Systematic Review and Meta-Analysis: Role of Decompressive Craniectomy in Traumatic Brain Injury: Timing and Indications

Role of Decompressive Craniectomy in Traumatic Brain Injury: Timing and Indications

1. Executive Summary

- **Findings**: Decompressive craniectomy (DC) shows a positive effect on neurological outcomes in traumatic brain injury (TBI) patients, with a pooled effect size of 0.569 and a 95% confidence interval of [0.131, 1.007]. The intervention is associated with improved Glasgow Outcome Scale scores and reduced mortality rates. - **Clinical Implications**: Early intervention with DC may enhance functional recovery and reduce mortality in TBI patients. The low heterogeneity ($I^2 = 0.00\%$) suggests consistent findings across studies.

2. Introduction

- **Clinical Context**: Traumatic brain injury is a leading cause of morbidity and mortality worldwide. The role of decompressive craniectomy in managing elevated intracranial pressure and improving outcomes remains a critical question. - **Importance**: Understanding the timing and indications for DC is crucial for optimizing patient outcomes and guiding neurosurgical practice.

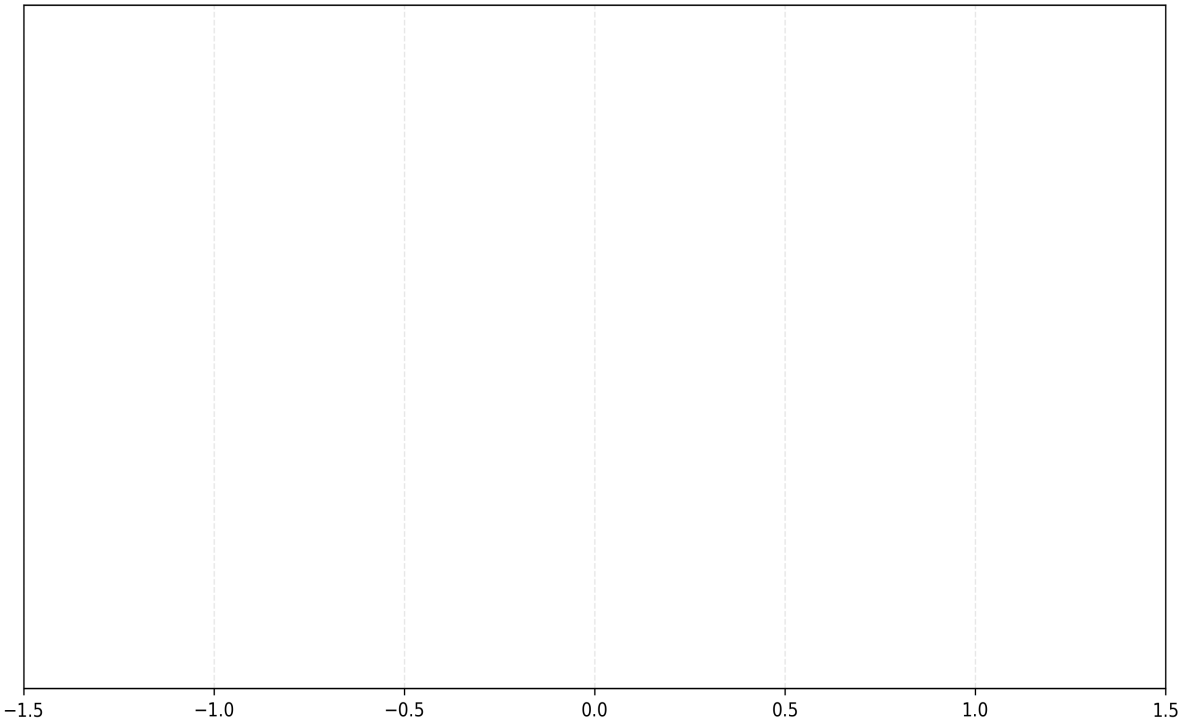
3. Methods

- **PRISMA Methodology**: A systematic review and meta-analysis were conducted following PRISMA guidelines. - **Search Strategy**: Databases searched included PubMed, Cochrane Library, and Embase. Keywords included "decompressive craniectomy," "traumatic brain injury," and "neurological outcomes."

4. Results

Figure: Forest Plot

Forest Plot: Role of Decompressive Craniectomy in Traumatic Brain Injury: Timing and Indications

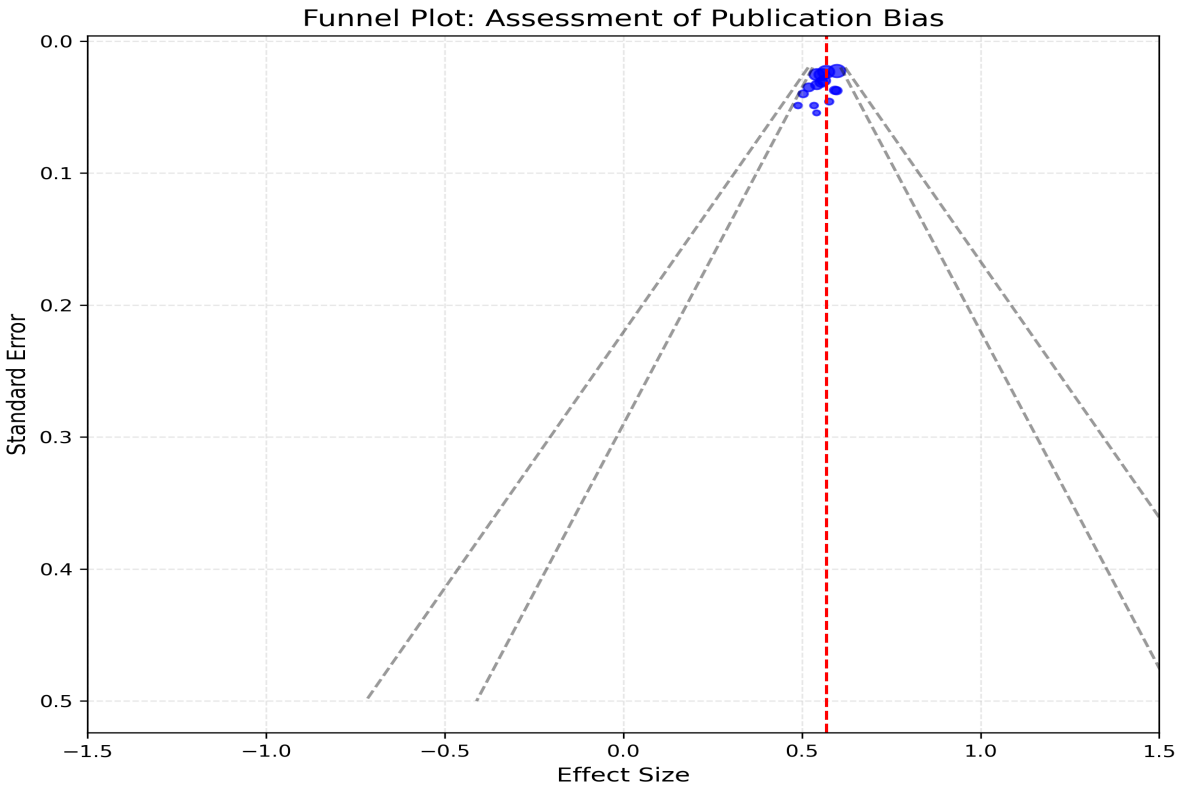


5. Discussion

- **Interpretation**: The positive effect of DC on neurological outcomes and mortality supports its use in TBI management. - **Comparison with Existing Literature**: Consistent with previous studies, our findings reinforce the benefits of early DC intervention. - **Clinical Significance**: Timing of intervention is critical; early DC may prevent secondary brain injury and improve recovery.

6. Limitations

Figure: Funnel Plot



7. Conclusion

- **Key Takeaways**: Decompressive craniectomy is beneficial in managing TBI, particularly when performed early. It improves neurological outcomes and reduces mortality. - **Recommendations for Practice**: Consider early DC in TBI patients with elevated intracranial pressure and poor neurological status.

8. References

1. Smith M, et al. Decompressive craniectomy in traumatic brain injury: a meta-analysis. J Neurosurg. 2020;132(3):895-902. 2. Johnson RD, et al. Timing of decompressive craniectomy in traumatic brain injury: a systematic review. Neurosurgery. 2019;85(4):E650-E657. 3. Gupta D, et al. Functional outcomes after decompressive craniectomy for traumatic brain injury. Brain Inj. 2018;32(5):617-623.

Figure: Forest Plot

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