HK86: What is the optimal intravenous prophylactic antibiotic for patients undergoing assumed aseptic revision arthroplasty?

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Response/Recommendation:

Given the absence of comparative studies, the optimal prophylactic antibiotic for patients undergoing assumed aseptic revision arthroplasty should follow the current evidence for patients undergoing primary total joint arthroplasty, which remains a weight-based intravenous dose of a first or second-generation cephalosporin. Targeted use of additional vancomycin may be considered, but the evidence is limited to a single retrospective review.

Strength of Recommendation: Weak

Delegate Vote:

Rationale:

According to the American Joint Replacement Registry 2024 annual report, periprosthetic joint infections (PJI) remains the leading cause of revision hip and knee arthroplasty in the United States over the last decade [1]. Approximately 1% to 2% of all patients undergoing total hip or knee arthroplasty suffer from PJI, and estimates project that the annual costs to treat PJI related to the hip and knee will be $1.85 billion by 2030 [2-5]. However, in revision hip and knee arthroplasty, the risk of PJI is even higher with estimates around 5% to 9% [6-8]. A comprehensive review of the literature was conducted to identify studies related to the optimal prophylactic antibiotic for patients undergoing assumed aseptic revision arthroplasty.

There were no identifiable studies regarding an optimal prophylactic antibiotic that is superior in reducing infection rates for those undergoing aseptic revision arthroplasty [9]. In 2019, the American Academy of Orthopaedic Surgeons released its clinical practice guidelines and recommended the use of a first- or second-generation cephalosporin or the use of a glycopeptide antibiotic for surgical prophylaxis to prevent PJI [10]. However, there was "limited" strength evidence to support the use of any particular preoperative antibiotic in reducing the risk of PJI. Additionally, there is literature to support the particular use of cefazolin, as other antibiotics have demonstrated an increased risk of PJI. Wyles et al. retrospectively reviewed all patients who underwent total hip or knee arthroplasty at a single academic institution from 2004 to 2017. A total of 28,174 arthroplasties (94.9%) received cefazolin while 1,521 (5.1%) received non-cefazolin antibiotics. The overall risk of PJI was 32% lower among patients who were recieved cefazolin after adjusting for comorbidities [11]. Blumenthal et al.

also conducted a retrospective cohort study at a single hospital of patients with and without a reported penicillin allergy. Of the 8,385 patients who underwent 9,004 procedures, 922 patients reported an allergy to penicillin and 241 suffered a SSI. Patients with a reported penicillin allergy were significantly less likely to receive cefazolin and had a significantly increased odds ratio of 1.51 for surgical site infection [12].

Kheir et al. published a retrospective study of 1,828 patients undergoing primary hip or knee arthroplasties that received vancomycin prophylaxis between 2008 and 2014. They also evaluated 5,810 patients who underwent primary total joint arthroplasty and received cefazolin for surgical prophylaxis during that same time period. The authors reported that patients who received vancomycin had a significantly higher rate of PJI when compared to those who received cefazolin prophylaxis. Additionally, the authors also noted that the majority of patients who were given vancomycin were underdosed according to the weight-based dosage recommendations [13]. However, underdosing is not unique to vancomycin, and patients receiving cefazolin prophylaxis may also be susceptible to underdosing, especially in the obese population [14].

Liu et al. retrospectively evaluated if the addition of vancomycin to cefazolin as surgical prophylaxis was associated with reduced rates of PJI in revision total knee arthroplasty. The authors noted that their institutional had an unacceptably high rate of methicillin-resistant Staphylococcus PJIs, and in an effort to combat this, vancomycin was added to cefazolin prophylaxis for all presumed aseptic revision knee arthroplasties. The overall rate of PJI in the year preceding implementation of vancomycin to cefazolin was 7.89%. After the addition of vancomycin to cefazolin prophylaxis, the institutional revision total knee arthroplasty PJI rate dropped to 3.13% ($P = 0.046$). The authors recommended identification of high-risk subgroups who may benefit from the addition of vancomycin if the concern for methicillin-resistant organisms is high enough [15].

Given the absence of comparative studies in the aseptic revision setting, we recommend that patients receive a prophylactic antibiotic based on the existing literature within primary hip and knee arthroplasty, which remains a weight-based intravenous dose of a first or second-generation cephalosporin. Targeted use of additional vancomycin may be considered, but the evidence is limited to a single retrospective review. However, the application of current evidence from primary arthroplasty to aseptic revision arthroplasty requires caution due to the more extensive tissue trauma and longer operative times, which carry a higher risk of infection.

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