The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 6, 2025

# COMPARISON OF FUNCTIONAL OUTCOME OF PECTORALIS MAJOR MYOCUTANEOUS FLAP AND SUBMENTAL ISLAND FLAP IN PATIENTS OPERATED FOR SQUAMOUS CELL CARCINOMA OF ORAL CAVITY

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DOI: https://doi.org/10.5281/zenodo.17394598

**Keywords**
*Pectoralis Major Myocutaneous Flap, Submental Island flap, Squamous Cell Carcinoma*

**Article History**
*Received: 28 April 2025*
*Accepted: 06 May 2025*
*Published: 18 June 2025*

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## Abstract

***Objective:*** *To compare the functional outcome of pectoralis major myocutaneous flap and submental island flap in patients operated for squamous cell carcinoma of oral cavity*

***Study design:*** *Quasi experimental trial*

***Study place and duration:*** *Department of Oral and Maxillofacial Surgery, Faryal College of Dentistry Lahore for 6 months from Oct 2024 to March 2025*

***Methodology***: *After meeting selection criteria 50 (25 in each group) patients were enrolled. Informed consent and demographic detail was taken. Patients were randomly divided into two groups. In group A, patients under surgery by PMMF technique. In group B, patients underwent surgery by SIF technique. The outcome in terms of success, infection, necrosis and aesthetic outcome was noted in both groups. All the data was collected on pre-designed proforma.*

***Results:*** *In the PMMF group, the mean age of patients was 41.16 ± 11.86 years, while in the SIF group it was 39.76 ± 13.98 years ($p = 0.704$). In the PMMF group, all 25 patients (100%) achieved successful outcomes, whereas in the SIF group, success was attained in 18 patients (72%), showing a statistically significant difference ($p = 0.004$). An excellent aesthetic outcome was achieved in 11 patients (44%) in the PMMF group, compared to 5 patients (20%) in the SIF group, with a statistically significant difference ($p < 0.001$).*

***Conclusion:*** *Pectoralis major myocutaneous flap appears to be a more effective option for the treatment of squamous cell carcinoma of the oral cavity, demonstrating better outcomes compared to the submental island flap group.*

## INTRODUCTION

Oral squamous cell carcinoma (OSCC) is the sixth most common cancer in the world and usually occur in middle aged and elderly persons [1-3]. Surgery is the standard treatment for OSCC, including local tumor resection, regional lymph node dissection, and defect reconstruction. Several methods have been introduced for reconstructing OSCC-related defects, including free skin grafts, locoregional flaps, and free flaps [4, 5]. Head and neck cancer is the sixth common cause of cancer with an estimated worldwide incidence of over 600,000 new cases annually[6]. Malignancy of the oral cavity is the commonest among all malignancies affecting the head and neck region, accounting for 20 per 100,000 population and approximately 60–80% of cases present at an advanced stage and it is the leading cause of mortality among the head neck cancers [7].

Primary closure of such defects is usually impossible, requiring local, regional, or distant flap reconstruction in order to secure oral competence with good commissure contour and cosmesis[8]. Surgery for head and neck malignancies can result in substantial soft and hard tissues defect. This may cause speech deficits and functional deficiency. As a result, the main goal of reconstructive surgery after oral cancer ablation is to restore the function of the different parts in the oral cavity with acceptable aesthetics using local and loco-regional flaps. Many regional flaps have been proposed for reconstruction of oral cavity soft tissue with variable success [6]. The pectoralis major myocutaneous flap (PMMF), was invented by Ariyan in 1979 and has been employed as a workhorse flap for the reconstruction of head and neck deformities during the subsequent three decades [9]. Submental island flap is found to be associated with low mortality and morbidity as was evident in our study till 6 months of follow-up, also described in the past literature [10, 11].

The pectoralis major myocutaneous flap is a reliable option for reconstructing soft tissue defects in the oral cavity due to its consistent vascular supply. However, its use is often limited by its bulky nature and reduced suitability in female patients. Considering these limitations, the submental island flap emerges as a favorable alternative for soft tissue reconstruction in oral cancers. Its thin and pliable structure, minimal donor site morbidity, and excellent tissue compatibility with surrounding oral structures make it particularly suitable for early-stage oral cavity malignancies, offering satisfactory functional and aesthetic outcomes [11]. Although both reconstructive techniques are widely utilized, there is a lack of comparative data particularly within our local population—regarding their functional outcomes. Therefore, a comprehensive evaluation is essential to determine the most appropriate flap for optimal treatment. In light of this gap, the present study was designed with the objective of comparing the functional outcomes of the pectoralis major myocutaneous flap and the submental island flap in patients undergoing surgery for squamous cell carcinoma of the oral cavity.

## METHODOLOGY

This was quasi experimental study which was carried out at department of Oral and Maxillofacial Surgery, Faryal College of Dentistry Lahore for 6 months from Oct 2024 to March 2025.The success of procedure was labeled if there was no infection and necrosis was observed in after treatment. Functional outcome was labeled in terms of excellent, good, fair and poor. The calculated sample size for this study was 50 (25 in each group). For this calculation 5% significance level, 80% power of study and percentage of excellent i.e. 76.7% with PMMF and 36.7% with SIF [1]. All the patients were enrolled by applying non-probability, consecutive sampling technique.

**Inclusion:** Patients having age 16 to 70 years of both gender, undergoing squamous cell carcinoma of oral cavity were fall in inclusion criteria.

**Exclusion:** The patients with recurrent cancer, evidence of progressive or complicated disease, were excluded in this study.

The patients were taken from surgical wards. Informed consent was obtained. Demographics (name, age, sex, duration of carcinoma, stage of cancer, BMI, diabetes, hypertension, smoking, alcoholism, anemia) were noted. Then patients were admitted and randomly divided in two groups by using lottery method. In group A, patients under surgery by PMMF technique. In group B, patients underwent surgery by SIF technique. All patients were followed-up in surgical wards for 3 days and then were discharged. The outcome in terms of success, infection, necrosis and aesthetic outcome was noted in both groups. All the data was collected on pre-designed Proforma.

All the collected data was entered and analyzed on SPSS version 26. All the quantitative data was presented in the form of mean±SD and all the qualitative data was presented in the form of frequency and percentages.

**RESULTS:**

In the PMMF group, the mean age of patients was 41.16 ± 11.86 years, while in the SIF group it was 39.76 ± 13.98 years (p = 0.704). Among patients in the PMMF group, 16 (64%) were male, compared to 13 (52%) in the SIF group (p = 0.390). Diabetes was present in 9 (36%) patients in the PMMF group and in 3 (12%) patients in the SIF group, with a statistically significant difference (p = 0.047*). Hypertension was found in 7 (28%) patients in the PMMF group and 6 (24%) in the SIF group (p = 0.747). Anemia was observed in 18 (72%) patients in the PMMF group and 17 (68%) in the SIF group (p = 0.758). Smoking was reported in 6 (24%) patients from the PMMF group and 5 (20%) from the SIF group (p = 0.733). Alcohol consumption was noted in 3 (12%) patients from the PMMF group and in 1 (4%) from the SIF group (p = 0.297). Stage IV cancer was diagnosed in 5 (20%) patients in the PMMF group and in 9 (36%) patients in the SIF group (p = 0.405). The mean duration of cancer and mean blood loss in the PMMF group were 13.88 ± 6.94 months and 829.48 ± 119.76 ml, respectively, compared to 10.60 ± 7.23 months and 1235.52 ± 146.47 ml in the SIF group (p = 0.108 and <0.001, respectively). **Table-I**

In PMMF group success was achieved in 25 (100%) patients whereas in SIF group it was achieved in 18 (72%) patients (p-value = 0.004). In PMMF group infection was noted in 1 (4%) patients whereas in SIF group it was noted in 5 (20%) patients (p-value=0.189). In PMMF group graft necrosis was not found in any of the patient while in SIF group it was noted in 4 (16%) patients (p-value = 0.110). In PMMF group excellent aesthetic outcome was achieved in 11 (44%) patients whereas in SIF group it was achieved in 5 (20%) patients (p-value < 0.001). **Table-II**

**Table-I: Basic demographic variables and clinical parameters of enrolled patients (n = 50)**

| | | Study Groups | | p-value |
|---|---|---|---|---|
| | | PMMF | SIF | |
| Age (Years) | | 41.16 ± 11.86 | 39.76 ± 13.98 | 0.704 |
| Gender | Male | 16 (64.0%) | 13 (52.0%) | 0.390 |
| | Female | 9 (36.0%) | 12 (48.0%) | |
| Diabetes | Yes | 9 (36.0%) | 3 (12.0%) | 0.047 |
| | No | 16 (64.0%) | 22 (88.0%) | |
| Hypertension | Yes | 7 (28.0%) | 6 (24.0%) | 0.747 |
| | No | 18 (72.0%) | 19 (76.0%) | |
| Anemia | Yes | 18 (72.0%) | 17 (68.0%) | 0.758 |
| | No | 7 (28.0%) | 8 (32.0%) | |
| Smoking | Yes | 6 (24.0%) | 5 (20.0%) | 0.733 |
| | No | 19 (76.0%) | 20 (80.0%) | |
| Use of Alcohol | Yes | 3 (12.0%) | 1 (4.0%) | 0.297 |
| | No | 22 (88.0%) | 24 (96.0%) | |

| | | | | |
|---|---|---|---|---|
| Duration of cancer | | 13.88 ± 6.94 | 10.60 ± 7.23 | 0.108 |
| Stage of cancer | II | 6 (24.0%) | 6 (24.0%) | 0.405 |
| | III | 14 (56.0%) | 10 (40.0%) | |
| | IV | 5 (20.0%) | 9 (36.0%) | |
| Blood Loss (ml) | | 829.48 ± 119.76 | 1235.52 ± 146.47 | <0.001 |

**Table-II: Comparison of Outcome variables between study groups**

| | | Study Groups | | Total | p-value |
|---|---|---|---|---|---|
| | | PMMF | SIF | | |
| Success achieved | | 25 (100.0%) | 18 (72.0%) | 43 (86.0%) | 0.004 |
| Infection occurred | | 1 (4.0%) | 5 (20.0%) | 6 (12.0%) | 0.189 |
| Graft Necrosis observed | | 0 (0.0%) | 4 (16.0%) | 4 (8.0%) | 0.110 |
| Aesthetic Outcome | Excellent | 11 (44.0%) | 5 (20.0%) | 16 (32.0%) | <0.001 |
| | Good | 12 (48.0%) | 4 (16.0%) | 16 (32.0%) | |
| | Fair | 2 (8.0%) | 9 (36.0%) | 11 (22.0%) | |
| | Poor | 0 (0.0%) | 7 (28.0%) | 7 (14.0%) | |

**DISCUSSION:**

The incidence of head and neck tumors has been increasing year by year, especially the incidence of oral cancer has been high, and surgery is the main means to treat oral cancer [3, 12, 13]. Worldwide, 405000 new cases of oral cancer are anticipated each year, and the countries with the highest rates are Sri Lanka, India, Pakistan, Bangladesh, Hungary, and France. The National Cancer Institute in Bethesda, USA, depicted that Egypt had one of the highest overall incidence rates of cancer of the oral cavity and pharynx (5.5/105) among the MECC (Middle East cancer consortium) countries [14-16].

Pradeep Pradhan et al documented that the submental island flap is considered to be the reliable option for the soft tissue reconstruction in oral cancer because of dependent vascular pedicle, less donor site morbidity and the lower cost compared to the free flaps, often preferred in patients with a lower socioeconomic condition [10]. According to research by Alalaway15 who concluded that the pectoralis major flap was an excellent option for head and neck reconstruction, particularly in older patients with compromised health. Other researchers concurred with their assessment[17].

The recurrence rate in this study was high (56.8%) and was significantly higher in the submental group (p-value = .001). This consideration regarding the risk of the submental flap in aggressive oral cavity cancer was previously raised by Cariati et., who encountered a 44.4% recurrence rate [18]. Mohammed H. Osman et al concluded that te safety, dependability, and adaptability of the pectoralis major myocutaneous pedicle flap as a reconstructive technique, with a manageable incidence of postoperative problems and related morbidity [19].

A study by Amira A.M.M. Attia et al demonstrated that there was no statistical significant difference in age and sex distribution between the groups. PMMF has statistically significantly higher excellent functional outcome vs. SIF, while there was no statistical significance difference in esthetic outcomes between the two groups. Both submental flap and pectoralis major myocutaneus flap are considered preferable and consistent options for oral cancer reconstruction with satisfactory cosmetic and functional results and reasonable oncological safety [1].

Tsai et al showed effectivity of PMMC flaps are even in patients who are undernourished and found no significant relationship between preoperative serum albumin level and severe wound infection[20].

Saeed Ullah Shah et al done a study on pectoralis major myocutaneous flap success rate in the surgical management of oral cancer. The author resulted that the surgery had an 80% overall success rate. Twenty patients (57.1%) experienced difficulties, including 17 (48.6%) who had flap-related issues. Seven patients

(20%) experienced problems unrelated to the flap, such as temporomandibular joint pain and haemorrhage of the chest incision. 9 patients (25.7%) experienced major difficulties, compared to 8 patients (22.9%) who experienced minor complications [9].

Nasef Zaher et al showed in their study that pedicled flaps for oral cavity reconstruction especially submental island flap and PMMF are considered simple, timesaving, relatively safe, with minimal donor site morbidity. The mean time to start of oral fluids intake was 14.1 ± 6.62 days. There were two postoperative deaths. Reconstruction related complications occurred in 21.4% in the submental island flap group and 6.2% in the PMMF group. Total flap loss was reported in 4 of our patients (9.1%) [3 submental; 1 PMMF], while partial flap loss was reported in 3 submental flaps (6.8%). There was no statistical significance in functional outcomes except in feeding function. There was no statistical significance in aesthetic outcomes between the 2 groups[21].

## CONCLUSION:

Based on the findings of this study, the pectoralis major myocutaneous flap appears to be a more effective option for the treatment of squamous cell carcinoma of the oral cavity, demonstrating better outcomes compared to the submental island flap group.

## CONFLICT OF INTEREST:

None.

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