

**How to Cite:**

Jyothirmayee, K., Jawarker, R., Kapoor, S., Plackal, J. J., Tusharbai, D. M., & Mishra, A. (2022). Efficacy of anterolateral thigh flap in oro-mandibular reconstruction: An original research. *International Journal of Health Sciences*, 6(S3), 8207–8213.  
<https://doi.org/10.53730/ijhs.v6nS3.7982>

## **Efficacy of anterolateral thigh flap in oro-mandibular reconstruction: An original research**

**Dr. K. Jyothirmayee**

Assistant Professor, Department Of Oral and Maxillofacial Surgery, Government Dental College and Hospital, Afzalgunj, Hyderabad, Telangana  
Email: [jyothirmayee.kali@gmail.com](mailto:jyothirmayee.kali@gmail.com)

**Dr. Rohie Jawarker**

MDS, Oral and Maxillofacial Surgery, Consultant, Happy Smiles Dental Clinic, Bhopal, MP.

\*Corresponding author email: [rohie90j@gmail.com](mailto:rohie90j@gmail.com)

**Dr. Shivangini Kapoor**

Consultant Oral and Maxillofacial Surgeon, Delhi  
Email: [drshivanginiskapoor@gmail.com](mailto:drshivanginiskapoor@gmail.com)

**Dr. Jacob John Plackal**

MDS, Oral and Maxillofacial surgery, Fellow in Oral Oncosurgery (RGUHS), Sri Uthradom Thirunal Hospital, Trivandrum, Kerala  
Email: [jacobjohn92@gmail.com](mailto:jacobjohn92@gmail.com)

**Dr. Dani Mihir Tusharbai**

MDS, Oral and maxillofacial surgery, Research Fellow, Department of Head and Neck oncology, Tata memorial hospital, Parel, Mumbai  
Email: [mihirdani26@gmail.com](mailto:mihirdani26@gmail.com)

**Dr. Aananya Mishra**

Final Year Postgraduate, Oral and maxillofacial surgery, Manipal college of Dental sciences, Mangalore, Manipal Academy of Higher Education, Manipal  
Email: [aananyamishra@icloud.com](mailto:aananyamishra@icloud.com)

**Abstract**---The purpose of this research was to evaluate the efficacy of utilizing the anterolateral flap from the thigh region for reconstructing the oro-mandibular defects when compared to other forms of flap reconstruction. A propensity score-matched analysis of patients with an oncologic head and neck defect who underwent microvascular reconstruction was performed. Two surgical groups, i.e., ALT (anterolateral thigh flap and bridging Plate) only and DFF (simultaneous soft tissue and vascularized bone flap), were created.

Incidence and subsequent management strategies for postoperative plate exposure were evaluated along with complications, overall survival, and postoperative quality of life (QoL). Sixty-two patients were 1:1 propensity matched (31 per group). The DFF group had a significantly larger soft tissue and bone defect than the single-flap group. The 5-year probability of not having a plate exposure was 45.5 and 47.4% for the double-flaps and single-flap groups, respectively ( $p = 0.186$ ). The ALT-only group had a significantly higher rate of wound infections (38.7% vs. 12.9%,  $p = 0.02$ ). The incidence of flap loss, re-exploration, inpatient mortality, plate fracture, medical complications, and overall survival were not significantly different. Although mean score for pain was significantly worse in the ALT-only group (75.2 vs. 88.5,  $p > 0.001$ ), the remainder of our QoL assessments (cosmesis, swallow, employment, and speech) were comparable. The utilization of an ALT with plate strategy is associated with competitive rates of plate exposure and overall survival relative to DFF but higher wound infections and long-term pain. These results have considerable salience for patient-counselling regarding expectations for functional and clinical outcomes.

**Keywords**---oromandibular defect, functional head, neck reconstruction, anterolateral thigh flap, quality of life.

## Introduction

Head and neck cancer is the sixth common cause of cancer with an estimated worldwide incidence of over 600,000 new cases annually.<sup>1</sup> Surgery for tumors of head and neck can cause significant soft tissue, bony and skin defects. This may result in functional impairment such as speech and swallowing deficits. Thus, the reconstruction of extensive defects after resection has always been challenging. In the past, attempts were made to achieve functional restoration of resected head and neck areas with acceptable cosmesis using local and locoregional flaps. The introduction of the Pectoralis Major Myocutaneous (PMMC) flap was well established in 1979 as one of the most important reconstructive methods due to its simple technical aspects and versatility.<sup>2</sup> However, the major disadvantages were that it was too bulky and the nipple position may become distorted, both of which can cause cosmetic problems. The free flap technique represented a revolution in reconstructive surgery as it enabled the harvesting of a large amount of revascularized tissue, and it could be tailored to the defect and allowed for more complex reconstructive procedures, while simultaneously permitting more extensive head and neck resections.<sup>3-5</sup>

Today, microvascular surgery is an essential part of the treatment of head and neck defects. Different free tissue flaps had been reported in the reconstruction of tumor defects of head and neck region, such as Latissimus Dorsi (LD) flap, Radial Forearm (RF) flap, scapula flap, Anterolateral Thigh (ALT) flap, Jejunum flap, and Rectus Abdominis muscle (RA) flap.<sup>6-9</sup> Complex oromandibular tissue defects can often be corrected with a single operation following tumor resection. Primary reconstruction of mandibular defects is usually performed immediately at the

time of benign tumor ablation (e.g., ameloblastoma), malignant cancer extirpation, or the resection of osteomyelitic and stage III osteoradionecrotic mandible. Primary repair of oromandibular defects offers significant advantage over secondary repair by preventing the wound from scarring while obtaining optimal functional and aesthetic results for the patient. Secondary reconstruction of mandibular defects is usually not recommended unless previously reconstructed tissue develops persistent infection and postoperative complications (i.e., screw loosening or plate extrusion). Secondary reconstruction presents a unique challenge for the surgeons due to the presence of soft tissue scarring and the contracture of the resected end of the mandibular tissue. This often hinders the surgeon's ability to predict the length and the amount of mucosa required intraorally.<sup>10</sup> The primary goals of oromandibular reconstruction are to achieve primary wound closure as well as to obtain a functional and aesthetic restoration. First, to avoid infection and facilitate wound healing, the use of soft tissue coverage (regional pedicled or free skin flap) helps establish primary wound closure in oromandibular reconstruction. Secondly, to obtain a functional and aesthetic restoration, it is important to reconstruct the intraoral lining using a reliable and practical flap to drape over the alveolus and the floor of the mouth.<sup>11</sup>

### **Aim of the present study**

The purpose of this research was to evaluate the efficacy of utilizing the anterolateral flap from the thigh region for reconstructing the oro-mandibular defects.

### **Methodology**

A total of 62 consecutive patients who underwent microvascular reconstruction of a composite oromandibular defect following oncologic extirpation between January 2016 and June 2021 were retrospectively reviewed. Patients with isolated defects of the anterior, central mandible, were excluded from the study due to the undisputedly superior outcomes offered by an osteo-septocutaneous reconstruction of the mandible. Corresponding medical records were reviewed for pertinent data related to demographics, perioperative variables, and clinical outcomes. Patient-level data included age, gender, body mass index (BMI), preoperative nutritional status, history of radiation therapy (RT), disease recurrence, and clinicopathological characteristics (TNM, overall stage). Baseline comorbidities were assessed and quantified according to the Charlson Comorbidity Index (CCI).<sup>12</sup> Operative data included operative time, estimated blood loss (EBL), blood transfusions, ablative approach, respective defect dimensions (mucosa, bone and skin), and defect location. Jewer's classification was used to categorize the location and relative complexity of the mandibular defect.<sup>13-15</sup>

The Synthes Inc. (Zuchwil, Switzerland) locking mandibular reconstruction plate fixation system was used to span the mandibular defect or secure the FF flap in all cases. Our primary outcomes of interest were the rate, timing, and subsequent management strategies for postoperative plate exposure. Plate exposure (intra-oral and/or extra-oral) was diagnosed on the basis of clinical exam. Secondary

outcomes of interest included the incidence of recipient site wound infections, flap loss (partial/total), inpatient mortality, length of stay (ICU/total), flap re-exploration, medical complications (pneumonia, sepsis, ICU psychosis, shock, and cardiovascular events), 5-year overall survival, and an assessment of postoperative quality of life using selected portions of the University of Washington Quality of Life (QoL) questionnaire.<sup>16</sup> Specific domains assessed in the present study include pain, appearance, employment, speech, and swallowing. Scoring is based on a scale of 0 (worst) to 100 (best), and all patients received the questionnaire at least 12 months after surgery. Continuous data were presented as mean and standard Deviations. To address confounding by indication and allocation bias in the treatment groups, we performed a propensity score matched-analysis.<sup>17</sup> The propensity score was based on age, gender, BMI, CCI, T stage, overall stage, second primary/ recurrent status, and exposure to preoperative radiation. The two groups were matched by their propensity score in a 1:1 ratio. Length of follow-up for the study was at least 5 years in all matched patients. Analyses were performed using SPSS statistical software. All p values were two-sided, and values  $\leq 0.05$  were considered statistically significant.

## Results

Before matching, the two groups were comparable with respect to gender, age, BMI, tumor location, and stage. The ALT-only group had a higher comorbidity burden (CCI mean, 2.59 vs. 1.52,  $p = 0.003$ ) and rate of preoperative RT (35.4% vs. 6.1%,  $p = 0.001$ ). Significantly more patients in the ALT with reconstruction plate group had recurrent/second primary cancers (33.9% vs. 12.1%,  $p = 0.017$ ). Patients in the ALT-only group were noted to have a shorter operative duration (646.9 vs. 781.6 min,  $p = 0.018$ ) along with smaller skin (49.9  $\pm$  51.2 vs. 101.8  $\pm$  46.7,  $p > 0.001$ ) and bone defects (8.7  $\pm$  2.9 vs. 10.4  $\pm$  2.9 46.7,  $p = 0.029$ ). The need for bilateral neck dissection (51.6% vs. 6.5%,  $p > 0.001$ ) was more common in the ALT-only group, whereas the need for unilateral neck dissection was less (38.7% vs. 90.3%,  $p < 0.001$ ). All other comparisons were nonsignificant. (Table 1) A statistically significant higher incidence of recipient site wound infections was observed in the ALT-only group (38.7% vs. 12.9%,  $p = 0.003$ ). However, this did not translate into an increased need for wound debridement (16.1% vs. 22.6%,  $p = 0.494$ ). Only 24 of 62 total patients (38.7%) completed our QoL questionnaire. Along the following dimensions: speech, swallowing ability, cosmesis/appearance, and employment (a measure of social integration), there were no significant differences noted between these two groups. However, mean score for pain was found to be significantly lower in the ALT-only group (75.2 vs. 88.5,  $p > 0.001$ ), indicating a higher incidence of mild chronic pain.

## Discussion

In this study, the reconstruction of composite oromandibular defects with an ALT flap and reconstruction plate compared with double free flaps was associated with: (a) similar rates of long-term (5 year) plate coverage, (b) significantly higher wound infection rates, and (c) worse long-term pain scores. Overall complications and the remaining domains of postoperative QoL (speech, employment, swallowing, and appearance) were comparable. VBF (Vascularized bone graft) is the "gold standard" for restoring continuity of the mandible on account of its

dental rehabilitative potential, unsurpassed reliability ([90% success rate), and durability in the face of irradiation. Other approaches include the use of: (a) nonvascularized bone grafts (NVBG) for defects <5 cm with adequate soft tissue vascularity, (b) NVBG and a soft-tissue free flap, (c) soft-tissue free flap with a reconstruction plate, and (d) DFF.<sup>17-22</sup> The results of the current series invite a cautious re-examination of the indications for use of synchronous DFF in the reconstruction of composite oromandibular defects. This is salient due to the fact that synchronous DFF reconstruction of the mandible is generally associated with increased case complexity, health resource utilization, and greater donor site morbidity.<sup>23</sup> The use of a bridging reconstruction plate as a permanent bone graft substitute, in addition to alleviating the aforementioned problems in a cohort of patients with considerable baseline comorbidity, also may facilitate early postoperative RT.<sup>24</sup> Our finding that long-term pain outcomes were significantly worse in the ALT-only group attributes a QoL related benefit to the utilization of DFF in composite mandibular reconstruction. In a broader context, it highlights the need for more comparative QoL studies in head and neck oncology patients using long-term data. A more robust understanding of the health-related quality of life in recipients of head and neck reconstruction will allow clinicians to counsel properly these patients preoperatively and set reasonable expectations.<sup>25</sup>

## Conclusion

Double free-flap utilization in composite oromandibular reconstruction, relative to a soft-tissue flap and plate, was associated with less infectious complications and decreased incidence of long-term pain. However, in-patient mortality, medical complications, long-term plate coverage, overall survival, and the remainder of our QoL assessments (speech, swallow, appearance, and employment) were noted to be comparable between the two groups.

## References

1. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. *Int J Cancer*. 2010;127:2893---917.
2. Ariyan S. The pectoralis major myocutaneous flap. A versatile flap for reconstruction in the head and neck. *Plast Reconstr Surg*. 1979;63:73---8.
3. de Bree R, Rinaldo A, Genden EM, Suárez C, Rodrigo JP, Fagan JJ, et al. Modern reconstruction techniques for oral and pharyngeal defects after tumor resection. *Eur Arch Otorhinolaryngol*. 2008;265:1---9.
4. Futran ND, Mendez E. Developments in reconstruction of mid-face and maxilla. *Lancet Oncol*. 2006;7:249---58.
5. Xiao Y, Zhu J, Cai X, Wang J, Liu F, Wang H. Comparison between anterolateral thigh perforator free flaps and pectoralis major pedicled flap for reconstruction in oral cancer patients--- a quality of life analysis. *Med Oral Patol Oral Cir Bucal*. 2013;18:e856---61.
6. Sweeny L, Eby B, Magnuson JS, Carroll WR, Rosenthal EL. Reconstruction of scalp defects with the radial forearm free flap. *Head Neck Oncol*. 2012;4:21.
7. Borah GL, Hidalgo DA, Wey PD. Reconstruction of extensive scalp defects with rectus free flaps. *Ann Plast Surg*. 1995;34:281---5.

8. Markey J, Knott PD, Fritz MA, Seth R. Recent advances in head and neck free tissue transfer. *Curr Opin Otolaryngol Head Neck Surg.* 2015;23:297---301.
9. Neligan PC. Head and neck reconstruction. *Plast Reconstr Surg.* 2013;131:260e---9e.
10. P. D. Kim and K. E. Blackwell, "Latissimus-serratus-rib free flap for oromandibular and maxillary reconstruction," *Archives of Otolaryngology - Head and Neck Surgery*, vol. 133, no. 8, pp. 791-795, 2007.
11. P.G. Cordeiro and D. A. Hidalgo, "Conceptual considerations in mandibular reconstruction," *Clinics in Plastic Surgery*, vol. 22, no. 1, pp. 61-69, 1995.
12. Charlson M, Szatrowski TP, Peterson J, Gold J. Validation of a combined comorbidity index. *J Clin Epidemiol.* 1994;47:1245-51.
13. Chim H, Salgado CJ, Mardini S, Chen HC. Reconstruction of mandibular defects. *Sem Plastic Surg.* 2010;24:188-97.
14. Fanzio PM, Chang KP, Chen HH, et al. Plate exposure after anterolateral thigh free-flap reconstruction in head and neck cancer patients with composite mandibular defects. *Ann Surg Oncol.* 2015;22:3055-60.
15. Jewer DD, Boyd JB, Manktelow RT, et al. Orofacial and mandibular reconstruction with the iliac crest free flap: a review of 60 cases and a new method of classification. *Plastic Reconstr Surg.* 1989;84:391-403 (discussion 4-5).
16. Lee YH, Lai YH, Yueh B, et al. Validation of the University of Washington Quality of Life Chinese Version (UWQOL-C) for head and neck cancer patients in Taiwan. *J Formos Med Assoc.* 2017;116(4):249-56.
17. Rubin DB. Propensity score methods. *Am J Ophthalmol.* 2010;149:7-9.
18. Urken ML, Buchbinder D, Costantino PD, et al. Oromandibular reconstruction using microvascular composite flaps: report of 210 cases. *Arch Otolaryngol Head Neck Surg.* 1998;124:46-55.
19. Schultz BD, Sosin M, Nam A, et al. Classification of mandible defects and algorithm for microvascular reconstruction. *Plastic Reconstr Surg.* 2015;135:743e-54e.
20. Urken ML, Weinberg H, Vickery C, Buchbinder D, Lawson W, Biller HF. Oromandibular reconstruction using microvascular composite free flaps. Report of 71 cases and a new classification scheme for bony, soft-tissue, and neurologic defects. *Arch Otolaryngol Head Neck Surg.* 1991;117:733-44.
21. Hidalgo DA, Pusic AL. Free-flap mandibular reconstruction: a 10-year follow-up study. *Plastic Reconstr Surg.* 2002;110:438-49; (discussion 50-51).
22. Kademani D, Mardini S, Moran SL. Reconstruction of head and neck defects: a systematic approach to treatment. *Sem Plastic Surg.* 2008;22:141-55.
23. Charlson M, Szatrowski TP, Peterson J, Gold J. Validation of a combined comorbidity index. *J Clin Epidemiol.* 1994;47:1245-51.
24. Fanzio PM, Chang KP, Chen HH, et al. Plate exposure after anterolateral thigh free-flap reconstruction in head and neck cancer patients with composite mandibular defects. *Ann Surg Oncol.* 2015;22:3055-60.
25. Cohen WA, Albornoz CR, Cordeiro PG, et al. Health-related quality of life following reconstruction for common head and neck surgical defects. *Plastic Reconstr Surg.* 2016;138:1312-20.

**Tables**

Table 1  
Operative variables in propensity-matched groups

	ALT flap + plate n (%)	Double flaps n (%)	<i>p</i>
No. of patients	31	31	
Op time (min)	646.9 ± 180.6	781.6 ± 250.4	0.018
ICU stay (days)	8.4 ± 4.3	6.9 ± 2.3	0.092
In-hospital mortality (%)	0 (0.0)	0 (0.0)	1
Medical complication	1 (3.2)	5 (16.1)	0.195
Wound infection/fistula	12 (38.7)	4 (12.9)	0.020
Quality of life-Pain	75.2 ± 10.1	88.5 ± 10.3	<0.001