Bone Grafts versus Titanium Mesh Implants in Orbital Fracture Management A Systematic Review and Meta-Analysis

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INTRODUCTION

- Orbital fractures pose functional and cosmetic challenges, often requiring surgical reconstruction to restore orbital volume, motility, and aesthetics.
- Bone grafts and titanium mesh are commonly used, but their comparative effectiveness remains debated.
- **Objectives**: to evaluate and compare the outcomes of bone grafts vs. titanium mesh in orbital fracture repair, focusing on:
  - Diplopia
  - Enophthalmos
  - Complications
  - Aesthetics

METHODS

- A systematic search of MEDLINE, EMBASE, CINAHL and CENTRAL databases followed PRISMA guidelines.
- Studies comparing bone grafts and titanium mesh were included.
- Primary outcomes were diplopia, enophthalmos, complications and aesthetics.
- Data extraction followed the Cochrane format, and meta-analyses used fixed and random-effects models.
- Risk of bias was assessed using ROBINS-I for non-randomised studies.

RESULTS

8 studies with 291 patients met inclusion criteria.

- **Diplopia**: No significant difference (OR: 1.87; 95% CI: 0.52–6.71; p=0.34).
- **Enophthalmos**: Lower risk with titanium mesh (OR: 2.83; 95% CI: 1.19–6.75; p=0.02).
- **Complications**: Similar between groups (OR: 2.39; 95% CI: 0.55–10.35; p=0.25).
- **Aesthetic outcomes** were insufficiently reported to meta-analyse.

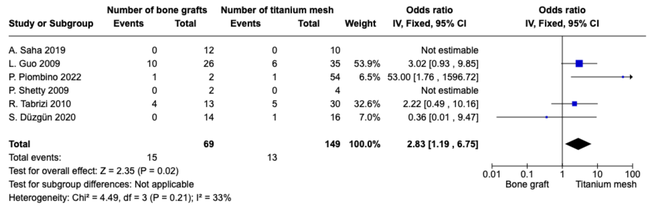


Figure 1. Forest plot comparing bone grafts and titanium mesh implants for enophthalmos outcomes in orbital fracture reconstruction.

KEY FINDINGS

Titanium mesh significantly reduces enophthalmos risk
Titanium and bone grafts have comparable diplopia and complication outcomes.

CONCLUSION

- Titanium mesh reduces enophthalmos risk and restores orbital volume, making it preferable in high-risk cases.
- Both materials minimise diplopia and have similar safety profiles.
- Material selection should consider patient factors, fracture characteristics, and surgeon expertise.
- Further research is needed to optimise selection.

CLINICAL RELEVANCE

- Titanium mesh is ideal when fast, precise orbital volume restoration is needed.
- Bone grafts remain valuable for larger, complex defects prioritising biological integration.
- Titanium's availability and ease of use make it well-suited to resource-limited settings.

REFERENCES