested in a standard manner[8].

In the study group flap was inset by anchoring it to the alveolus of hard palate through drill holes and reinforced with additional sutures to make the suture line watertight (Figure 1 & 2). In the control, group flap was sutured to mucoperiosteum of the hard palate by conventional method i.e., direct suture.

Clinico-demographic profiles of the patients including age, sex, size of the defect, the staging of illness and type of reconstruction were noted. Disruption of suture margin in the hard palate, development of oro-cutaneous fistula (OCF), day of starting oral feeds, removal of Ryle's tube and post-operative average length of stay in the hospital were recorded.

### *Statistical analysis*

"R" version 3.6.3 was used to analyze the data. The normality of data was analyzed using Shapiro and Kolmogrov Smirnoff test. As the following variables 'day of oral clear fluid intake, removal of Ryle's tube and post-operative length of hospital' stay were skewed they were described in terms of median and Interquartile range and Mann-whitney U test was used to compare between the groups. Independent *t*-test was used to compare clinic demographic variables like Hemoglobin and Serum Albumin. Chi-square test was used to compare proportion of

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Fig. 1: Placing drill holes in the alveolus of Maxilla in Study group

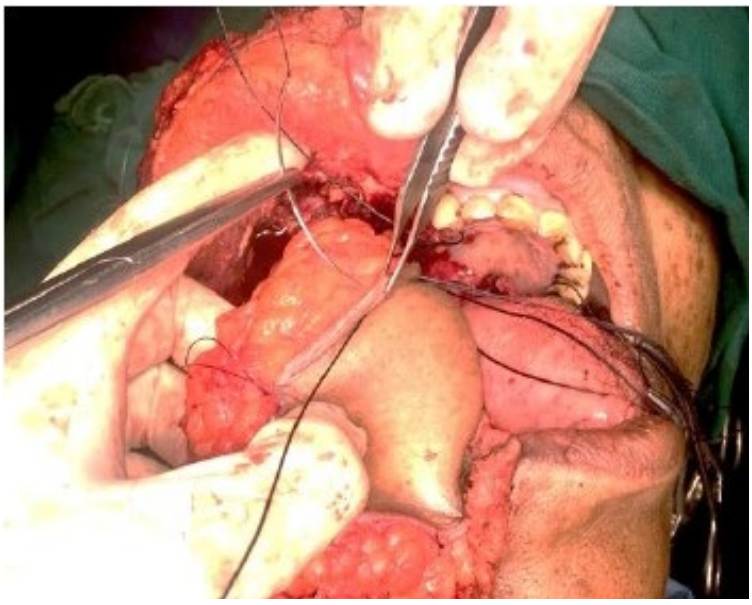

Fig. 2: Anchoring PMMC Flap to the Bony Alveolus through drill holes in Study Group

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OCF and DOSL between the groups. $P< 0.05$ was considered for statistical significance.

## RESULTS

Twenty-four patients were allotted in each of the study and control groups. Baseline characteristics like age, gender Hemoglobin, Serum Albumin, Stage of the disease, Type of reconstruction and defect size were comparable in both groups (Table 1).

Disruption of suture line in hard palate was found to be 2 (8.33%) in study group and 8(33.33%) in control group. Oro-cutaneous fistula was 2 (8.33%) in the study group and 8(33.33%) in control group.

**Table 1:** Clinicodemographic profile of patients in study and control groups

| Variables | | Study (n = 24) | Control (n=24) | *P*-value |
|---|---|---|---|---|
| Age (yr) Mean ± SD | | 57.92±12.3 | 55.79±13.8 | 0.99 |
| | | **Gender** | | |
| Male | | 5(20.83) | 10(41.66) | |
| Female | | 19(79.16) | 14(58.33) | 0.21 |
| Haemoglobin | | 11.6 ± 1.5 | 11.3 ± 2.0 | 0.49 |
| Serum albumin | | 3.2 ± 0.7 | 3.1 ± 0.8 | 0.64 |
| | II | 1(4.16) | 1(4.16) | |
| Stage of Disease | III | 4(16.66) | 5(20.83) | 0.93 |
| | IV | 19(79.16) | 18(75) | |
| | PMMC | 16(66.66) | 19(79.16) | |
| Type of reconstruction | PMMC+DP | 8(33.33) | 4(16.66) | 0.27 |
| | PMMC+FF | 0 | 1(4.16) | |
| Defect size | | 26.5 (18.5-35) | 25.0 (20.0-35.0) | 0.708 |

PMMC, Pectoralis major myocutaneous flap; PMMC+DP, Pectoralis major Musculocutaneous Flap and Deltopectoral flap; PMMC+FF, Pectoralis major Musculocutaneous Flap and forehead flap

**Table 2:** Comparison of outcome parameters between study and control group

| Variables | Study | Control | *P*-value |
|---|---|---|---|
| DOSL at hard palate n(%) | 2(8.33) | 8(33.33) | 0.033 |
| OCF n(%) | 2(8.33) | 8(33.33) | 0.033 |
| Started orally (in days) Median [IQR] | 3.0[2.0 – 4.0] | 5.0[5.0 – 6.0] | 0.001 |
| RT removal on (in days) Median [IQR] | 12.5 [12.0 – 17.0] | 20.5 [ 15.3 - 31.0] | 0.002 |
| Post- operative average length of hospital stay (in days) Median [IQR] | 21 [19.3 - 35.0] | 34.5 [23.8 - 47.3] | 0.021 |

DOSL, Disruption of suture line; OCF, oro-cutaneous fistula.

The difference was statistically significant in both the variables (*P*-0.033, *P*-0.033). The median days on which patients were started with oral clear liquids and removal of Ryle's tube were statistically significant between study and control groups. Post-operative average length of hospital stay was also statistically significant (*P*-0.021) between the groups (Table 2).

## DISCUSSION

Despite advances in microsurgical techniques, PMMC flap is the most reliable choice employed in post ablative oral cancer defects, especially in patients with severe co-morbidities, non-availability of donor sites for free flaps due to atherosclerosis and sometimes following loss of free flaps[9]. In these situations, this flap in addition to being reliable also requires shorter surgical time. Conventionally the upper margin of the flap is sutured to the mucosa of alveolus or hard palate. Nonetheless, this may disrupt the suture margin in the upper border of the flap resulting in OCF. In one study the flap was hitched to the teeth of the mandible and none of their ten patients developed fistula[10]. In our study, we employed a modified technique in anchoring upper margin of PMMC flap to the mucosa of alveolus of hard palate through drill holes. (Figure 2)

In our study, all patients with malignancy underwent tumour extirpation with modified radical neck dissection. The resultant defect was covered with either PMMC with or without a deltopectoral flap or forehead flap for reconstruction of cover and the flap options considered were similar to previous research[11]. Besides, most of the patients with buccal mucosa carcinoma present to the hospital at an

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advanced stage of their disease[12]. Hence, following radical tumour extirpation and neck dissection, cheek defects of various sizes require reconstruction. The size of the skin paddle in the study and control group was alike previous studies.

In our study suture line disruption with modified technique was significantly less compared to conventional technique[13]. Disruption of upper flap margin may either be due to lack of blood supply, flap necrosis, infection and weight of the flap due to muscle bulk, or breast fat in females. (Figure 3) In addition, factors like gravitational pull, vectoral forces and pull of muscle downwards may also be responsible for suture line disruption at the palatal margin. In one of our study group patients, the flap margin which was necrosed at the margin was debrided and re-anchored to the same drill hole, as there was adequate dimension of the remaining flap. Fistula formation might be associated with haemoglobin level <13 g/dl, serum albumin <3.4 g/dl, and hypopharynx reconstruction[7], which might also be one of the reasons behind the incidence

**Fig. 3:** Upper margin of flap disrupted in Control Group

**Fig. 4:** Late post-operative view with well healed suture margin in Study Group

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of OCF following buccal defect reconstruction in our study. Hemoglobin and Serum Albumin were corrected in the pre-operative period in all our patients.

PMMC flap shows varying range and rate of complications from 17% to 63% which includes necrosis, seroma, hematoma, OCF, etc[15]. OCF affects feeding, nutrition, wound healing, scarring, speech impairment and salivary discharge from the fistula. The modified technique in our study brought down the overall incidence of OCF compared to conventional inset, (Figure 4) thus reducing the healing time. Moreover, in two patients in whom OCF occurred in the study group, it was small and healed on conservative treatment. The incidence of OCF was low (8.33%) in the study group when compared to other studies ranging from 10.7% to 45%[13, 14, 15]. In this study, no seroma or hematoma formation was noted at the donor site as we used suction drain at donor as well as the recipient site.

OCF may increase in size leading to leakage of saliva through tissues and this may sometimes also necessitate secondary suturing or the addition of another flap[16]. Patients in the control group underwent various secondary procedures i.e., secondary suturing (three patients), flap re-anchoring (one patient), and tongue flap (one patient). In other studies patients underwent secondary procedures such as Estlanders flap, tongue flap, palatal mucoperiosteal flap, trapezius MC flap, direct closure, radial forearm free flap.

Patients were started oral feeding early with modified technique and consequently Ryle's tube was removed earlier indicating the reliability of the technique against the conventional PMMC flap inset technique for reconstruction[17]. Patient's subjective perception of comfort was thus better in the study group. The post-operative average length of hospital stay in the study group was also significantly less than in conventional group in this study which is comparable to other studies[18]. Thereby, patients in the study group were instituted post-operative Radiotherapy as per schedule.

## CONCLUSION

Overall modified technique of anchorage of PMMC flap to hard palate can be considered as a reliable technique in buccal mucosal reconstruction because of its stability to prevent suture line disruption. This technique has thereby significantly reduced the incidence of oro-cutaneous fistula and associated morbidity.

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## CONFLICTS OF INTEREST

The authors declare that there is no conflict of interests.

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