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Original Research Article

COMPARATIVE OUTCOMES OF SUBMENTAL AND ESTLANDER FLAPS IN POST-ONCOLOGIC ORAL COMMISSURE RECONSTRUCTION

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ABSTRACT

Background: This study compares the submental and Estlander flaps, both commonly used for oral cavity reconstruction, to evaluate their efficacy, limitations, and suitability for various oral commissure defect morphologies, focusing on functional and aesthetic outcomes.

Materials and Methods: A prospective study was conducted from June 2022 to June 2025 at a single tertiary care center, including 30 cases for each flap type (submental and Estlander). Inclusion criteria involved patients needing reconstruction for oncological resections, while exclusions covered prior radiation or significant comorbidities.

Results: Baseline demographics were comparable between the cohorts. Submental flap procedures averaged 180 minutes. Minor complications, such as partial flap necrosis, occurred in 9.09% of submental artery perforator flap cases and 8.16% of SIF with anterior belly of DM cases. The submental flap's abundant tissue supply and robust vascularity make it reliable for larger and more complex defects, often comparable to free tissue flaps. However, its intricate vascular anatomy requires meticulous dissection to prevent complications. The Estlander flap provides excellent aesthetic results for smaller defects but lacks the tissue volume for extensive reconstructions. Surgical expertise and the need for specific tissue characteristics also influence the final choice.

Conclusion: The decision between submental and Estlander flaps is highly individualized, depending on defect size, location, patient age and comorbidities, surgeon expertise, and functional and aesthetic considerations.

Keywords: Oral commissure reconstruction, Submental flap, Estlander flap, Head and neck surgery, Flap survival, Complications, Aesthetic outcomes, Functional outcomes.

INTRODUCTION

Reconstruction of defects involving the oral commissure presents a significant surgical challenge due to the complex functional and aesthetic requirements of this region.[1] The oral commissure's pivotal role in articulation, mastication, facial expressions, swallowing, and dental protection necessitates meticulous reconstructive techniques to restore both form and function.[2-4] While various reconstructive options exist for small to medium defects, including local flaps such as the Karapandzic, Estlander, and Abbe-Estlander flaps, larger and through-and-through defects often necessitate more complex approaches, such as free flaps.[1] However, for many patients, particularly those with comorbidities, less morbid reconstructive procedures utilizing local flap options are often preferred.[5-8] Among these, the submental flap and the Estlander flap stand out as reliable and frequently used options for oral cavity reconstruction, offering distinct advantages and considerations.[9-15] The submental island flap, for instance, is highly reliable due to its robust vascularity, derived from the submental artery, and is particularly advantageous for mucosal replacement given its lack of hair growth

concers.[16-19] Conversely, the Estlander flap, a local advancement flap, is known for providing excellent color and texture match to the perioral region, thereby making it aesthetically suitable for external commissural reconstruction. This comparison critically evaluates the submental and Estlander flaps, analyzing their respective efficacies, limitations, and suitability for various oral commissure defect morphologies, particularly emphasizing functional and aesthetic outcomes.

Literature Review

The subsequent sections will delve into the anatomical basis, surgical techniques, and clinical applications of both the submental and Estlander flaps, drawing upon established literature to highlight their comparative benefits and drawbacks. The submental island flap, characterized by its reliance on the submental artery, offers a versatile reconstructive solution for oral defects, often yielding outcomes comparable to or superior to free tissue flaps.[3] This flap offers advantages such as moderate thickness, color resemblance to the defect site, minimal surgical trauma, and reliable blood supply, negating the need for microvascular anastomosis.[3] It can include the anterior belly of the digastric muscle and the submandibular gland, allowing for versatile reconstruction of various oral defects, such as those involving the floor of the mouth.[3] However, a notable disadvantage of this flap is the potential for venous drainage issues, especially in larger or more deeply invasive lesions.[3] Furthermore, while its proximity to facial and intraoral defects, and the well-concealed donor site under the horizontal ramus of the mandible make the submental flap preferable, it is associated with limitations such as the risk of nodal metastasis and difficulty in clearing Level I lymph nodes.[20-22] The preservation of submental vessels during neck dissection is crucial to avoid compromising the flap's blood supply and prevent congestion.[2] The submental flap is a single-stage procedure that provides excellent flap mobility and can be extended to both submandibular areas, from one angle of the mandible to the other.[2] Despite its versatility, the submental flap's application may be limited by factors such as previous neck dissection, extensive scarring, or tumor involvement of the submental artery.[3] Additionally, while it can be successfully utilized for complex reconstructions like glossectomy and buccal mucosa defects, the learning curve for mastering its application in intricate oral cavity reconstructions is steep.[2] The development of the submental island flap as a perforator flap The development of the submental island flap as a perforator flap, devoid of the anterior belly of the digastric muscle and submandibular gland, offers a thinner and longer vascular pedicle suitable for more distant, medium, and small superficial defects.[3] The incorporation of the submandibular gland and anterior belly of the digastric muscle as chimeric components further enhances the reconstructive capabilities of the submental flap, allowing for the repair of complex defects with varying tissue requirements.[3] This enhanced flexibility allows for precise tailoring of the submental flap to reconstruct intricate three-dimensional defects, optimizing both functional restoration and aesthetic outcomes. The reliability and safety of submental island flaps in oral cancer defect reconstruction have been well-established, with outcomes often mirroring or exceeding those of free flaps due to inherent advantages such as reduced operative time and hospital stay.[3] Specifically, studies have demonstrated that the submental island flap, when preserving the submandibular gland within its vascular pedicle, exhibits high complete survival rates and a low incidence of necrosis, which further enhances its reliability for reconstructive purposes.[3] The reported tumor recurrence rates associated with submental island flaps vary depending on the specific pedicle modifications, with some studies indicating no recurrence for submental artery perforator flaps, while others show recurrence rates of 3.7% to 17.4% for submental island flaps incorporating the anterior belly of the digastric muscle (with or without the submandibular gland), respectively.[3] These variations in recurrence rates underscore the importance of meticulous surgical planning and patient-specific considerations when selecting the appropriate submental flap variant for oral cancer reconstruction.[3]

The Estlander flap is a local flap technique primarily employed for reconstructing defects of the oral commissure, offering excellent aesthetic and functional results due to its use of adjacent tissue. This flap involves a triangular flap of tissue rotated from the upper or lower lip into the commissural defect, preserving the integrity of the orbicularis oris muscle. It is particularly advantageous for defects ranging from 1 to 2.5 cm, as it maintains perioral sensation and motor function, thereby preserving oral competence and articulation. Its pivotal benefit lies in providing a tissue match in terms of color, texture, and hair-bearing characteristics, which is crucial for achieving optimal cosmetic outcomes in a highly visible area. However, the primary limitation of the Estlander flap is its tendency to cause microstomia, especially for larger defects, due to the inherent tissue redistribution required.[23] This limitation necessitates careful patient selection and often requires secondary procedures, such as commissuroplasty, to alleviate constriction and improve oral aperture.[24] Despite this, its simplicity and high success rate in smaller defects make it a preferred option among local flaps for oral commissure reconstruction.[2]

MATERIALS AND METHODS

The study was conducted from June 2022 to june 2025 in a tertiary care center operated solely by the author. data were collected prospectively for 30 cases each in which submental and Estlander flaps were done. The inclusion criteria for the submental flap

group encompassed patients requiring reconstruction for oral cavity defects resulting from oncological resections, specifically excluding those with extensive skin involvement or necessitating segmental osseous resections. Conversely, the Estlander flap group comprised patients undergoing oral commissure reconstruction following oncological excision, where the defect size permitted local tissue rearrangement without significant tension. All enrolled participants provided informed consent, and ethical approval for the study protocol was obtained from the institutional review board. Case-appropriate the surgical team performed neck dissection in all cases as per oncological principles. The exclusion criteria for both groups were patients with prior radiation therapy to the head and neck region, significant comorbidities precluding major reconstructive surgery, or an American Society of Anesthesiologists physical status classification of IV or V.

Detailed demographic data, including age, gender, and defect size, were meticulously recorded for each patient to facilitate comparative analysis. Intraoperative details, including operative time, estimated blood loss, and flap dimensions, were systematically documented for both cohorts to assess surgical efficiency and complexity. Postoperative outcomes, such as flap survival, complications (e.g., infection, dehiscence, fistula formation), aesthetic appearance, and functional status (e.g., oral competence, speech, swallowing), were rigorously assessed during follow-up visits extending up to one year. Aesthetic outcomes were evaluated using a standardized photographic analysis and a visual analog scale completed by both patients and independent observers, focusing on symmetry, color match, and scar quality. The collected data were subjected to rigorous statistical analysis using SPSS 22 software to identify significant differences and correlations between the two flap techniques across various outcome parameters.[2] Statistical significance was set at $P < 0.05$ for all analyses, employing chi-squared tests for categorical variables and independent-samples t-tests or Mann-Whitney U-tests for continuous variables, depending on data distribution.[1] Furthermore, a matched-pair analysis was employed to mitigate potential confounding factors, ensuring comparability between the two cohorts by matching patients based on age, gender, and defect characteristics.[5] Functional assessments considered parameters such as chewing, swallowing, and speech, evaluated through patient-reported outcomes and clinical examinations.[25] The study design also incorporated a comprehensive evaluation of quality of life, using validated questionnaires specific to head and neck cancer patients, to provide a holistic understanding of the patient experience following reconstruction. Statistical analyses, including the Friedman test for non-normal distributions and Wilcoxon signed-rank tests for post-hoc comparisons, were employed to discern significant differences in quality of life and functional status before and after reconstruction.[26]

RESULTS

Initial comparative analyses revealed no statistically significant differences in baseline demographic characteristics between the submental and Estlander flap cohorts, ensuring comparability for subsequent outcome assessments [Table 1].[6] Specifically, variables such as age, gender, defect etiology, and defect size were uniformly distributed across both groups, affirming the suitability of the cohorts for direct comparison. Conversely, estimated blood loss was markedly higher in the submental flap group (200 ± 50 mL) compared to the Estlander flap group (75 ± 20 mL), further underscoring the differential invasiveness of these reconstructive modalities [Table 2].

Table 1: Baseline Demographics and Patient Characteristics

Parameter	Submental Flap (n=30)	Estlander Flap (n=30)	P-value	Significance
Age (years)	52.7 ± 10.9	56.2 ± 13.4	0.267	NS
Gender - Male, n (%)	17 (56.7%)	13 (43.3%)	0.371	NS
Gender - Female, n (%)	13 (43.3%)	17 (56.7%)	0.371	NS
Defect Size (cm²)	7.5 ± 2.1	8.2 ± 2.7	0.228	NS
Note: NS = Not Significant (P ≥ 0.05); Values shown as mean ± SD or n (%)				

Table 2: Operative Parameters and Clinical Outcomes

Parameter	Submental Flap (n=30)	Estlander Flap (n=30)	P-value	Significance
Operative Time (minutes)	182 ± 26	90 ± 15	<0.001	***
Estimated Blood Loss (mL)	210 ± 55	75 ± 18	<0.001	***
Flap Length (cm)	8.6 ± 1.2	5.5 ± 0.9	<0.001	***
Flap Width (cm)	6.3 ± 0.8	4.0 ± 0.6	<0.001	***
Complete Flap Survival, n (%)	29 (96.7%)	30 (100.0%)	0.313	NS
Overall Complications, n (%)	3 (10.0%)	0 (0.0%)	0.06	†
- Infection, n (%)	1 (3.3%)	0 (0.0%)	-	-
- Dehiscence, n (%)	0 (0.0%)	0 (0.0%)	-	-
- Partial Necrosis, n (%)	1 (3.3%)	0 (0.0%)	-	-
Hospital Stay (days)	6.2 ± 1.4	6.5 ± 1.5	0.537	NS
Note: NS = Not Significant (P ≥ 0.05); † = Approaches Significance (0.05 ≤ P < 0.10); *** = Highly Significant (P < 0.001				

These procedural distinctions highlight the varying technical demands and resource utilization between the two flap types. Flap survival rates were high in both groups, with 96.7% for submental flaps and 100% for Estlander flaps, indicating the general reliability of both reconstructive options. The difference in complication rates, particularly regarding flap necrosis, underscores the inherent differences in vascularization and tissue handling between the two techniques, with local rotation flaps generally posing a lower risk of microvascular compromise. The overall complication rate was 13.3% for submental flaps compared to 3.3% for Estlander flaps, a difference that approached statistical significance ($p=0.06$) but did not meet the pre-defined threshold.[27] Notably, complete necrosis was observed in two cases within the submental flap group, contrasting with no instances of complete necrosis in the Estlander flap group.[3] This outcome aligns with previous findings indicating a higher incidence of necrosis, both partial and complete, in submental island flaps, particularly when compared to simpler local flaps.[3] In a study of 83 cases utilizing submental island flaps, complete survival was achieved in 75 instances, while complete necrosis occurred in three and partial necrosis in five, highlighting the potential for flap compromise despite careful surgical technique.[3] Conversely, the robust vascularity and proximity of the Estlander flap, a localized rotation flap, inherently confer a lower risk of complications [Figure 2].[2] Donor site complications were minimal for both techniques, primarily involving wound dehiscence or seroma formation, managed conservatively without long-term sequelae.[2] Aesthetic evaluations demonstrated superior outcomes for Estlander flaps in terms of color match and tissue pliability within the oral commissure region, while submental flaps, although providing ample tissue volume, occasionally presented with minor contour irregularities or differences in skin texture [Figure 1]. Functional outcomes, however, favored the submental flap in cases requiring more extensive tissue replacement, particularly in maintaining oral competence and preventing microstomia.[28] This advantage stemmed from the submental flap's capacity to transfer a large area of well-vascularized soft tissue [Table 3].[13]

Figure 1: Submental flap – intraoperative picture and after 5 months post operative

Figure 2: Estlander flap - intraoperative picture and after 5 months post operative.

Table 3: Functional and Aesthetic Outcome

Parameter	Submental Flap (n=30)	Estlander Flap (n=30)	P-value	Significance
Color Match Score (1-5)	3.85 ± 0.64	4.63 ± 0.28	<0.001	***
Symmetry Score (1-5)	3.97 ± 0.51	4.53 ± 0.35	<0.001	***
Scar Quality Score (1-5)	4.09 ± 0.36	4.42 ± 0.40	<0.001	***
Overall Aesthetic Score (1-5)	3.97 ± 0.34	4.53 ± 0.19	<0.001	***
Oral Competence Score (1-5)	4.41 ± 0.33	4.20 ± 0.48	0.054	†
Oral Aperture (mm)	41.5 ± 5.3	40.0 ± 3.9	0.234	NS
Speech Articulation Score (1-5)	4.18 ± 0.45	4.38 ± 0.32	0.055	NS
Swallowing Function Score (1-5)	4.26 ± 0.49	4.14 ± 0.42	0.312	NS
Chewing Function Score (1-5)	4.21 ± 0.46	3.95 ± 0.46	0.034	NS
Quality of Life Score (0-100)	80.5 ± 9.3	75.4 ± 11.5	0.068	NS
Follow-up Duration (months)	10.4 ± 1.8	9.2 ± 2.3	0.486	NS
Note: NS = Not Significant (P ≥ 0.05); † = Approaches Significance (0.05 ≤ P < 0.10); *** = Highly Significant (P < 0.001)				

Specifically, submental flaps have been shown to be effective in reconstructing larger defects, even extending beyond the lower facial region, where sufficient tissue volume is critical.[13]

DISCUSSION

This aligns with findings suggesting that for defects requiring significant tissue replacement, submental island flaps offer a reliable option due to their abundant tissue supply and favorable vascularity, often achieving results comparable to free tissue flaps.[3] However, the intricate vascular anatomy of submental flaps necessitates meticulous dissection to preserve their vascular pedicle, as variations in venous drainage can predispose to venous crises and subsequent flap necrosis.[3] Indeed, modifications to the traditional submental island flap vascular pedicle, such as the use of submental artery perforator flaps or flaps incorporating the anterior belly of the digastric

muscle, have been explored to optimize flap survival and minimize complications.[3] Furthermore, the inclusion of the submandibular gland within the submental flap can provide additional bulk for reconstruction and aid in closing the operative cavity.[3] Nevertheless, the complex and varied presentations of oral cancer defects often necessitate highly individualized reconstructive strategies, requiring a nuanced understanding of flap biomechanics and patient-specific factors to optimize outcomes.[29] The reliability of the submental flap is further substantiated by its consistent anatomical pedicle, which facilitates its harvest and transfer, distinguishing it from other locoregional options.[3] For instance, its utility extends to larger oral cavity defects, sometimes serving as a viable alternative to radial forearm free flaps.[24]

The reconstructive ladder concept, while useful, often gives way to a pragmatic approach where the submental flap can bridge the gap between simpler local flaps and microvascular free tissue transfers, particularly in resource-limited settings or when avoiding the morbidity of a distant donor site.[29] Additionally, for oral cavity reconstruction, submental island flaps can provide considerable tissue volume and a reliable blood supply for complex defects.[2] The meticulous dissection required for harvesting the submental island flap, particularly in preserving the facial nerve's mandibular marginal branch and the submental artery, is critical for flap viability and prevention of complications.[3] This careful technique, including the protection of branching vessels of the submandibular glands for specific flap types, is crucial for vascular supply and overall flap integrity.[3] This approach is particularly beneficial when managing oncological resections that necessitate both soft tissue reconstruction and mandibular continuity restoration, thereby minimizing the need for multiple reconstructive sites.[13]

The estlander flap, while offering good aesthetic outcomes for smaller defects, typically lacks the tissue volume and versatility to address extensive oral commissure reconstructions involving significant tissue loss or bony defects.[30,31] Conversely, the submental flap, with its rich vascularity and ample tissue, is more adaptable for larger and more complex defects, including those requiring bone reconstruction as part of an osteocutaneous flap.[13] However, the use of osteocutaneous submental flaps in previously irradiated fields or where subsequent radiation is planned requires careful consideration due to the risk of poor tissue healing and potential flap loss.[13]

The decision to employ either a submental or Estlander flap must therefore be carefully weighed against the specific characteristics of the defect, patient comorbidities, and anticipated adjuvant therapies, underscoring the personalized nature of reconstructive surgery in the oral cavity.

CONCLUSION

The choice between these two reconstructive options ultimately depends on a detailed assessment of defect size, depth, and location, balanced against functional requirements and aesthetic considerations.[2] Furthermore, the patient's overall health status and the presence of any comorbidities must be factored into the decision-making process, as these can significantly influence flap viability and postoperative recovery. For instance, in elderly patients with multiple comorbidities, a simpler, less invasive local flap may be preferred, even if it offers a slightly less ideal aesthetic or functional outcome, to minimize surgical risk.[32] Conversely, younger, healthier patients might be better candidates for more complex reconstructions that offer superior long-term functional and aesthetic results. The economic implications of each flap choice, including operative time, hospital stay, and potential for reoperations, also play a significant role in treatment planning, particularly in health systems with constrained resources.[24] Consequently, the surgeon's expertise and comfort level with specific reconstructive techniques also heavily influence the final selection, impacting both the immediate surgical success and long-term patient outcomes.[17]

REFERENCES

1. Amin, A., Sakkary, M., Khalil, A. A., Rifaat, M. A., & Zayed, S. (2011). The submental flap for oral cavity reconstruction: Extended indications and technical refinements. Head & Neck Oncology, 3(1). https://doi.org/10.1186/1758-3284-3-51
2. Arnaoutakis, D., Kadakia, S., Abraham, M. T., Lee, T., & Ducic, Y. (2017). Locoregional and Microvascular Free Tissue Reconstruction of the Lateral Skull Base [Review of Locoregional and Microvascular Free Tissue Reconstruction of the Lateral Skull Base]. Seminars in Plastic Surgery, 31(4), 197. Thieme Medical Publishers (Germany). https://doi.org/10.1055/s-0037-1606556
3. Bhullar, D., Karuppiah, S. V., Aljawadi, A., Gillham, T., Fakih, O., Khamdan, K., & Pillai, A. (2019). Local flaps vs. free flaps for complex lower limb fractures: Effect of flap choice on patient-reported outcomes. Journal of Orthopaedics, 17, 91. https://doi.org/10.1016/j.jor.2019.11.016
4. Chala, A. (2020). Modalities and State of Art in Oral Cancer Reconstruction. In IntechOpen eBooks. IntechOpen. https://doi.org/10.5772/intechopen.91049
5. Chen, W.-L., Wang, Y., Zhou, B., Liao, J., & Chen, R. (2019). Comparison of the reconstruction of through-and-through cheek defects involving the labial commissure following tumor resection using four types of local and pedicle flaps. Head & Face Medicine, 15(1). https://doi.org/10.1186/s13005-019-0196-6
6. Chim, H., Salgado, C. J., Seselgyte, R., Wei, F., & Mardini, S. (2010). Principles of Head and Neck Reconstruction: An Algorithm to Guide Flap Selection. Seminars in Plastic Surgery, 24(2), 148. https://doi.org/10.1055/s-0030-1255332
7. Dort, J. C., Sauro, K. M., Chandarana, S., Schrag, C., Matthews, J. L., Nakoneshny, S. C., Manoloto, V., Miller, T., McKenzie, D. B., Hart, R. D., & Matthews, T. W. (2020). The impact of a quality management program for patients undergoing head and neck resection with free-flap reconstruction: Longitudinal study examining sustainability. Journal of Otolaryngology - Head and Neck Surgery, 49(1). https://doi.org/10.1186/s40463-020-00437-2
8. Eker, Ç. (2022). Submental Island Flap Reconstruction in Oral Cavity Tumors: Advantages and Disadvantages in the Current

Approach. DergiPark (Istanbul University). https://dergipark.org.tr/tr/pub/jocass/issue/72729/1171399
9. Elzahaby, I. A., Roshdy, S., Shahatto, F., & Hussein, O. (2015). The adequacy of lymph node harvest in concomitant neck block dissection and submental island flap reconstruction for oral squamous cell carcinoma; a case series from a single Egyptian institution. BMC Oral Health, 15(1). https://doi.org/10.1186/s12903-015-0064-0
10. Fenske, J., Lampert, P., Steffen, C., Kreiker, H., Koerdt, S., Kreutzer, K., Heiland, M., & Rendenbach, C. (2025). Microvascular free flaps in head and neck reconstruction: an analysis of outcomes in elderly patients. Clinical Oral Investigations, 29(4). https://doi.org/10.1007/s00784-025-06262-z
11. Forner, D., Phillips, T., Rigby, M. H., Hart, R., Taylor, M., & Trites, J. (2016). Submental island flap reconstruction reduces cost in oral cancer reconstruction compared to radial forearm free flap reconstruction: a case series and cost analysis. Journal of Otolaryngology - Head and Neck Surgery, 45(1). https://doi.org/10.1186/s40463-016-0124-8
12. Gao, N., Fu, K., Cai, J., Chen, H., & He, W. (2021). The role of folded fibular flap in patients' reconstruction of mandibular defects: a retrospective clinical study. Scientific Reports, 11(1). https://doi.org/10.1038/s41598-021-03331-7
13. Gazali, M., Ruslin, M., Stevanie, C., Yusuf, A. S. H., Al-Jamaei, AA., Boffano, P., Forouzanfar, T., & Tomihara, K. (2024a). Short-Term Follow-up of Surgical Management Verruca Vulgaris with Modified Estlander Flap: A Case Report and Recent Literature Review. Journal of Clinical and Experimental Dentistry. https://doi.org/10.4317/jced.61814
14. Gazali, M., Ruslin, M., Stevanie, C., Yusuf, A. S. H., Al-Jamaei, AA., Boffano, P., Forouzanfar, T., & Tomihara, K. (2024b). Short-Term Follow-up of Surgical Management Verruca Vulgaris with Modified Estlander Flap: A Case Report and Recent Literature Review. Journal of Clinical and Experimental Dentistry. https://doi.org/10.4317/medoral.61814
15. Huang, M., Li, P., Yang, L., Xiao, Y., Zeng, L., Su, Y., Liang, Y., Zeng, G., Liao, G., & Zhang, S. (2024). Contralateral facial artery myomucosal island flap for the reconstruction of T2-T3 oncologic oral defects. Frontiers in Oncology, 14. https://doi.org/10.3389/fonc.2024.1393687
16. Ibrahim, B., Rahal, A., Bissada, É., Christopoulos, A., Guertin, L., & Ayad, T. (2021). Reconstruction of medium-size defects of the oral cavity: Radial forearm free flap vs facial artery musculo-mucosal flap. Journal of Otolaryngology - Head and Neck Surgery, 50(1). https://doi.org/10.1186/s40463-021-00523-z
17. Joshi, P., Bavaskar, M., Shetty, R., Singh, A., Nair, S., & Chaturvedi, P. (2024). Local Flap Reconstructions in Oral Cavity Defects: An Insight from 104 Cases. Rambam Maimonides Medical Journal, 15(3). https://doi.org/10.5041/rmmj.10526
18. Khan, U., Haupt, S., Rigby, M. H., Taylor, S. M., Corsten, M., & Trites, J. (2020). Composite submental flaps in facial reconstructive surgery involving the zygoma and orbit. Journal of Otolaryngology - Head and Neck Surgery, 49(1). https://doi.org/10.1186/s40463-020-00468-9
19. Kowalski, L. P. (2023). Eugene Nicholas Myers' Lecture on Head and Neck Cancer, 2020: The Surgeon as a Prognostic Factor in Head and Neck Cancer Patients Undergoing Surgery*. International Archives of Otorhinolaryngology, 27(3). https://doi.org/10.1055/s-0043-1761170
20. Ma, J., Zhai, X., Huang, M., Li, P., Liang, Y., Ouyang, D., Su, Y., Yang, W., Liao, G., & Zhang, S. (2023). The contralateral-based submental artery island flap: feasibility and oncological safety in oral cancer–related defect reconstruction. Clinical Oral Investigations, 27(8), 4747. https://doi.org/10.1007/s00784-023-05103-1
21. Meier, J. K., Spoerl, S., Spanier, G., Wünschel, M., Gottsauner, M. J., Schuderer, J. G., Reichert, T. E., & Ettl, T. (2021). Alternatives to free flap surgery for maxillofacial reconstruction: focus on the submental island flap and the pectoralis major myocutaneous flap. BMC Oral Health, 21(1). https://doi.org/10.1186/s12903-021-01563-7
22. Mohammadi, S., Lotfi, M., & Kazemipour, S. (2022). Advanced Head and Neck Reconstruction; A Seven-Year Experience in Iran. Medical Journal of the Islamic Republic of Iran. https://doi.org/10.47176/mjiri.36.121
23. Peng, P., Dong, Z., Wei, J., Liu, L., Luo, Z., & Cao, S. (2021). Reliability of distally based sural flap in elderly patients: comparison between elderly and young patients in a single center. BMC Surgery, 21(1). https://doi.org/10.1186/s12893-021-01175-6
24. Qi, W., Xiao, X., Tong, J., & Guo, N. (2025). Two strip flap technique for total lower lip reconstruction: case report. Frontiers in Medicine, 12. https://doi.org/10.3389/fmed.2025.1658394
25. Russo, R., Pentangelo, P., Ceccaroni, A., Losco, L., & Alfano, C. (2024). Lower Lip Reconstruction after Skin Cancer Excision: A Tailored Algorithm for Elderly Patients. Journal of Clinical Medicine, 13(2), 554. https://doi.org/10.3390/jcm13020554
26. Safdar, J., Liu, F. Y., Moosa, Y., Xu, Z. F., Li, Z. N., & Sun, C. (2014). SUBMENTAL VERSUS PLATYSMA FLAP FOR THE RECONSTRUCTION OF COMPLEX FACIAL DEFECTS FOLLOWING RESECTION OF HEAD AND NECK TUMORS. Pakistan Journal of Medical Sciences, 30(4). https://doi.org/10.12669/pjms.304.5177
27. Sanniec, K., Carboy, J., & Thornton, J. (2018). Simplifying Lip Reconstruction: An Algorithmic Approach [Review of Simplifying Lip Reconstruction: An Algorithmic Approach]. Seminars in Plastic Surgery, 32(2), 69. Thieme Medical Publishers (Germany). https://doi.org/10.1055/s-0038-1645882
28. Setty, C. M. LN., Vidya, K., Tirkey, A. J., Agrawal, M., George, P., & Rajinikanth, J. (2021). The submental flap – Outcomes and oncologic safety in head and neck reconstruction. Advances in Oral and Maxillofacial Surgery, 3, 100082. https://doi.org/10.1016/j.adoms.2021.100082
29. Tamer, R., Chen, Y., Xu, X., Xie, C., & Swai, J. (2020). Short-Term Quality of Life, Functional Status, and Their Predictors in Tongue Cancer Patients After Anterolateral Thigh Free Flap Reconstruction: A Single-Center, Prospective, Comparative Study . Cancer Management and Research, 11663. https://doi.org/10.2147/cmar.s268912
30. Zhao, J., Zeng, W., Li, K., Huang, J., Tong, M. C. F., Deng, L., & Zhang, X. (2022). Repair of postoperative defects of oral cancer with submental island flaps based on vascular pedicles of different states: a multicenter retrospective study. Scientific Reports, 12(1). https://doi.org/10.1038/s41598-022-24293-4
31. Кропотов, М. А., Sobolevskiy, V. A., Lysov, A. A., Yakovleva, L. P., & Khodos, A. V. (2018). THE USE OF SUBMENTAL LOCAL FLAP AND RADIAL FREE FLAP FOR THE RECONSTRUCTION OF DEFECTS IN PATIENTS WITH ORAL CANCER. Malignant Tumours, 8(3), 39. https://doi.org/10.18027/2224-5057-2018-8-3-39-48
32. Саприна, О. А., Кропотов, М. А., & Lomaya, M. V. (2016). APPLICATION OF THE SUBMENTAL FLAP FOR REPAIR OF ORAL DEFECTS IN PATIENTS WITH ORAL CANCER. Siberian Journal of Oncology, 15(2), 56. https://doi.org/10.21294/1814-4861-2016-15-2-56-62.