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Low-dose Antibiotic Loaded Cement Did Not Lower Primary TKA Infection Rates

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From the Kaiser Permanente National Total Joint Replacement Registry

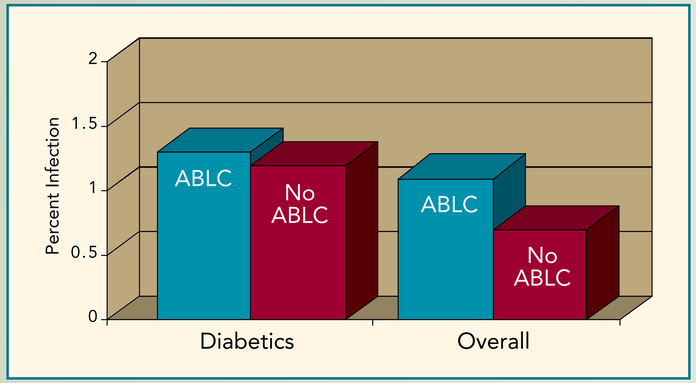
INTRODUCTION

The routine use of antibiotic-loaded bone cement (ALBC) for infection prophylaxis in primary total knee arthroplasty (TKA) is controversial. Commercially pre-mixed ALBC became available in the United States in May 2003. Despite the potential for reducing deep infections, concerns about ALBC include: cost, allergic reactions, toxicity, microbial resistance, and degradation of cement material properties. There are few reports, with small sample sizes, studying the effects of ALBC in TKA.

METHODS

A community based total joint registry, an integrated administrative database, and a comprehensive infection surveillance program were used to evaluate deep infection in 15,859 primary TKAs from May 2003 to April 2006. Deep infection rates were compared between ABLC TKAs and non-ABLC TKAs. Center for Disease control definitions were used to define and validate (by infection control practitioners) deep infection occurrence (Table 1). Patients with diabetes mellitus were also compared. Chi-square statistics and Fishers exact tests were applied to assess differences in infection rates. The p-value was set at 0.05.

Figure 1. Primary TKA infection rates



RESULTS

ABLC was used in1240 patients (7.8%). Among 3,339 (21.1%) diabetic patients, ABLC was used in 301 (9.0%) patients. The overall rate of deep infection was 1.1% (n=14) for TKA with ABLC and 0.7% (n=102) without ABLC (p=0.09). Among diabetics, the deep infection rate was 1.3% (n=4) with ABLC and 1.2% (n=36) without ABLC (p=0.83).

Table 1. CDC Criteria for Defining a Surgical Site Infection (SSI)

Deep incisional SSI

Infection occurs within 30 days after the operation if no implant† is left in place or within 1 year if implant is in place and the infection appears to be related to the operation and infection involves deep soft tissues (e.g., fascial and muscle layers) of the incision and at least one of the following:

1. Purulent drainage from the deep incision but not from the organ/space component of the surgical site.
2. A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (>38°C), localized pain, or tenderness, unless site is culture-negative.
3. An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
4. Diagnosis of a deep incisional SSI by a surgeon or attending physician.

Notes:

1. Report infection that involves both superficial and deep incision sites as deep incisional SSI.
2. Report an organ/space SSI that drains through the incision as a deep incisional SSI.

CONCLUSION

Much of the ALBC joint replacement literature involves European experience with primary total hip arthroplasty (THA). However, in the United States, infection rates are higher with TKA, and the use of cement in THA is declining. There are no large randomized controlled trials, but Registry studies spanning decades of primary THA cases from Sweden and Norway showed statistically significant reduced THA deep infections with the combination of systemic antibiotics and ALBC (Malchau et al., Espehaug et al).

Our investigation represents the largest series of ALBC for primary TKA with 1240 cases. There was no significant reduction of primary TKA deep infections with the use of ALBC in our series, even in diabetic patients. The current study involves the collective experience of multiple community-based surgeons incorporating contemporary surgical techniques.

Prior investigations of ALBC in primary TKA involve small sample sizes with cefuroxime mixed with cement (Chiu et al, McQueen et al). There are no commercially premixed ALBC containing cephalosporins. The current products available contain only tobramycin or gentamycin.

The cost of commercially available ALBC is three to four times greater than standard cement. Widespread use of ALBC may contribute to antimicrobial resistant organisms, making the management of infected TKA even more difficult. Removal of the antibiotic-containing cement in patients who be required if allergic reactions developed, a likely consideration if cephalosporins were introduced in commercially pre-mixed ALBC. The potential for toxicity, and late aseptic loosening from degradation of the material properties of cement, is likely small in low dose ALBC preparations.

Our preliminary results indicate no improvement in deep infection rates with the use of ALBC in primary TKA. We will continue to follow this cohort and report our findings in the future. At this time, the routine use of ALBC for primary TKA does not appear warranted.

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