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Autogenous Grafts and Alloplastic Prosthesis in Temporomandibular Joint Reconstruction: A Systematic Review and Meta-analysis

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 24 October 2025 and was last updated on 24 October 2025.

INTRODUCTION

Review question / Objective Autogenous Grafts VS Alloplastic Prosthesis in Temporomandibular Joint Reconstruction.

Condition being studied Focusing on temporomandibular joint (TMJ) reconstruction, the disease conditions involve those leading to the loss of structure or function of the temporomandibular joint, including both ankylosing and non-ankylosing disorders.

METHODS

Search strategy Item Search terms
#1 TMJ osteoarthritis [Title/Abstract]
#2 TMJ ankylosis [Title/Abstract]
#3 TMJ fracture [Title/Abstract]
#4 TMJ neoplasm [Title/Abstract]
#5 TMJ absorption [Title/Abstract]
#6 TMJ deformity [Title/Abstract]
#7 TMJ pain [Title/Abstract]
#8 TMJ
#9 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8
#10 Reconstruction [Title/Abstract]
#11 Costochondral graft [Title/Abstract]
#12 Coronoid process graft [Title/Abstract]
#13 Sternoclavicular graft [Title/Abstract]
#14 Arthroplasty [Title/Abstract]
#15 Transport distraction osteogenesis [Title/Abstract]
#16 Prosthesis [Title/Abstract]
#17 #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16

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#18 #9 AND #17.

Participant or population Patients of any age undergoing total TMJR for end-stage TMJ pathology, including osteoarthritis, rheumatoid arthritis, juvenile idiopathic arthritis, trauma, ankylosis, condylar resorption, or neoplasms.

Intervention TMJR using GA, ABG (CCG, CPG, SCG, DO), and alloplastic prosthesis (stock, custom and metal-on-metal prostheses).

Comparator Studies with or without comparator groups were eligible. Comparisons could include pre- vs. postoperative outcomes, GA vs. ABG, or ABG vs. alloplastic prosthesis.

Study designs to be included Retrospective clinical studies, prospective cohort studies, and RCT.

Eligibility criteria Inclusion criteria encompassed: (1) retrospective clinical studies, prospective cohort studies, and RCTs; (2) investigations comparing the clinical efficacy of distinct TMJR techniques; (3) studies reporting at least one primary outcome (pain intensity, MIO, dietary function assessment) and complication rates.
Exclusion criteria were: (1) non-primary research (e.g., letters, editorials, reviews, meta-analyses); (2) animal studies; (3) publications with insufficient data or non-extractable data.

Information sources PubMed, Embase, and Web of Science.

Main outcome(s) Primary outcomes: Pain reduction, maximum interincisal opening (MIO), and diet function.

Additional outcome(s) Secondary outcomes: Complication rates.

Quality assessment / Risk of bias analysis The methodological quality of the included RCTs varied. Although all studies used a randomized design—facilitating causal inference—some had small sample sizes, which may reduce statistical power. Incomplete outcome reporting, such as missing standard deviations, confidence intervals, or dropout reasons, limited data interpretability and synthesis accuracy. Statistical reporting was also inconsistent. These limitations indicate heterogeneous methodological quality across studies, which should be considered when interpreting the pooled and subgroup results.

Strategy of data synthesis All statistical analyses were conducted in R (version 4.5.1) following the PRISMA 2020 guidelines. For studies reporting incomplete standard deviations for pre- or post-operative outcomes, we first attempted to calculate them using established methods (e.g., from confidence intervals, P-values, or standard errors) as detailed in the Appendix. Studies for which standard deviations could not be derived and other essential data (e.g., sample sizes, means) were missing were excluded to ensure accurate effect size estimation. Data processing was performed using readxl and dplyr, while meta-analyses were conducted with metafor and meta. Effect sizes (mean differences or log-response ratios) and variances for continuous outcomes (mouth opening, pain, masticatory function) were computed using escalc, and random-effects models (rma) were fitted to pool effects and generate forest and funnel plots. Complication incidence was analyzed using metaprop. Potential publication bias was assessed via Egger's test (regtest), and the certainty of evidence was evaluated using the GRADE approach across five domains: risk of bias, inconsistency, indirectness, imprecision, and publication bias.

Subgroup analysis To investigate potential sources of heterogeneity and the consistency of treatment effects, we plan to perform subgroup analyses based on the following factors:
Etiology of TMJ Defect: Comparing outcomes in patients with ankylosing diseases (e.g., ankylosis) versus non-ankylosing diseases (e.g., advanced osteoarthritis, traumatic injury, condylar resorption).
Type of Allograft: Comparing different autogenous tissues used, such as costochondral graft (CCG) versus vascularized fibula flap.
Type of Prosthesis: Comparing different prosthetic designs, such as patient-specific customized prostheses versus standard stock prostheses.
Patient Age Group: Comparing outcomes in adult patients (≥18 years) versus growing pediatric patients (<18 years), as growth potential is a critical consideration.
Length of Follow-up: Comparing short-to-mid-term outcomes (<0.5 years) with long-term outcomes (≥1 years) to assess durability.

Sensitivity analysis To assess the robustness of our primary findings, we will conduct the following sensitivity analyses:
Exclusion of High-Risk-of-Bias Studies: Repeating the meta-analysis after excluding studies judged as having a high risk of bias (as assessed by tools like Cochrane RoB 2 or ROBINS-I).

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Exclusion of Outliers: Identifying and excluding studies that exert a disproportionate influence on the summary results (statistical outliers) to see if the overall effect size remains stable.
Alternative Statistical Model: Repeating the analysis using a fixed-effect model if the primary analysis uses a random-effects model, or vice versa, to check for model-dependent results.
Different Effect Measures: For binary outcomes (e.g., success/failure), re-analyzing the data using Risk Ratio (RR) if the primary analysis uses Odds Ratio (OR), to ensure the choice of effect measure does not alter the conclusion.

Language restriction English.

Country(ies) involved China.

Keywords TMJ, Reconstruction, CCG, Prosthesis.

Contributions of each author

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