Effectiveness of antimicrobial catheters in cerebrospinal fluid-shunting-associated infections: a systematic review and meta-analysis

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OBJECTIVE

- To study the effectiveness of antimicrobial cerebrospinal fluid (CSF) shunting catheters in reducing the risk of infection and related mortality

METHODS

- PubMed and Scopus databases were searched (till October 2012)
- Studies evaluating antibiotic-impregnated (AIC), silver-coated (SCC) and hydrogel-coated catheters (HCC) vs conventional catheters (CC) were included
- Cerebrospinal fluid shunting was classified either as permanent (mainly with ventriculoperitoneal shunting) or as temporary (mainly with external ventricular drainage)
- A random effects model meta-analysis was performed

RESULTS

- Thirty studies (13838 procedures) were eligible for inclusion (6 randomized and 24 non-randomized)
- Most patients did not have major risk factors for development of CSF shunting infections
- Significant statistical heterogeneity was observed in most of the analyses. Unadjusted data only were available
- AICs were associated with
  - lower risk for CSF-shunting-associated infections (RR 0.41, 95% CI 0.30 -0.56) than CC
  - lower risk for Staphylococcal infections (0.23, 0.15-0.35) than CC
  - lower risk for early (< 6 months after implantation) shunt infection in permanent shunting (0.34, 0.13-0.88) than CC
  - similar risk for late infections (1.23, 0.24-6.20) to that of CC
  - lower risk for infections in randomized (0.43, 0.18-1.03) and non-randomized (0.40, 0.28-0.57) studies than CC
  - Lower risk for infection than CC in all age groups
    - neonates (0.39, 0.16-0.96)
    - children (0.55, 0.35-0.87)
    - adults (0.32, 0.14-0.76)
    - mixed populations of adults and children (0.39, 0.24-0.63)
- Data for temporary shunting only was available for SCC, which were associated with lower risk for infection (0.55, 0.34-0.89) than CC
- No difference in development of infections was observed between HCC and CC (1.63, 0.21-12.96)
- Nine studies (1605 procedures) provided data for mortality; no difference in mortality was observed between all types of antimicrobial catheters and CC

CONCLUSION

Based on data from non-randomized studies, AIC and SCC seem to reduce the risk for infection in patients undergoing cerebrospinal fluid shunting. Additional randomized controlled trials are needed to investigate differences in effectiveness among the different types of antimicrobial shunting catheters.

Figure 1. Forest plot depicting the risk ratios (RR) for CSF-shunting-associated infections when AIC wee compared with CC.

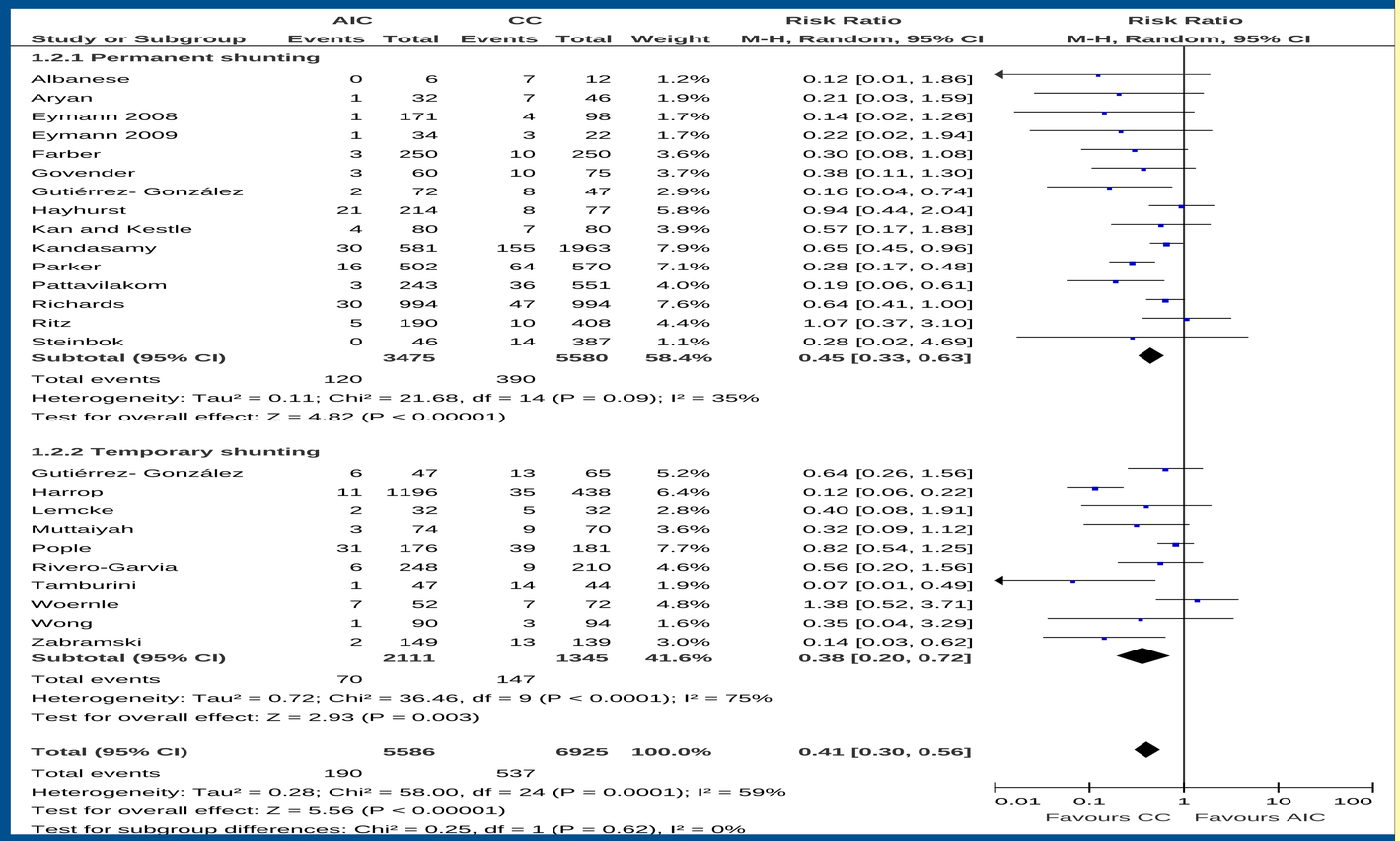

Figure 2. Forest plot depicting the risk ratios (RR) for all-cause mortality when AIC and SCC compared with CC.