Does Antibiotic-laden Cement Influence Organism Resistance in Acute Postoperative Periprosthetic Joint Infection after Primary Total Knee Arthroplasty?

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INTRODUCTION:

Periprosthetic joint infection (PJI) is a rare but devastating complication following primary total knee arthroplasty (TKA). Antibiotic-loaded bone cement (ALBC) is used in primary TKA to increase local antibiotic elution and decrease PJI risk. However, it is unclear if the additional antibiotics and extended elution time from ALBC could lead to greater organism resistance when PJI occurs. This study compares resistance to antibiotics commonly used in cement between acute PJIs in which the primary TKA used ALBC versus regular bone cement. METHODS:

We retrospectively identified 114 acute postoperative PJI cases (within 90 days following a primary TKA or aseptic revision TKA) at a single institution between 2018 and 2023. Data recorded included type of cement, presence of antibiotics (premanufactured and hand-mixed), and operative details from the index surgery and subsequent PJI revision. The primary outcome was resistance to an antibiotic used in cement, identified through preoperative aspirations and intraoperative cultures. A chi-square test was used to compare resistance rates between the ALBC and regular bone cement groups.

RESULTS:

Of the 114 cases analyzed, 54 used ALBC and were tested for aminoglycoside susceptibility, with 11 (20.37%) showing resistance. In the regular bone cement group, 40 cases were tested for aminoglycoside susceptibility, with 4 (10.00%) being resistant. All cases tested for vancomycin susceptibility were non-resistant (Figure 1). The chi-square test revealed no statistically significant difference in aminoglycoside resistance between the ALBC and regular bone cement groups (p = 0.1746). The odds of aminoglycoside resistance were 2.302 times higher in the ALBC group compared to the regular bone cement group, but this difference was not statistically significant (95% CI: 0.7015 to 6.985) DISCUSSION AND CONCLUSION:

Although the ALBC group had a higher percentage of aminoglycoside resistance compared to the regular bone cement group (20.37% vs. 10.00%), the use of ALBC did not significantly influence organism resistance to aminoglycosides or vancomycin in acute postoperative PJI after primary TKA. These findings suggest that ALBC can be used without significantly increasing the risk of antibiotic resistance in acute PJI cases following TKA. Future research should monitor resistance patterns and evaluate long-term outcomes to ensure the continued efficacy of ALBC in preventing and managing PJIs. The study provides crucial data on the resistance profile of organisms in PJI, reinforcing the safe use of ALBC in practice.

