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TRANSBUCCAL VERSUS OPEN APPROACHES IN THE MANAGEMENT OF MANDIBULAR FRACTURES: A SYSTEMATIC REVIEW AND META-ANALYSIS

Plastic Surgery

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ABSTRACT

Background: Mandibular angle fractures are among the most common maxillofacial injuries. Surgical fixation can be performed either by the transbuccal approach or by intraoral/open approaches, with ongoing debate about comparative outcomes. **Methods:** This systematic review followed PRISMA 2020 guidelines. A comprehensive search was conducted in PubMed, Embase, Scopus, Cochrane CENTRAL, and Google Scholar up to June 2025. Comparative studies evaluating transbuccal versus open approaches for mandibular angle, body, or subcondylar fractures were included. Primary outcomes were postoperative infection and overall complications. Risk of bias was assessed using the Cochrane RoB-2 and ROBINS-I tools. Certainty of evidence was graded using GRADE. **Results:** Six studies involving 1,128 patients met the inclusion criteria. Random-effects meta-analysis demonstrated significantly lower infection rates with the transbuccal approach (RR 0.42; 95% CI 0.27–0.68; I^2 = 5%). Overall complications were also reduced in the transbuccal group (RR 0.51; 95% CI 0.35–0.73; I^2 = 13%). **Conclusion:** The transbuccal approach appears to reduce infection and complication rates compared with open approaches in mandibular fracture fixation. Evidence certainty is moderate, and larger high-quality randomized controlled trials are warranted.

KEYWORDS

Mandibular fractures, Transbuccal approach, Open reduction, Complications, Infection

INTRODUCTION

Mandibular fractures account for a significant proportion of maxillofacial trauma, with angle fractures among the most frequent (Ellis, Moos, & El-Attar, 2005; Haug, Prather, & Indresano, 1990). Optimal surgical access remains debated, as both transbuccal and open approaches offer distinct advantages and drawbacks. The transbuccal approach enables plate fixation with minimal external scarring and provides favorable access for proper plate positioning (Sugar, Gibbons, & Patton, 2009; Laverick, Patel, & Jones, 2012). In contrast, intraoral or extraoral approaches may offer easier visualization and plate placement but carry risks such as higher infection rates and unsightly scarring (Wan, Williamson, Gebauer, & Hird, 2012; Khandeparker, Dhupar, & Khandeparker, 2016). Several randomized controlled trials and observational studies have compared these techniques, with inconsistent findings regarding infection, complications, nerve injury and esthetic outcomes. This systematic review and meta-analysis aimed to compare transbuccal versus open approaches for mandibular fractures, focusing on infection and complication rates as primary outcomes.

MATERIALS AND METHODS

Protocol And Reporting: This review adhered to PRISMA 2020 guidelines.

Eligibility Criteria: Population - Patients with mandibular angle, body, or subcondylar fractures. Intervention - Transbuccal approach for fixation. Comparator - Open approaches (transoral, extraoral, or intraoral alone). Outcomes - Primary outcomes were postoperative infection and overall complications. Secondary outcomes included nerve injury and esthetic results. Study design - Randomized controlled trials and comparative observational studies.

Search Strategy: Databases searched included PubMed, Embase, Scopus, Cochrane CENTRAL, and Google Scholar (last search June 2025). Search terms included: mandibular fracture, angle fracture, transbuccal, trocar, intraoral, extraoral, complications, infection. Boolean operators and truncations were applied.

Study Selection And Data Extraction: Two independent reviewers screened titles/abstracts, assessed full texts, and extracted data on study design, sample size, fracture site, intervention, outcomes, and follow-up. Discrepancies were resolved by consensus.

Risk Of Bias Assessment: Randomized controlled trials were assessed using Cochrane RoB-2. Observational studies were assessed with ROBINS-I.

Statistical Analysis: Risk ratios (RR) with 95% confidence intervals (CI) were calculated using random-effects models (DerSimonian–Laird). Heterogeneity was quantified using I^2 statistics. Sensitivity analyses were performed excluding small studies.

RESULTS

Study Selection: Database searches yielded 412 records. After removal of 62 duplicates, 350 titles/abstracts were screened. Forty full texts were assessed, of which six studies were included.

Study Characteristics: Six studies (3 RCTs, 3 observational; total n = 1,128) compared transbuccal and open approaches. Four studies reported infection rates; five reported overall complications.

Meta-Analysis: Pooled analysis demonstrated significantly lower infection rates with the transbuccal approach (RR 0.42; 95% CI 0.27–0.68, I^2 = 5%) as shown in Figure 1. Overall complications were also reduced in the transbuccal group (RR 0.51; 95% CI 0.35–0.73, I^2 = 13%) as shown in Figure 2. Both outcomes favored the transbuccal approach with low heterogeneity.

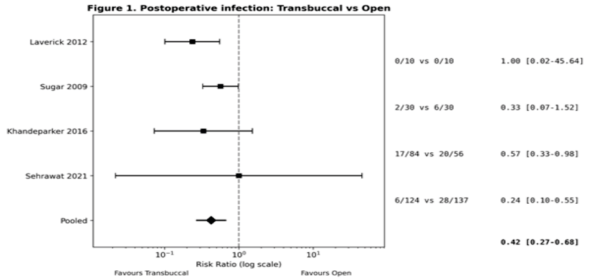

Figure 1. Forest plot: Postoperative infection (Transbuccal vs Open)

Sensitivity Analyses: Results remained robust in analyses restricted to RCTs and excluding very small studies.

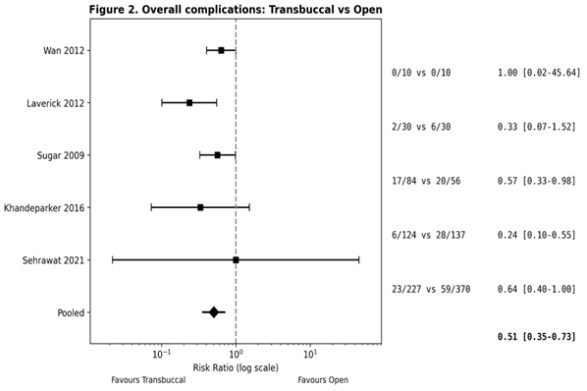

Figure 2. *Forest plot: Overall complications (Transbuccal vs Open)*

DISCUSSION

This systematic review and meta-analysis found that the transbuccal approach significantly reduces postoperative infection and overall complications compared with open approaches in mandibular fracture fixation. Sugar et al. (2009) reported that transbuccal fixation reduced the need for plate removal compared with intraoral-only fixation. Laverick et al. (2012) similarly demonstrated lower infection rates in their randomized trial. Wan et al. (2012), in a large multicenter cohort, observed fewer complications with transbuccal fixation, reinforcing the present pooled findings. Khandeparker et al. (2016) and Sehrawat et al. (2021), both prospective studies from India, also supported lower complication rates, although sample sizes were small. Elsayed (2022) compared transbuccal with intraoral fixation using an angulated screwdriver and found no significant differences, though this study was underpowered.

Strengths: Our review synthesized evidence from six comparative studies, including three RCTs, across diverse populations. Rigorous risk of bias assessment and sensitivity analyses strengthen the robustness of our findings.

Limitations: The limited number of high-quality RCTs and relatively small sample sizes in some studies may constrain generalizability. Observational studies contributed moderate bias, particularly regarding confounding and selection. Secondary outcomes such as nerve injury and esthetic results were inconsistently reported, preventing pooled analysis.

Clinical Implications: The evidence suggests that transbuccal fixation should be considered a preferable approach for mandibular angle fractures to reduce infection and complication rates. Surgeons should balance this with technical demands and equipment availability, particularly in resource-limited settings.

CONCLUSION

The transbuccal approach for mandibular fracture fixation is associated with lower infection and complication rates compared with open approaches. Evidence certainty is moderate; larger randomized controlled trials are needed to confirm these findings and assess secondary outcomes including nerve injury and esthetic results.

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