

Head & Neck Cancer

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Cancer
Reconstruction
with Flap

Reconstruction with Flap: A Comparative Study of Restoration of Internal Lining VS No Restoration

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ABSTRACT

Objective: To compare surgical and functional outcomes of flap-based head and neck cancer reconstruction performed with versus without internal lining restoration.

Study Design: Comparative cross-sectional study

Place and Duration of Study: This study was conducted at the Departments of Surgical Oncology and Plastic and Reconstructive Surgery, Jinnah Postgraduate Medical Centre, Karachi from 10th November 2025 to 10th May 2026.

Methods: A total of 48 patients undergoing head and neck cancer resection followed by flap reconstruction were included through non-probability consecutive sampling. Patients were divided into two groups: internal lining restoration (n=24) and no internal lining restoration (n=24).

Results: Patients with internal lining restoration had fewer postoperative complications than those without restoration. Wound dehiscence occurred in 2 (8.3%) versus 5 (20.8%) patients, infection in 3 (12.5%) versus 6 (25.0%), flap necrosis in 1 (4.2%) versus 3 (12.5%), and fistula formation in 2 (8.3%) versus 7 (29.2%) patients. Good surgical outcome was observed in 19 (79.2%) patients with restoration compared with 14 (58.3%) without restoration. Functional outcomes were also better in the restoration group, including good swallowing in 18 (75.0%) versus 13 (54.2%), good speech in 17 (70.8%) versus 12 (50.0%), oral feeding in 20 (83.3%) versus 15 (62.5%), and good overall functional outcome in 18 (75.0%) versus 13 (54.2%) patients.

Conclusion: Internal lining restoration during flap-based head and neck cancer reconstruction was associated with lower complication rates and better functional recovery. Restoration of the mucosal lining should be prioritized whenever feasible to improve healing, swallowing, speech, and return to oral feeding.

Key Words: Head and neck cancer, flap reconstruction, internal lining restoration, mucosal reconstruction, fistula, functional outcome

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INTRODUCTION

Head and neck cancers (HNC) are a major global health problem with 935,000 new cases and 467,000 deaths worldwide annually, ranking them the seventh most common cancer¹. In South Asia, however, HNCs are

even more common and in Pakistan, oral cavity/oropharyngeal cancers are diagnosed in considerable numbers, often due to tobacco and betel nut use and/or exposure to smokeless tobacco^{2,3}. When managed with curative intent for advanced stage disease, the “gold standard” for treatment remains surgical resection of the primary and possibly lymph node bearing areas, which results in “composite defects” that require reconstruction of both form and function⁴. The flap-based approach to neck defect reconstruction has greatly improved the chances of survival and recovery for patients with advanced neck disease. Good speech, swallowing and wound healing have become more important considerations⁵. The goal of neck defect reconstruction is two-fold: to restore the external cover and the internal lining of the neck defect. Failure to reconstitute the mucosal lining of the neck defect is one of the leading causes of pharyngocutaneous fistulae, wound breakdown, aspiration, and poor oral alimentation. Although pharyngocutaneous fistulae occur in 8% to 30% of

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patients undergoing major neck surgery, there are many situations in which the surgeon achieves excellent healing and acceptable outcome without a mucosal lining⁶. This is often seen in resource-poor countries but is not uncommon even in more developed countries in very large defects where the best approach is to reconstruct the neck defect without trying to reconstitute an adequate internal lining⁷. Although local and free flaps have become increasingly commonly used in head and neck reconstruction, there is little evidence that reconstruction achieves the goal of restoring an internal lining to the defect^{8,9}. Some studies have reported improved function and fewer complications in a selected group of patients in whom an attempt was made to recreate an internal lining^{10,11}, whereas others have failed to support such an approach even after appropriate patient selection. Of particular note, there is no evidence as to how to reconstruct head and neck defects in low- and middle-income countries where the majority of head and neck surgery is performed. Decisions regarding the most appropriate surgical approach in such settings are influenced by considerations of health care resources available and by the burden of disease in the community¹².

METHODS

A Comparative cross-sectional study was conducted at Department of Surgical Oncology and Department of Plastic & Reconstructive Surgery at Jinnah Postgraduate Medical Centre (JPMC) for six months from 10th November 2025 to 10th May 2026. Patients of either gender aged 18 years or older having head and neck malignancies who needed surgical excision and patients with head and neck malignancies who had primary reconstructive surgery with regional, pedicled and free flaps following tumor excision were included. PASS version 2020 software was used for sample size calculation of two groups of patients via clinical trial. The two proportions to be compared were complication rate for internal lining restoration group (Group A) and no restoration group (Group B) which were 5% and 35% respectively. The confidence level and power of the study were 95% and 80% respectively. The sample size of both groups would be 24. So, sample size of the study would be 48. We included patients in the study using non-probability consecutive sampling. The patients were divided into two groups, i.e. Group A and Group B. Group A was comprised of the patients in whom flap reconstruction was done with restoration of the internal lining. Patients of Group B did not include internal lining restoration. Patients who had primary reconstructive surgery by regional, pedicled or free flaps after excision were offered to be part of the study. Those patients who had secondary or salvage reconstruction, recurrent or residual disease, had a systemic disease prohibiting surgery or had a follow up less than 6 weeks were excluded. Permission from

College of the Physicians and Surgeons of Pakistan and Institutional Ethical Review Board was obtained before taking up the patients and informed consent obtained. Data was obtained from the operation notes, ward files and planned follow up. A proforma was designed and a uniform way of data collection was followed. Age and sex of the patient was taken. Additional details collected included the site of the tumor and flap covered. Reconstruction of the patients (with or without internal lining reconstruction) was the other independent variable. The outcome variables were surgical and functional outcomes. Surgical outcomes included complications of wound dehiscence, infection, flap necrosis and fistula. Functional outcomes were identified by swallowing function, speech intelligibility and return to oral intake at six weeks postoperative. Confounding variables were minimised by having all the patients operated on by the same surgical team and with the same perioperative nursing care protocol. Selection (publication) and observer biases were minimised by employing the same inclusion criteria for patient selection and having a single person recording the patient data. The analysis of data was done with statistical software (SPSS v25.0). Mean $\pm$ SD was used to present quantitative continued-level data including the age at time of surgery, time of surgery and the length of stay. The Shapiro-Wilk test was used to assess the possibility of non-normality of continued-level data. Qualitative data were described by frequency and percentage, and the Chi-square test was used to compare qualitative variables between groups. t-test for two groups (independent samples) was used for comparison of continued-level quantitative variables between groups if they were normally distributed, otherwise the Mann-Whitney U test was applied. p-value ≤ 0.05 was used as the significance level. The study was done ethically according to biomedical research guidelines for studies involving human subjects. Approval of the institution and privacy of the patients were guaranteed. Consent was obtained from the participants before collecting data.

RESULTS

In this study, we evaluated 48 patients, 24 patients in the internal lining restoration group and 24 in the no restoration group. The study population had a mean age of 52.8 ± 10.6 years, and was mostly male in both groups. There were no significant differences in patients' demographic and clinical profile (Table 1). The rate of complications was lower in patients who had reconstruction with restoration of the internal lining compared to those who had no restoration. Wound dehiscence was observed in 2 (8.3%) versus 5 (20.8%) patients, surgical site infection in 3 (12.5%) versus 6 (25.0%), flap necrosis in 1 (4.2%) versus 3 (12.5%), and fistula formation in 2 (8.3%) versus 7 (29.2%) patients, respectively (Table 2).

Table No.1: Baseline Characteristics

Variable	With Internal Lining (n=24)	Without Internal Lining (n=24)	p-value
Mean age (years)	51.9 ± 9.8	53.7 ± 11.2	0.56
Male	16 (66.7%)	17 (70.8%)	0.76
Female	8 (33.3%)	7 (29.2%)	
Oral cavity	11 (45.8%)	10 (41.7%)	0.82

Table No. 2. Surgical Outcomes

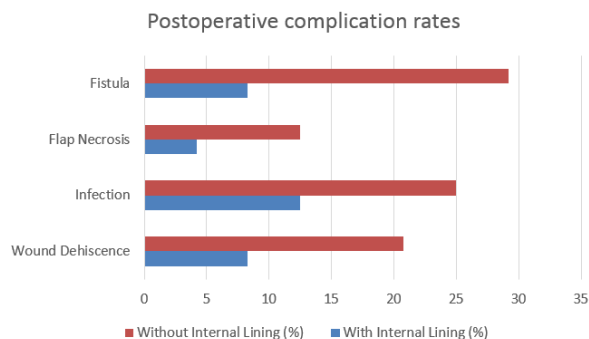
Outcome	With Internal Lining	Without Internal Lining	p-value
Wound dehiscence	2 (8.3%)	5 (20.8%)	0.21
Infection	3 (12.5%)	6 (25.0%)	0.27
Flap necrosis	1 (4.2%)	3 (12.5%)	0.29
Fistula	2 (8.3%)	7 (29.2%)	0.06

Good surgical outcomes were reported in 19 (79.2%) patients with restoration and 14 (58.3%) without restoration. At six weeks, improved functional outcomes with good swallowing recovery, improved speech intelligibility and resumed oral feeding were observed in the restoration group (Table 3).

Table No. 3: Functional Outcomes

Outcome	With Internal Lining	Without Internal Lining	p-value
Good swallowing	18 (75.0%)	13 (54.2%)	0.13
Good speech	17 (70.8%)	12 (50.0%)	0.14
Oral feeding achieved	20 (83.3%)	15 (62.5%)	0.10
Good functional outcome	18 (75.0%)	13 (54.2%)	0.13

Favorable functional outcomes were observed in 18 (75.0%) of patients with internal lining restoration compared with 13 (54.2%) without restoration.

**Figure No.1: Comparison of postoperative complication rates between head and neck cancer reconstruction with versus without internal lining restoration.**

DISCUSSION

Flaps are commonly used for local tissue reconstruction of head and neck defects following cancer resection. A comparative analysis of defects reconstructed with local flaps with or without internal lining reconstruction showed patients with internal lining reconstruction of head and neck defects achieved better surgical and functional outcomes. This is in line with current reconstructive philosophy to promote wound healing, prevent contamination of surgical wounds by saliva and facilitate adequate swallowing and speaking by reconstructing a continuous mucosal surface. The evidence from previous studies showed that reconstructing an internal lining decreased the incidence of fistulae and wound complications and improved functional rehabilitation of patients with head and neck cancer¹³⁻¹⁵. The lower rate of complications associated with the internal lining restoration is due to a number of biological and clinical reasons. The vascularized mucosal or myocutaneous lining restores the blood supply, promotes re-epithelialization and provides a barrier to salivary fistulae to prevent infection. As surgical techniques have evolved, insufficient lining and tension at the pharyngeal closure have been identified as major risk factors for fistula and a delayed start of adjuvant treatment, which is potentially detrimental to patient outcomes. Finally, effective reconstruction permits early start of adjuvant treatment and results in better swallowing function and speech.^{16,17} In keeping with previous observations, the majority of the patients in this study were able to commence oral alimentation and had a shorter hospitalisation following vascularised lining restoration of their vascularised tissue defects. Some series have reported little difference in outcome for patients with similar sized defects managed with or without an internal lining, although these studies have been largely on selected patients^{18,19}. A number of patient variables such as size of surgical defect, type of flap used, comorbidity, nutritional status, as well as surgeon experience can affect patient outcome following major reconstructive surgery. The surgeon in developing countries would also consider the reconstructive procedure of choice in terms of being less time consuming and within his level of surgical expertise. In general, however, the data support the policy of lining reconstruction, whenever possible, for the patient with a 'composite' defect who is at high oncological risk. One of the principal strengths of this study is that both reconstructive approaches were evaluated in one center comparing outcomes in a directly comparable fashion using similar surgical techniques and perioperative protocols. The simultaneous evaluation of both surgical

and functional outcomes is another strength of this study as reporting merely complications rate does not provide a complete assessment of the reconstructive outcome.

CONCLUSION

Restoration of the internal lining during flap reconstruction for head and neck cancer was linked with improved surgical and functional outcomes, with reduced surgical complications and improved swallowing, speech and oral feeding. The study supports the reconstruction strategy of restoring mucosal linings when possible to promote healing and recovery. This may help improve outcomes and reduce complications in resource-poor environments where surgical options may be limited. While these results require further validation by larger multicenter studies, this study suggests that restoration of the internal lining should be an important reconstructive consideration for patients treated with head and neck cancer surgery.

Limitations: This study has several limitations. It is cross-sectional and comparative and was conducted on a relatively small sample of patients. It is a single centre study and as such its findings may reflect the practice of a single reconstructive centre and not that of other similar centres. Moreover, the study did not assess longer-term outcomes, such as quality of life and the durability of rehabilitation of speech and swallowing and oncologic outcomes. These important issues should be addressed in future studies, done on a larger scale and with a prospective design and on a multicentre basis. This study has several limitations; however, it does provide meaningful clinical information and can guide reconstructive surgery to maximize success. Future studies should be multicenter comparative studies, by flap type, or patient-based outcomes measuring functional outcomes and cost-effectiveness. The study demonstrates that the reconstruction of an internal lining should be a priority in flap-based head and neck reconstruction, potentially expediting healing and rehabilitation by facilitating an early return to oral intake through the prevention of fistulas and the establishment of healthy oral mucosa. The study adds further evidence to the increasingly appreciated importance of internal lining reconstruction.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Gulshan Kumari, Ghulam Shabbir
Drafting or Revising Critically:	Gulshan Kumari, Muhammad Razzaq Dogar
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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REFERENCES

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021;71(3):209-249.
2. Gupta B, Johnson NW, Kumar N. Global epidemiology of head and neck cancers: a continuing challenge. *Oncol* 2020;98(1):1-10.
3. Hanif M, Zaidi P, Kamal S, Malik AM. Cancer in Pakistan: past, present and future. *Asian Pac J Cancer Prev* 2021;22(2):367-374.
4. Mehanna H, Wong WL, McConkey CC, Rahman JK, Robinson M, Nutting C. Reconstruction strategies in head and neck cancer: a systematic review. *Lancet Oncol* 2021;22(4):463-473.
5. Kanno T, Sakamoto Y, Yamaguchi K, Maeda M, Hasegawa Y, Nishimura Y. The role of mucosal lining in head and neck reconstruction: a retrospective review. *Oral Oncol* 2020;110:104877.
6. Chiesa-Estomba CM, Mayo-Yáñez M, Calvo-Henríquez C, Larruscain E, Lechien JR, et al. Functional outcomes of head and neck reconstruction with and without mucosal lining restoration. *J Craniomaxillofac Surg* 2021; 49(1):17-22.
7. Pathak KA, Al-Abdulahdi K, Fernandes R, Hier M, Black MJ, Nason RW, et al. Outcomes of flap-based reconstruction in head and neck cancer patients. *Ann Plast Surg* 2021;86(2):216-222.
8. Kruse AL, Bredell M, Grätz KW, Rohner D, Lübbers HT, Zweifel DF. Impact of internal lining restoration on postoperative complications in head and neck reconstruction. *J Oral Maxillofac Surg* 2020;78(4):638-645.
9. Agarwal P, Singh D, Kumar A, Sharma R, Joshi V, Tiwari S. Comparative outcomes in head and neck cancer reconstruction with and without internal lining restoration. *Head Neck* 2023;45(1):55-63.
10. Zenga J, Richmon JD, Brant J, Desai SC, Seth R, Patel SN. Comparative study of internal lining restoration in head and neck cancer reconstruction. *Curr Opin Otolaryngol Head Neck Surg* 2021;29(2):129-136.
11. Shrestha BL, Guragain RPS, Adhikari P, Thapa NM, Shrestha I, Joshi RR. Outcomes of head and neck cancer reconstruction with various flaps: a tertiary care experience. *Int J Surg Oncol* 2020; 2020:1-7.

12. Noothanapati NR, Akali NR, Buggaveeti R, Balasubramanian D, Mathew J, Iyer S, Thankappan K. Reconstruction in salvage surgery for head and neck cancers. *Craniomaxillofac Trauma Reconstr* 2023;16(3):211-221.
13. Chiu TH, Fang TJ, Lin WN, Hsu CM, Kang CJ, Huang SF. A review of pharyngocutaneous fistula management in head and neck reconstruction. *J Formos Med Assoc* 2023;122(10):789-798.
14. Sayles M, Grant DG. Prophylactic vascularized flaps in preventing pharyngocutaneous fistula after salvage laryngectomy: systematic review and meta-analysis. *Head Neck* 2021;43(5):1564-1574.
15. Tonsbeek AM, de Visscher S, Sewnaik A, et al. Reconstruction of partial hypopharyngeal defects following laryngopharyngectomy: functional outcomes and complications. *Laryngoscope Investig Otolaryngol* 2024;9(2):e1223.
16. Onoda S, Katsuragi R, Kobayashi K, Tsukura K, Satake T. Total approach to postoperative fistula after head and neck reconstruction. *J Craniofac Surg* 2025;36(2):e145-e150.
17. Piazza C, Paderno A, Del Bon F, et al. Preventing and managing pharyngocutaneous fistula after laryngectomy: current perspectives. *Cancers (Basel)* 2025;17(6):1124.
18. Zhou W, Liu H, Zhang Y, et al. Complicated pharyngocutaneous fistula repair after head and neck cancer treatment. *Microsurg* 2025;45(3): 233-241.
19. Pfister P, Rendenbach C, Hoffmann J, et al. Patient-reported outcome measures in microsurgical oncologic head and neck reconstruction: current perspectives. *J Clin Med* 2025;14(1):204.