



A COMPARATIVE STUDY ON SUBMENTAL ISLAND PEDICLED FLAP [SIPF] VS RADIAL ARTERY FOREARM FREE FLAP [RFFF] RECONSTRUCTION IN PATIENTS WITH EARLY-STAGE ORAL CARCINOMA

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KEYWORDS :

INTRODUCTION

Oral carcinoma is one of the important public health problem in India as it is one of the most common types of cancer which affects a large number of population throughout the India. Oral carcinoma includes any malignant growth which is found on the lip, tongue, floor of the mouth, cheek lining, palate or gingiva and it is among the top three types of cancer in India. It is also leading cause of cancer mortality among men in India.¹ The diagnosis of oral cancer at early stage is one of the key factor to check upon physical, psychological and financial losses to the patient as well as it can ensure initiation of timely and proper treatment which can improve the survival rate up to 90%.²

Oral cavity being unique in the intricacy of its form and function such as speech, swallowing; therefore, reconstruction is needed after surgical intervention performed for cancer resection so as to restore speech, swallowing and cosmesis. This is challenging from surgeon's point of view to restore form as well as function. There are various options available for reconstruction of the oral tongue and floor of mouth which includes primary closure, free tissue transfer to name a few. One of the important factor which decides choice of reconstruction is the size and location of the defect with main objective of reconstruction to bring back the ability to maintain speech and swallowing function for the patient. For larger defects, free tissue transfer has traditionally been used. The radial forearm free flap (RFFF) is considered the flap of choice for soft tissue reconstruction of oral cavity defects as it provides good mobility to tongue which results in acceptable long-term swallowing and articulation ability. However, RFFF requires microvascular surgery and therefore it often results in long duration of surgery, increase in morbidity in terms of prolonged hospital stay and possible donor-site morbidity.³

To overcome the issues associated with RFFF, Martin et al introduced the use of submental island artery flap in 1993.⁴ Since then it has become popular for its use in head and neck reconstruction.^{5,6,7,8,9} The Submental Island Pedicled Flap (SIPF) is an axial fasciocutaneous flap that includes skin, subcutaneous tissue, platysma, and fat and is pedicled on the submental artery. Advantages of the submental island flap is that it has highly consistent colour and flexibility compared with the head and neck skin, simple harvesting, high survival rate, easy suturing at the donor site, and small scars. It requires less intensive postoperative flap monitoring.

The purpose of this study was to compare duration of surgery, postoperative complications, hospital stay and cosmesis of the SIPF with those of the RFFF in patients undergoing oral reconstruction. Other objectives of the study were to evaluate and compare complications following flap reconstruction.

MATERIALS AND METHODS

This prospective comparative study was carried out on patients with oral carcinoma admitted in the surgical ward of a tertiary care hospital situated in central India. After obtaining ethical clearance from the institutional ethics committee, the study was conducted after obtaining written informed consent from study participants. Data collection period of the study was from September 2020 to August 2021. Prior to

admission, proper screening along with detailed clinical evaluation with detailed history of each patient was done.

Detailed examination of tumour, nodal status, metastatic status and donor site evaluation was done with routine & radiological investigation.

Inclusion criteria

- Age between 20 to 80 years.
- Proven case of head and neck carcinoma (Tissue Biopsy and Clinical examination).
- Patient willing to consent for surgery and oral reconstruction.

Exclusion Criteria

- Patients with systemic metastasis
- Patients with locally advanced disease
- Patients with neck metastasis
- Patients unfit for surgery after pre-anesthetic check-up.
- Patients not giving consent.

The patients were divided into two groups: Group I & Group II and each group consisted of 15 patients. Surgery was organized in the same way as other elective patients admitted in general surgical ward. Patients were fully explained about the procedure and preoperative counselling regarding the nature of the disease, treatment plan, complications & follow up was done and written informed consent in patient's own language was taken.

The data was collected and entered in Microsoft Excel 2016 and was analyzed using Statistical Package for the Social Sciences (SPSS for Windows, Version 25.0, IBM Corporation, Armonk, New York, United States). Appropriate statistical tests were applied and $p < 0.05$ was considered as statistically significant.

RESULTS

Patient and tumour characteristics

Table 1 shows the patient and tumour characteristics for each group, SIPF and RFFF respectively. Thirty flaps were performed on 30 patients. When compared for age and gender distribution, the patients in the SIPF and RFFF groups had similar distribution across both the groups. Nine (09) out of 30 patients had tumour located at the cheeks followed by seven (07) patients whose tumour was found to be located at tongue and floor of the mouth. The distribution among SIPF and RFFF group was comparable across location of tumour but was not statistically significant ($p = 0.88$).

Majority of tumours in both the groups were staged as T2 (19 out of 30, 63.3%), however, this distribution was not found to be statistically significant ($p = 0.70$).

Operative and Postoperative Outcomes

Duration of surgery (in minutes) and duration of hospital stay (in days) was compared between the SIPF and RFFF group. Patients who underwent SIPF reconstruction experienced shorter duration of surgery (mean 146.53 minutes versus 167.60 minutes; $p = 0.001$) and duration of hospital stay (mean 5.07 days versus 9.73 days; $p = 0.00$) in

comparison to those patients who underwent RFFF reconstruction. (Table 2)

Complications

Data obtained for complications and cosmesis have been presented in table 3. There was one (01) case of flap failure in SIPF group and two (02) cases in RFFF group. Complications such as infection, seroma/hematoma development and donor site complications were seen in one (01) case respectively in the patients who underwent SIPF reconstruction while in RFFF group, the frequency for each was found to be three (03), one (01) and three (03) respectively. The difference between two groups was not statistically significant ($p = 0.92$).

Assessment for cosmesis was done for patients in each group by using grading. It was found that ten (10) patients had excellent cosmesis in SIPF group as compared to eight (08) patients in the RFFF group. Poor cosmesis was seen in four (04) patients from RFFF group and three (03) patients in SIPF group respectively. However, there was no statistically significant difference found between the two groups ($p = 0.75$).

DISCUSSION

Since the introduction of SIPF approach by Martin in 1993, the SIPF has been used for reconstruction of defects of head and neck including the face, neck, buccal mucosa, palate, and tongue.^{4,9} As RFFF, SIPF have similar advantages such as pliability and thin skin. This present study was conducted for comparing the SIPF with the RFFF for oral reconstruction in patients with early-stage oral carcinoma in terms of operative and functional outcomes.

In our study, we found that two groups, SIPF and RFFF groups were comparable across age and gender. Similar distribution which was comparable as reported by Paydarfar et al³. In the study conducted by Paydarfar et al³, they included 60 flap patients out of which 27 had undergone reconstruction surgery using SIPF as flap and 33 using RFFF as flap. As reported in our study, the mean duration of surgery (in minutes) and mean duration of hospital stay (in days) was found to be shorter in SIPF group in comparison to the RFFF group. Another study by Patel¹⁰ reported the mean duration of surgery for SIPF was 6.5 hours as compared to 9 hours for RFFF. Similarly, duration of hospital stay was found to be shorter in SIPF group than in RFFF group.

Zhang et al¹¹ included total 190 patients and had reported that survival was comparable between the two groups. They also reported that quality of life was better in RFFF group although, SIPF placed fewer limitations on patient's health status and hospital costs were also lower. In our study, we have not measured quality of life nor calculated hospital costs for both group; however, shorter stay in hospital will ensure lower hospital cost for patients thus SIPF group would likely to have lower hospital expenses than RFFF group. Forner et al¹² also compared the SIPF group with RFFF group for patients undergoing oral reconstruction following glossectomy and reported that mean duration of surgery and length of hospital stay was lower in the SIPF group than RFFF group.

In our study, we found that complication rates were lower in SIPF group as compared to RFFF group. Similar findings have been reported by Paydarfar et al³ who also concluded that SIPF gave better results as compared to RFFF.

One of the limitations of this study was its small size and hence, making generalization of results being difficult which are applicable on whole population. Another limitation of our study was that the two groups used for comparison were not perfect matches. Cost-analysis was not done for both the groups.

CONCLUSION

From our study, it can be concluded that functional results were similar in both the groups, however cosmetic results were also at par in Submental Island Pedicled Flap (SIPF) group compared to Radial Free Forearm Flap (RFFF) group. Duration of surgery and duration of hospital stay were significantly less in Submental Island Pedicle Flap compared to Radial Artery Free Forearm Flap. SIPF is an excellent alternative for reconstruction because of its reliability and relative ease of application for small to medium sized defects of oral cavity. Colour and texture of donor and recipient site matches perfectly in SIPF as compared to RFFF flap. Donor site defect in Submental Island Pedicle Flap (SIPF) can be closed primarily and is associated with less morbidity as compared to radial artery free forearm Flap (RFFF) skin

grafting is required. Donor site scar is acceptable and not visible as it is in continuation with upper neck dissection scar.

Tables

Table 1 Comparison of patients with SIPF and RFFF

Characteristics	SIPF n (%)	RFFF n (%)	p value*
Age, Mean (SD)	58.00 (10.07)	58.47 (10.01)	0.90
Gender			
Male	13 (86.7)	11 (73.3)	0.36
Female	02 (13.3)	04 (26.7)	
Location of Tumour			
Floor of the mouth	02 (13.3)	03 (26.7)	0.48
Cheeks	03 (20.0)	06 (40.0)	
Lips	01 (6.7)	02 (13.3)	
Tongue	04 (26.7)	02 (13.3)	
Tongue/Floor of the mouth	05 (33.3)	02 (13.3)	
Tumour Staging			
1	06 (13.3)	05 (6.7)	0.70
2	09 (60.0)	10 (53.3)	

* $p < 0.05$ significant

Table 2 Comparison of Duration of surgery and hospital stay in SIPF and RFFF

Characteristics	SIPF n (%)	RFFF n (%)	p value*
Duration of Surgery (in minutes)			
Mean \pm SD	146.53 \pm 14.54	167.60 \pm 13.24	0.001
Duration of Hospital Stay (in days)			
Mean \pm SD	5.07 \pm 2.12	9.73 \pm 2.02	0.00

* $p < 0.05$ significant, Unpaired t-test used

Table 3 Comparison of Complications and Cosmesis in SIPF and RFFF

Characteristics	SIPF n (%)	RFFFn (%)	p value*
Complications			
Flap failure	01 (6.7)	02 (13.3)	0.92
Infection	01 (6.7)	03 (20.0)	
Seroma/ Hematoma	01 (6.7)	01 (6.7)	
Donor site Complications	01 (6.7)	03 (20)	
Cosmesis			
Excellent	10 (66.7)	08 (53.3)	0.75
Good	02 (13.3)	03 (20)	
Poor	03 (20)	04 (26.7)	

* $p < 0.05$ significant

REFERENCES

- Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Cited [26 September 2022]. Available from: <https://gco.iarc.fr/today/data/factsheets/populations/356-india-fact-sheets.pdf>
- Borse V, Konwar AN, Buragohain P. Oral cancer diagnosis and perspectives in India. *Sens Int.* 2020;1:100046. doi: 10.1016/j.sintl.2020.100046. Epub 2020 Sep 24.
- Paydarfar JA, Patel UA. Submental Island Pedicled Flap vs Radial Forearm Free Flap for Oral Reconstruction: Comparison of Outcomes. *Arch Otolaryngol Head Neck Surg.* 2011;137(1):82-87. doi:10.1001/archoto.2010.204.
- Martin D, Pascal JF, Baudet J, Mondie JM, Farhat JB, Athoum A, Le Gaillard P, Peri G. The submental island flap: a new donor site. Anatomy and clinical applications as a free or pedicled flap. *Plastic and reconstructive surgery.* 1993 Oct 1;92(5):867-73.
- Merten SL, Jiang RP, Caminer D. The submental artery island flap for head and neck reconstruction. *ANZ journal of surgery.* 2002 Feb;72(2):121-4.
- Sebastian P, Thomas S, Varghese BT, Iype EM, Balagopal PG, Mathew PC. The submental island flap for reconstruction of intraoral defects in oral cancer patients. *Oral oncology.* 2008 Nov 1;44(11):1014-8.
- Abouchadi A, Capon-Degardin N, Patenôtre P, Martinot-Duquennoy V, Pellerin P. The submental flap in facial reconstruction: advantages and limitations. *Journal of oral and maxillofacial surgery.* 2007 May 1;65(5):863-9.
- Genden EM, Buchbinder D, Urken ML. The submental island flap for palatal reconstruction: a novel technique. *Journal of oral and maxillofacial surgery.* 2004 Mar 1;62(3):387-90.
- Patel UA, Bayles SW, Hayden RE. The submental flap: a modified technique for resident training. *The Laryngoscope.* 2007 Jan;117(1):186-9.
- Patel UA. The submental flap for head and neck reconstruction: Comparison of outcomes to the radial forearm free flap. *Laryngoscope.* 2020 Mar;130 Suppl 2: S1-S10. doi: 10.1002/lary.28429. Epub 2019 Dec 14.
- Zhang J, Wang Y, Han X, Chen H. Comparison of clinical results and quality-of-life in tongue cancer patients undergoing submental island flap and radial forearm free flap reconstruction. *Journal of Oral and Maxillofacial Surgery.* 2020 Sep 1;78(9):1639-44.
- Forner D, Phillips T, Rigby M, Hart R, Taylor M, Trites J. Submental Island flap reconstruction reduces cost in oral cancer reconstruction compared to radial forearm free flap reconstruction: a case series and cost analysis. *J Otolaryngol Head Neck Surg.* 2016 Feb 5;45:11. doi: 10.1186/s40463-016-0124-8.