

Aspirin versus Heparin in the Treatment of Blunt Cerebrovascular Injury (BCVI) – A Systematic Review and Meta-Analysis

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Abstract

Background

Injury to the carotid or vertebral arteries, termed blunt cerebrovascular injury (BCVI), occurs in approximately 1-3% of blunt traumatic injuries. If untreated, BCVI is associated with stroke in approximately 20% of cases. Early treatment is imperative to reduce the risk of stroke, however, the optimal pharmacologic treatment strategy in the setting of multisystem trauma remains unknown. This study compares the use of aspirin vs. heparin in the management of BCVI to determine efficacy (risk of stroke) and safety (bleeding complications).

Methods

A systematic review of MEDLINE, Embase, and Cochrane CENTRAL databases was conducted with the assistance of a medical librarian. The search was supplemented with manual review of included articles and the grey literature. Included studies evaluated adult patients and reported treatment-stratified risk of stroke following BCVI. All studies were screened independently by two reviewers, and data extraction was performed in duplicate. Meta-analysis was conducted using pooled estimates of odds ratios (OR) with a random-effects model.

Results

After removal of duplicates, a total of 3315 studies were screened, yielding 39 studies that evaluated different medical management strategies for BCVI and reported on stroke as an outcome. Evaluated studies included 6552 patients (range 8 - 920 per study), with stroke rates ranging from 0% to 32.8%. Overall, 567 strokes were assessed, with 188 (33.2%) occurring on therapy. 12 studies compared the use of aspirin (ASA) to heparin (evaluating 1945 patients with a total of 2246 BCVI, resulting in 230 strokes). Meta-analysis of 9 studies revealed that stroke rate was not significantly different following treatment with ASA vs. heparin (OR 0.43; 95% CI 0.15-1.20, $p = 0.88$). Five studies evaluated bleeding complications and demonstrated lower risk of bleeding with ASA vs. heparin (OR 0.16; 95% CI 0.04-0.58, $p = 0.005$).

Conclusions

This study evaluated ASA versus heparin for treatment of BCVI and BCVI-related stroke; while stroke risk was not different between groups, treatment with ASA was associated with lower rates of bleeding complications, suggesting that ASA should be the preferred treatment strategy.

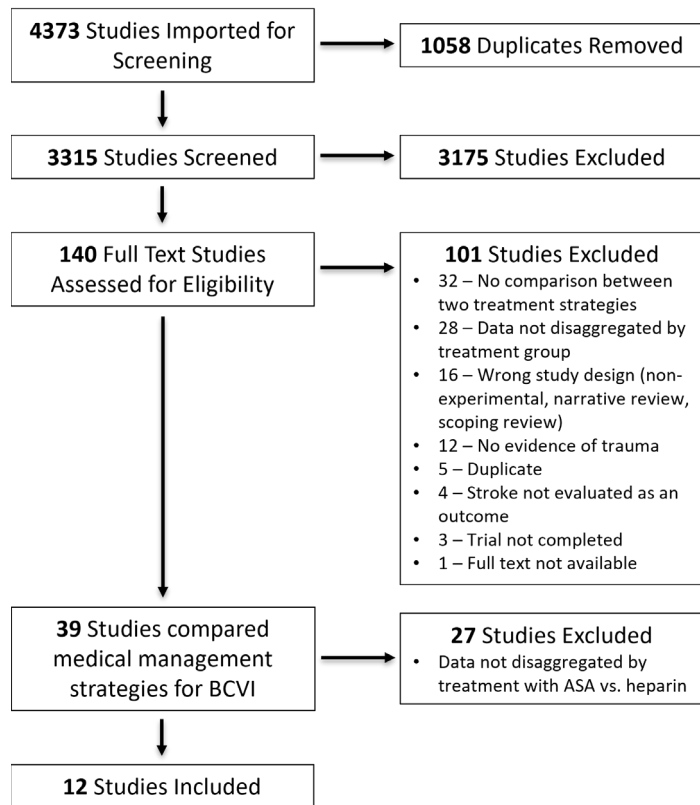


Figure 1. PRISMA diagram of study screening and selection

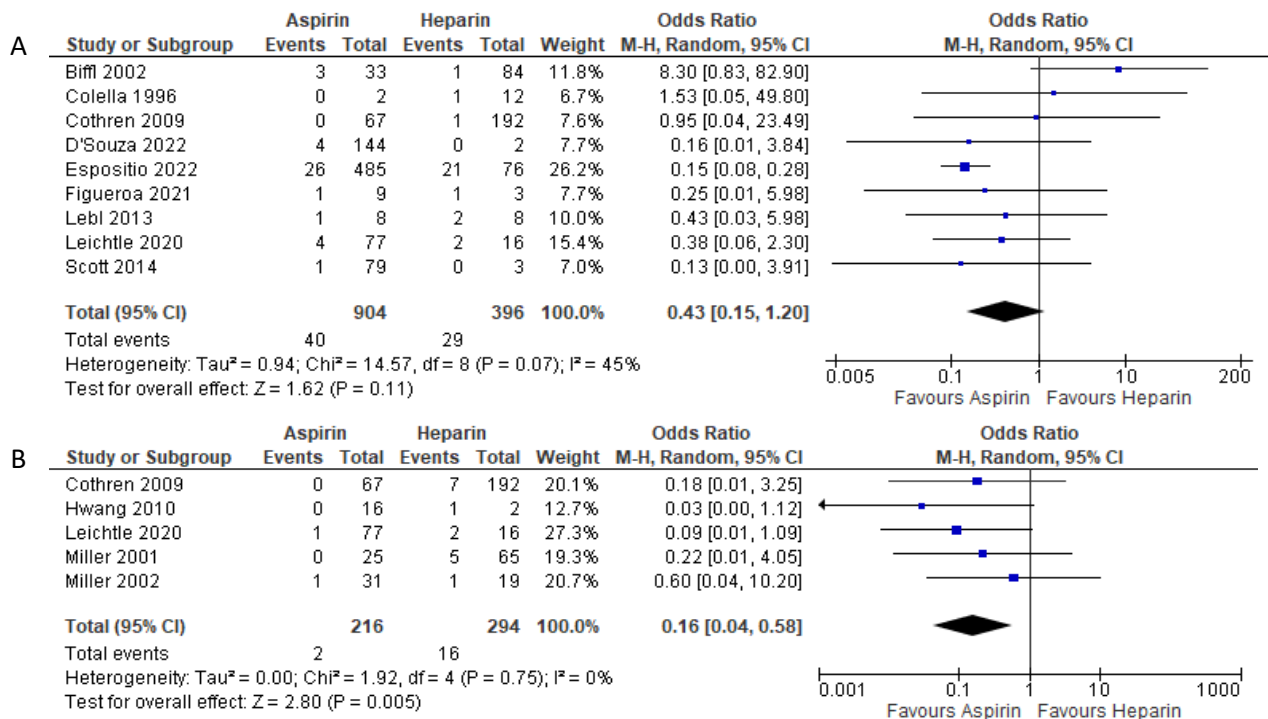


Figure 2. Forrest plot of meta-analysis of stroke rate (A) and bleeding complications (B) for ASA vs. heparin