The Clinical Advantages of Dual Antibiotic-Loaded Bone Cement in Reducing Infections After Hip Arthroplasty: A Myth or a Reality?

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INTRODUCTION: Surgical site infections (SSIs) remain a devastating complication following hip arthroplasty. Antibiotic-loaded bone cement is widely used for prophylaxis, with dual antibiotic-loaded cement proposed to offer superior protection compared to single antibiotic formulations. This study aimed to compare the efficacy of dual versus single antibiotic-loaded bone cement in reducing SSIs and mortality following hip arthroplasty.

METHODS: A systematic review and meta-analysis was conducted according to PRISMA guidelines. Studies comparing dual and single antibiotic-loaded bone cement in patients undergoing total or hemi hip arthroplasty were included. The primary outcome was the incidence of surgical site infections; the secondary outcome was all-cause mortality. Pooled odds ratios were calculated using a random-effects model.

RESULTS: From 1,114 initially identified studies, eight met inclusion criteria, encompassing 36,939 patients, 5,830 received dual antibiotic-loaded cement and 31,109 received single-loaded cement. Across studies published between 2016 and 2024, dual antibiotic-loaded cement was associated with a significantly lower odds of surgical site infection (SSI) (OR: 0.64; 95% CI: 0.47–0.87) (Figure 1). For deep surgical site infections (DSSI), reported in four studies, the odds were also lower in the dual group (OR: 0.46; 95% CI: 0.27–0.79). Subgroup analysis revealed that dual-loaded cement significantly decreased SSI risk in primary hemiarthroplasty (OR: 0.48; 95% CI: 0.34–0.69), but not in primary total hip arthroplasty (OR: 1.42, 95% CI: 0.63-3.18) nor in revision total hip arthroplasty (OR: 0.99; 95% CI: 0.48–2.02) (Figure 2). Mortality and multi-complication outcomes, reported in three and two studies respectively, showed no statistically significant differences between the two groups (Figure 3 & 4).

DISCUSSION AND CONCLUSION:

Dual antibiotic-loaded bone cement in hip arthroplasty significantly reduces the risk of surgical site infections compared to single-loaded cement, with no observed significant difference in mortality. These results highlight the potential benefit of using dual-loaded cement as a targeted approach to minimize postoperative infections. Further research is needed to evaluate its long-term efficacy and cost-effectiveness.

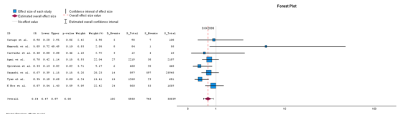

Figure 1. Forest Plot Comparing the Risk of SSI Between Dual and Single Antibiotic-Loaded Cement Across All Hip Arthroplasty Cases

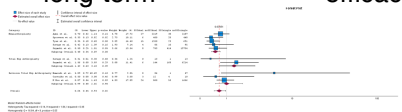

Figure 2. Forest Plot of Subgroup Analysis by Arthroplasty Type: Primary Hemiarthroplasty, Primary Total Hip Arthroplasty and Revision Total Hip Arthroplasty.

Figure 3. Forest Plot Comparing Mortality Rates Between Dual and Single Antibiotic-Loaded Cement in Hip Arthroplasty