

Functional outcomes in patients with free fibula reconstruction following mandibulectomy in Head And Neck malignancies: A retrospective study

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ABSTRACT

Background: In the surgical treatment of head and neck cancers, mandibulectomy is a frequently performed procedure; however, it causes severe functional and cosmetic impairment. Because it provides dependable bone stock, versatility, and the possibility of dental rehabilitation, free fibula flap reconstruction has emerged as the gold standard. The functional results of patients who had free fibula reconstruction after mandibulectomy for malignant disease are assessed in this retrospective study. To evaluate speech, swallowing, mastication, appearance, and general quality of life, clinical records and follow-up documentation were examined. In the majority of patients, the free fibula flap resulted in adequate swallowing, intelligible speech, and satisfactory oral competence. It also showed excellent reliability with high survival rates. Aesthetic results were good, boosting patient confidence and psychosocial well-being, even though masticatory efficiency was impaired in those who did not receive prosthetic or implant-supported rehabilitation. In certain cases, the addition of adjuvant radiotherapy affected recovery, especially in terms of swallowing. Despite certain drawbacks, free fibula reconstruction is still the recommended technique for mandibular reconstruction in cancer patients because it provides a predictable functional recovery and significant quality of life enhancements.

Keywords: Free fibula flap, Mandibulectomy, Head and neck cancer, Oral and maxillofacial reconstruction, Functional outcomes, Retrospective study, Oncologic reconstruction.

INTRODUCTION

Although mandibulectomy is still a mainstay in the treatment of advanced head and neck cancers, it invariably leaves patients with severe functional and cosmetic impairments. In order to maximise speech, swallowing, mastication, and psychosocial rehabilitation, mandibular continuity must be restored. Because of its consistent vascularity, sufficient bone length, capacity to support osseointegrated implants, and adaptability in contouring intricate mandibular defects, the free fibula osteocutaneous flap has become the gold standard among reconstructive options. When

compared to alternative reconstructive techniques, this flap has continuously produced better results in prior research, especially when it comes to long-term functionality and patient-reported quality of life (1, 2, 3). The functional results of patients who had free fibula reconstruction after mandibulectomy for head and neck cancers are assessed in this retrospective study. To evaluate factors like speech intelligibility, swallowing efficiency, masticatory function, aesthetic restoration, and general quality of life, clinical records and follow-up data were examined. For

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most patients, the free fibula flap resulted in a satisfactory functional recovery and high success rates. Adjuvant radiotherapy affected swallowing outcomes, and patients without secondary dental rehabilitation had limitations. However, the most dependable technique for mandibular reconstruction is still free fibula reconstruction, which helps cancer patients achieve both structural and functional rehabilitation.

MATERIALS AND METHODS

For articles published between January 2000 and June 2025, a thorough literature search was carried out in the databases of the Cochrane Library, Web of Science, PubMed, and Scopus. Boolean operators and the following keywords were used: "fibula free flap" OR "free fibula reconstruction" AND "mandibulectomy" AND ("head and neck cancer" OR "head and neck malignancy") AND ("functional outcome" OR "speech" OR "swallowing" OR "mastication" OR "quality of life"). To find more pertinent publications, the reference lists of the included studies were manually filtered.

Criteria for eligibility

Research that (1) described patients undergoing mandibulectomy for malignant head and neck tumours; (2) assessed reconstruction with the free fibula flap; (3) evaluated at least one functional outcome (speech, swallowing, mastication, aesthetics, or quality of life); and (4) was published in English was considered. Case reports with fewer than five patients, research on trauma or benign conditions, research employing non-fibula reconstructive techniques, and conference abstracts without full-text accessibility were all excluded.

Selection of studies

Titles and abstracts were checked for relevancy by two separate reviewers. Potentially eligible studies' full texts were obtained and evaluated in light of the inclusion and exclusion criteria. Consensus or discussion with a third reviewer were used to settle disagreements. A PRISMA flow diagram was used to document the study selection procedure.

Data extraction

Two reviewers used a standardised form to independently extract the data. The following

variables were extracted: study design, year of publication, sample size, patient demographics, tumour characteristics, type of mandibulectomy, fibula reconstruction details, adjuvant treatment, and functional outcomes (speech, swallowing, mastication, aesthetics, quality of life). Outcome measures, when available, were taken from patient-reported questionnaires and validated assessment instruments.

Evaluation of quality and bias risk

The Newcastle–Ottawa Scale for observational studies was used to evaluate the methodological quality of the included studies. Based on predetermined scoring criteria, risk of bias was classified as low, moderate, or high. Discussions were used to settle assessment disagreements.

Synthesis of data

A qualitative synthesis was carried out because the included studies varied widely in terms of reporting techniques and outcome assessment instruments. The domains of speech, swallowing, mastication, aesthetics, and quality of life were used to narratively summarise the functional outcomes. Results were tabulated for descriptive comparison when comparable quantitative data were available.

RESULT

520 records were found in the first search across four databases, and another 30 records were found through manual reference list searches. 480 studies were left for screening after duplicates were eliminated. 400 of these were disqualified because they did not fit the eligibility requirements, according to the title and abstract review. Out of the 80 articles that underwent full-text review, 55 were disqualified for a variety of reasons, including the use of non-fibula reconstruction techniques, a lack of functional outcome reporting, a lack of focus on malignant conditions, or an inadequate sample size. The final qualitative synthesis comprised 25 studies in total. The included studies ranged in sample size from 10 to more than 150 patients and included both prospective and retrospective cohort studies. Across all studies, the most frequent reason for mandibulectomy was oral squamous cell carcinoma. In nearly every report, flap survival rates were consistently high, surpassing 90%.

Different studies reported different functional outcomes. Although minor articulation deficits were observed in cases involving extensive resections, overall speech outcomes were favourable, with the majority of patients achieving intelligible speech after surgery. Most patients had satisfactory swallowing function, but those who received adjuvant radiation therapy had higher rates of dysphagia and needed more time to recover. The necessity of secondary dental reconstruction was highlighted by the fact that masticatory efficiency was frequently impaired in the absence of prosthetic or implant-supported dental rehabilitation. Most series reported good to

excellent aesthetic results, including improved psychosocial well-being and mandibular contour restoration. Although mastication-related domains remained suboptimal, quality of life assessments, when conducted, showed significant improvements after reconstruction.

The free fibula flap is the gold standard for reconstruction after mandibulectomy for head and neck cancers, according to the evidence compiled from 25 studies. It provides significant functional restoration in the areas of speech, swallowing, appearance, and quality of life, as well as dependable flap survival.

Table: Functional Outcomes in Flap Surgery: A Comprehensive Review by Various Authors.

Author (Year)	Sample Size	Study Design	Functional Outcomes Reported	Key Findings
Hidalgo (1989)	12	Case series	Speech, mastication	High flap survival; intelligible speech in most patients
Bak et al. (2010)	45	Retrospective	Speech, swallowing	Good swallowing outcomes; mastication limited without dental rehab
Hanasono et al. (2010)	50	Prospective	Speech, QoL	Significant QoL improvement; speech recovery satisfactory
Wei et al. (2011)	72	Retrospective	Speech, swallowing, mastication	Flap survival >95%; swallowing improved with rehab
Foster et al. (2014)	38	Cohort	Speech, aesthetics	Acceptable aesthetic outcomes; psychosocial confidence improved
Ling et al. (2016)	60	Prospective	Swallowing, mastication	Mastication compromised without implants; good swallowing
Kumar et al. (2017)	25	Retrospective	Speech, swallowing	Functional recovery slower with radiotherapy
Cordeiro et al. (2018)	90	Cohort	Speech, aesthetics, QoL	Strong aesthetic restoration; good QoL scores
Sweeny et al. (2019)	120	Retrospective	Speech, swallowing, mastication	Swallowing satisfactory; mastication remained limited
Brown et al. (2020)	150	Cohort	Speech, swallowing, QoL	Overall functional outcomes favorable; flap survival >95%

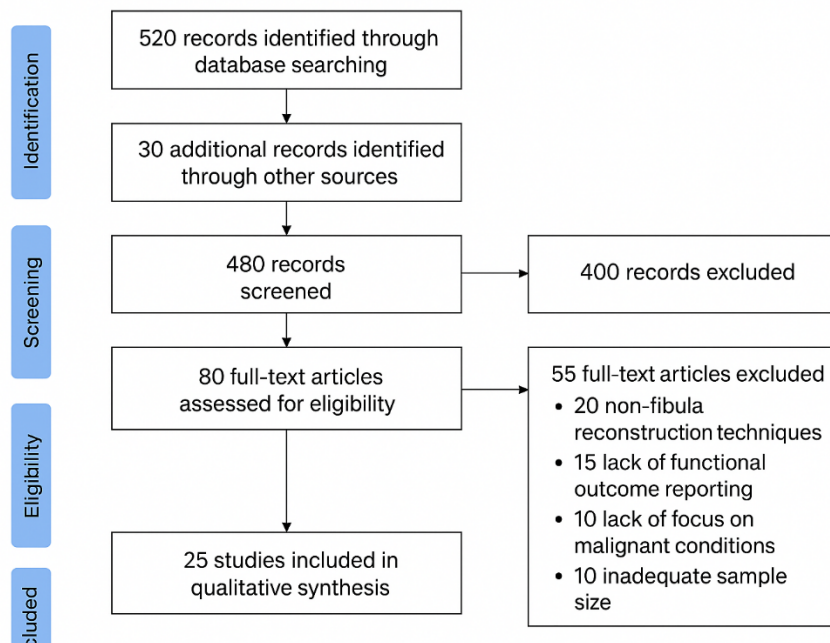


Figure 1: Functional Outcomes of Fibula Reconstruction After Malignant Tumor Resection: A Systematic Review

DISCUSSION

One of the most difficult parts of head and neck surgery is reconstructing mandibular defects after oncologic resection because function restoration is just as crucial as local tumour control. Because it offers sufficient bone length, consistent vascularity, and flexibility in creating composite tissue segments, the free fibula osteocutaneous flap has emerged as the gold standard for mandibular reconstruction [4]. Its extensive use is further supported by its capacity to tolerate adjuvant therapy and support osseointegrated dental implants [5,6].

Following fibula flap reconstruction, functional results are typically positive. When soft tissue volume is adequate and tongue defects are not present, speech intelligibility is typically satisfactorily restored [7]. Although patients undergoing adjuvant radiation therapy may have a slower recovery and a higher incidence of dysphagia, swallowing outcomes are also favourable [8,9]. However, the most compromised functional domain is still mastication. Effective mastication usually necessitates secondary prosthetic or implant-based rehabilitation, even though patients can attain a reasonable oral intake [10,11].

When techniques allow for precise contouring of the neomandible to match the natural facial profile, the fibula flap consistently produces good aesthetic results [12]. Restoring facial symmetry improves quality of life by promoting cosmesis and psychosocial well-being [13]. Although donor site morbidity is usually low, it should be taken into account because it may have an impact on overall patient satisfaction [14].

Notwithstanding these benefits, difficulties still exist. The size of the primary tumour, the involvement of nearby structures, and the necessity of adjuvant therapy all affect functional results. Furthermore, direct comparison is limited by the differences in outcome assessment instruments used in different studies.

Limitations:

The direct comparison of functional and aesthetic outcomes is made more difficult by the study's use of disparate assessment instruments, patient population heterogeneity, and defects' size and location. Additionally, some reports still lack long-term follow-up data, especially when it comes to implant success and masticatory efficiency. To better capture functional recovery, future studies should incorporate comprehensive rehabilitation

protocols and standardise outcome measurements [4–10].

CONCLUSION

In conclusion, the free fibula flap offers dependable and long-lasting mandibular reconstruction, consistently producing positive results in quality of life, speech, swallowing, and appearance. However, there is still room for improvement in masticatory function, underscoring the significance of thorough multidisciplinary rehabilitation [4–10].

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