

HK88: Should prophylactic antibiotics be withheld during revision arthroplasty for aseptic failure until culture samples are taken?

Joshua P. Rainey, Carlos A. Higuera-Rueda, Elido A. Perez-Gonzalez, Paulo Alencar, Amir Khoshbin, Wenwei Qian, Anders Odgaard, Lucas A. Anderson

Response/Recommendation:

No. Prophylactic antibiotics should not be withheld to obtain culture samples, during revision arthroplasty for aseptic failure.

Level of Evidence: Strong

Delegate Vote:

Rationale:

Periprosthetic joint infection (PJI) remains the leading cause of revision in total hip and knee arthroplasty [1]. Revision arthroplasty carries a higher risk of PJI compared to primary hip and knee arthroplasty [2-4]. Historically, prophylactic antibiotics were thought to interfere with culture yield, and this led to hesitation regarding their use. However, recent data has challenged this notion. Additionally, some advocate for antibiotic administration prior to incision to allow systemic distribution of antibiotics and potentially decrease the risk of PJI and surgical site infections.

A thorough review of the literature was performed to assess if prophylactic antibiotics should be withheld during revision arthroplasty for aseptic failure until culture samples are taken. A total of nine studies were identified - two randomized controlled trials, two prospective cohort studies, and five retrospective reviews - and all concluded there was no significant difference in rate of culture positivity with respect to antibiotic prophylaxis pre- or post-tissue sampling. The majority of the literature evaluated patients with known PJI who were undergoing revision arthroplasty, but one retrospective review specifically evaluated patients who underwent aseptic revision total hip arthroplasty [5].

Perez et al. performed a randomized controlled trial evaluating if preoperative antibiotic prophylaxis increased the rate of culture negativity in patients who were treated for PJI. There were 14 patients in each group, and four patients in each group had culture negative PJIs ($p > 0.05$). The authors concluded that antibiotic prophylaxis did not affect intraoperative cultures in suspected or confirmed PJI [6]. Tetreault et al. also conducted a randomized controlled trial randomizing 65 patients with known PJIs to either administration or holding of prophylactic antibiotic prior to obtaining intraoperative samples. A total of 82% of patients who received prophylactic antibiotics had identical intraoperative and preoperative cultures results, and a total of 81% of patients who did not receive prophylactic antibiotics had identical intraoperative and preoperative cultures results. The authors concluded that prophylactic antibiotics did not affect culture results [3].

Bedencic et al. prospectively evaluated 40 patients with suspected PJI undergoing revision arthroplasty. Three tissue samples were obtained for culture after arthrotomy was made, then two grams of cefazolin was administered. Later in the procedure but before irrigation and debridement, a second set of tissue samples were obtained for culture. There were no differences in colony-forming units between specimens before and after antibiotic prophylaxis. There was also no difference in the likelihood that an infection would be diagnosed between the cultures obtained prior or after antibiotic administration. The authors concluded that prophylactic antibiotic administration does not likely compromise the diagnostic sensitivity of tissue cultures [7]. Burnett et al. also prospectively evaluated 26 infected total knee arthroplasties with a known preoperative organism. The authors then re-aspirated these knees, antibiotic prophylaxis was administered, then culture swabs and tissue were obtained after arthrotomy. In all 26 knees, the cultured organisms from preoperative aspiration and the organisms obtained intraoperatively were the same organism despite infusion of antibiotics. The authors noted that preoperative prophylactic antibiotics did not impact the results of intraoperative cultures [8].

In their retrospective review, Groot et al. evaluated 490 patients undergoing presumed aseptic revision total hip arthroplasty. Of these patients, 61 received prophylactic antibiotics prior to incision while 429 patients received prophylactic antibiotics after tissue samples were collected for culture. Prophylactic antibiotics were noted to not yield fewer culture results compared to patients who received antibiotics after tissue samples, and there was a non-significant increase in subsequent PJI rate in patients who received antibiotics after tissue biopsy (3.0% versus 1.6%, $P = 0.54$) [5]. In the retrospective review by Stoll et al., a total of 124 patients underwent revision shoulder arthroplasty for septic and aseptic etiologies. There were 48 patients who received prophylactic antibiotics prior to incision, and 76 patients who received antibiotics after cultures were obtained. The authors noted no significant difference in culture positivity between the preculture antibiotic and post culture antibiotic groups (16% versus 15%, $p = 0.82$) [9].

Ghanem et al. published their retrospective review of 171 patients undergoing revision arthroplasty for PJI of the knee. A total of 72 patients were preoperative antibiotics prior to incision whereas 99 patients received antibiotics after samples for culture were obtained. The rate of culture negative infection not significantly different between groups ($p = 0.34$), with 12.5% culture negative in the preoperative antibiotic group and 8% in the group who received antibiotics after tissue sampling [10].

Wouthuyzen-Bakker et al. performed a retrospective review of 284 patients undergoing aseptic knee revision in whom 141 received antibiotic prophylaxis prior to incision. The percentage of cases with greater than or equal to one positive culture was no significantly different between those who received preoperative antibiotic prophylaxis versus those who received antibiotics after tissue sampling (26% versus 27%, $p = 0.70$) [11]. Anagnostopoulos et al. also published a retrospective review of 110 patients undergoing orthopaedic joint surgery. The authors assessed if antibiotic prophylaxis prior to incision influenced the rate of positive C.

acnes cultures. There was no association between the proportion of positive samples and administration of prophylactic antibiotics (71.6% versus 65.9%, $p = 0.39$) [12].

In summary, the literature appears to support the administration of prophylactic antibiotics in revision arthroplasty, even in cases of suspected PJI. Given the low pretest probability of PJI in presumed aseptic revision arthroplasty, we recommend that prophylactic antibiotics be administered prior to incision.

References:

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