SH57: What is the role for re-aspiration or tissue cultures prior to second stage revision surgery in the treatment of PJI?

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Supportive Delegates: Kevin Cronin; Mohammad Ghoraishian

Response: The data does not support the routine re-aspiration or tissue culture prior to second-stage revision; however, there may be benefit in select cases.

Strength of Recommendation: Limited

Delegate Vote: 46 (92%) agree; 0 disagree; 4 (8%) abstain

Rationale: A comprehensive review of English speaking literature was performed using the key terms "shoulder arthroplasty infection" and "two-stage repeat aspiration" or "repeat aspiration" or "repeat tissue culture" in PubMed and Google scholar. We also reviewed articles identified from a search of "staged shoulder arthroplasty infection" from 2018 to present with the same databases to examine the results when a repeat aspiration or repeat tissue acquisition was performed prior to the second stage procedure.

Despite the somewhat extensive literature examining the outcomes of 2-stage procedures for the treatment of shoulder periprosthetic infections the use of between stage intraoperative re-aspiration and/or tissue cultures is inconsistent. Of recent studies, some routinely advocate for either a repeat aspiration or tissue culture (3, 8, 10, 11) while others do not (1, 2, 4-7, 9) factor this step into the decision making prior to proceeding with a second stage reimplantation.

Of the three recent publications that used repeat tissue or fluid analysis prior to definitive reimplantation of a prosthesis, 1 used open tissue culture (10), 1 used open culture combined with frozen section (8) and 1 used preoperative aspiration/culture (3) to "rule out" residual infection. It is important to note that none of these studies had a control group where no repeat testing was performed with which to compare reinfection rate or functional outcomes. The authors success rate in eradicating infection with their proposed algorithms, which included both isolated 2-stage revisions and those with multiple debridements, ranged from 0-20%. One study published in 2015 examined the value of open biopsy during staged treatment of shoulder PJI(11). In this series, 18 shoulders underwent a repeat open biopsy after placement of an antibiotic spacer and completion of an IV antibiotic regimen. Twenty-two percent were culture positive and underwent a repeat formal irrigation and debridement and IV antibiotic treatment course before reimplantation. Using this treatment algorithm the authors reported a 0% recurrent infection rate at a mean follow-up of 24 months. A study published in 2020 (3) utilized fluoroscopically-guided aspiration during staged treatment of shoulder PJI. Of the 25 patients that proceeded to the second stage after a negative guided-aspirate with a mean follow-up of 38 months, only 20 (80%) remained infection free. Interestingly they did not have any positive aspirates in this study.

The hip and knee literature can provides little guidance related to periprosthetic joint infection and the role of repeat joint fluid aspiration. In the 2019, the International Consensus Meeting provided the following recommendation prior to second stage reimplantation: "There are no definitive metrics to allow for determination of optimal timing of reimplantation. Thus,

timing of reimplantation should consider resolution of clinical, downtrend in serological markers, and results of synovial analysis, if aspiration is performed. Level of Evidence: Moderate. In hip and knee periprosthetic infections the role of repeat fluid analysis in unknown given the low rate of sensitivity of this test.

In aggregate, the existing literature cannot give evidence based guidance either in support of or against the routine use of repeat aspiration or tissue culture for patients undergoing a two-stage treatment of shoulder PJI. Selective use may be indicated based on clinical presentation, serologic test results and possibly the nature of the infecting organism or health of the host.

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