Exploring Outcomes of Microvascular Free Flap Repair as a Treatment for Non-Malignant Perforation of the Pharynx and Cervical Esophagus: A Systematic Review.

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Abstract

Esophageal and pharyngeal perforations are life-threatening emergencies that can arise from causes including caustic injury and iatrogenic factors. Regional pedicled flaps are used traditionally to repair these perforations, however, free flaps may sometimes be better suited due to their pliability in covering larger defects. This systematic review aims to provide an overview of outcomes following microvascular free tissue transfer for non-malignant perforations of the pharynx and esophagus.

A systematic search was conducted in October 2024 using Ovid Medline and SCOPUS databases to identify peer-reviewed studies published in English between 1980 and 2024. 1,896 articles were originally identified. Three independent reviewers screened the articles, and studies were eligible for inclusion if they addressed non-malignant perforations and described the use of microvascular flap repair in the pharynx and cervical esophagus.

A total of 47 articles were included, of which 19 articles described 44 free flaps specifically. The median patient age was 44 (range: 1.6-83), and 62.5% were male. The average recovery time was 29.46 days. Swallowing ability was preserved in 81.8% of cases. The most common free flaps used were the omental flap (25%) and the jejunal flap (20%). Iatrogenic complications most frequently required repair (56%) , and these injuries were significantly more likely to be repaired with omental flaps compared to other free flaps ($p<0.001$). The most common complication associated with free flap repair was stricture, whereas in pedicled flaps, the most common complication was leakage. Differences in recovery time in the two groups were not significant, nor were differences in complications.

This review highlights the need for further analysis of differences in outcomes between free and regional flap repair. Data was limited due to the relatively small number of free flap articles. Future research should explore long-term outcomes of various flaps to provide clearer guidelines for when free tissue transfer may be indicated.

Introduction

Esophageal and pharyngeal perforations are rare but life-threatening emergencies most often caused by caustic injury, trauma, or iatrogenic complications such as anterior cervical spinal fusion. They are associated with high risks of sepsis, hemorrhage, and mortality if not promptly treated.[1-2]

Traditionally, regional pedicled flaps have been used for repair, but free flaps may offer greater versatility in covering larger or more complex defects, potentially lowering complication rates[1].

This systematic review aimed to evaluate outcomes of microvascular free tissue transfer for non-malignant perforations of the pharynx and cervical esophagus and compare them with regional flap outcomes.

Methods and Materials

A systematic search of Ovid Medline and SCOPUS was performed in October 2024, covering English-language studies published between 1980 and 2024. The initial search identified 1,896 studies.
Three independent reviewers screened studies for inclusion if they described non-malignant perforations of the pharynx or cervical esophagus treated with microvascular flap repair.
A total of 45 studies met criteria, including 19 that specifically reported outcomes for 35 free flaps.
Data extracted included demographics, etiology of perforation, flap type, complications, swallowing outcomes, and recovery time.
Descriptive synthesis was performed to compare free and regional flap outcomes, as well as differences across free flap subtypes.

Results

- Across 45 studies, the median patient age was 44 years (range 1.6–83), and 62.5% of patients were male. Iatrogenic injury was the leading cause of perforation, accounting for 65% of cases, most often following anterior cervical spinal fusion.
- The **most frequently used free flaps were omental (25%) and jejunal (20%)**, while the sternocleidomastoid (SCM) remained the most common regional flap.
- **Swallowing function was preserved in 81.8% of cases following free flap repair,** and the **mean recovery** time was **29.5 days**, which **did not differ significantly** between free and regional flap groups.
- Complication profiles varied: strictures were the most common complication following free flaps, while leakage predominated with regional flaps. Omental flaps were significantly more likely to be selected in iatrogenic injuries ($p < 0.001$). Overall **complication rates and recovery times were not significantly different** between flap types.

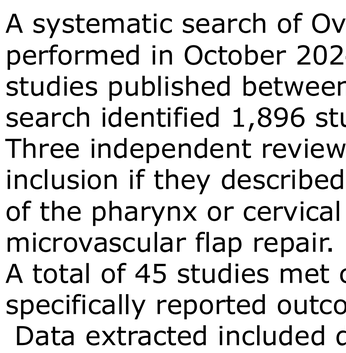

Figure 1. Reported cause of esophageal perforation

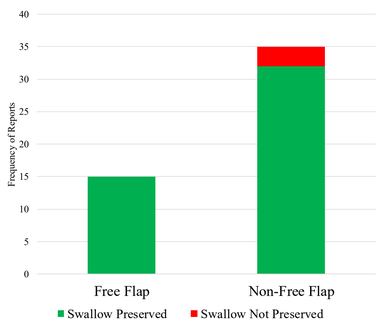

Figure 2. Reported outcome if esophageal reconstruction resulted in return of speech

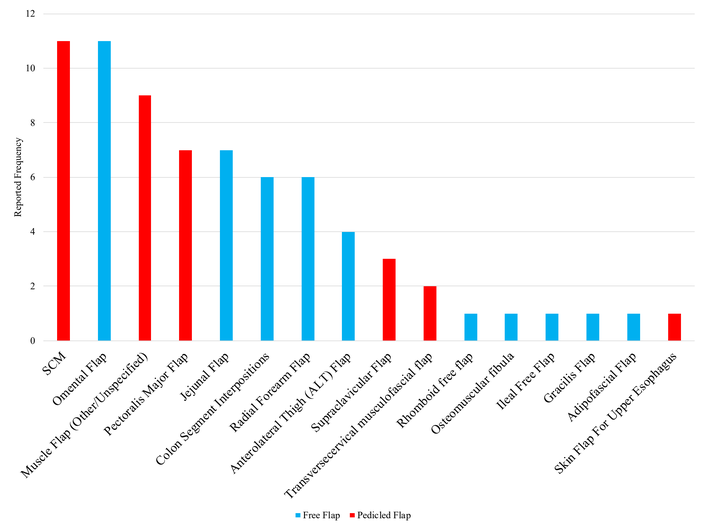

Figure 3. Reported types of flaps utilized in esophageal reconstruction

Discussion

•Free tissue transfer, particularly omental and jejunal flaps, demonstrated strong functional outcomes with reliable swallowing preservation and flexibility in managing complex or extensive perforations.

•While complication rates were comparable between free and regional flaps, the types of complications differed, suggesting distinct risk profiles depending on flap choice.

•The observed association between omental flaps and iatrogenic perforations highlights a potential area where free flaps may be especially advantageous.

•Limitations of this review include the small number of available free flap cases, predominance of case reports, and variability in outcome reporting across studies.

Conclusions

Microvascular free flaps are a safe, effective option for non-malignant pharyngeal and esophageal perforation repair, with omental flaps offering particular advantages in iatrogenic cases; future studies should standardize reporting and include long-term follow-up to clarify when free tissue transfer is preferred over regional repair.

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References

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