SH78: Should bone graft or cement be removed in treatment for subacute or chronic shoulder PJI?

Liaison: Surena Namdari
Lead Delegate: Mark Lazarus
Supportive Delegates: Grant Garrigues; Robert Hudek

Response: Current best practice is to remove any material that can be extracted without significant morbidity. There is insufficient evidence to support the routine removal of all bone graft or cement during treatment of subacute or chronic shoulder PJI.

Strength of Recommendation: Limited

Delegate Vote: 49 (100%) agree; 0 disagree; 0 abstain

Rationale: A comprehensive literature review was performed to identify all studies on retained bone cement and/or bone graft during revision shoulder arthroplasty. Searches of PubMed and Google Scholar were performed through October 2024 for the MeSH major topic "arthroplasty" subheading "cement," major topic "arthroplasty" and subheading "bone graft," and combination of all field and MeSH terms "arthroplasty" "infection" "cement" "bone graft" and "revision." Because of a paucity of studies specifically reporting shoulder arthroplasty available on this topic, the search was expanded to include studies for other joints. Inclusion criteria were all English studies (Level I-IV evidence) that reported on the influence of retained cement and/or bone graft during revision arthroplasty for prosthetic joint infection (PJI). When present in the report, specific outcomes of patients treated during the subacute or chronic period (after 12 weeks) after PJI is reported. In the studies identified, it was impossible to differentiate those patients with subacute or chronic PJI from those with acute infection from hematogenous spread. Exclusion criteria were non-English language articles, nonhuman studies, retracted papers, case reports, review papers, studies with less than <10 patients in the sample size, studies without clinical follow-up/infection rates, and technique papers without patient data. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) criteria were followed.

There is one study that investigated the effect of cement retention during revision surgery for shoulder PJI on subsequent infection (1). This study did not differentiate acute vs. subacute or chronic patients. 16% of the 37 total patients had retained cement. Of the 10 patients with recurrent infection, only 1 had retained cement ($p=0.389$). The overall infection rate of those with retained cement was 7% as compared to 30% for those without retained cement. 48.6% of infections were C. Acnes and this group had a cure rate of 89%. Of the 4 infections with staph species (MRSA or MSSA), only 1 was cured. The distribution of offending bacterium in the retained vs cleared of cement groups is not reported.

There are two other upper extremity studies, both in the elbow. One study looked at 57 elbows with an infection eradication rate of 69% (2). The authors do define patients as acute (1), subacute (9), and chronic (42), but do not specifically report results by group. Overall, time from index surgery to first debridement did not statistically change recurrence rate ($p=0.3$). The risk of persistent infection was 3.3 times higher in those patients with retained cement ($p=0.04$) but the risk of continued infection was more related to infecting organism (Staph Epi, $p=0.06$). The second study analyzed 19 patients after revision TEA for infection (3). The time from index

surgery to first revision was 7.3 years (range 0.1 – 24.7), but the exact distribution of patients operated on in the acute, subacute, or chronic periods was not reported. One patient was infected with C. Acnes. The overall infection eradication rate was 53%. Six patients (60%) with retained cement after first revision had persistent infection as compared to 3 patients (33%) with full cement removal (p=.370). Three patients (30%) who had retained cement required allograft during final revision as compared to 6 patients (67%) who had complete cement removal (p=.179), suggesting that attempts at complete cement removal may be detrimental to subsequent bone integrity

There are three studies in the hip arthroplasty literature that specifically address the effect of retained cement during revision for PJI on subsequent infection. One study analyzed 89 consecutive patients and reported a persistent infection rate of 7.9% after single stage revision with retention of cement (4). The procedure described is meticulous, including burring of any cement that was exposed to the joint fluid space. The authors do not define patients by acute, subacute, or chronic, but 42.7% were operated on within the first 6 months from index arthroplasty. Results based on time from index arthroplasty to revision were not reported. Only 2 patients were deemed infected with "proprionobacterium" species, and both of these patients were in the cured cohort. Another study in the hip arthroplasty literature reviewed 15 patients with only 1 suffering persistent or recurrent infection but 2 patients having positive cultures at the time of subsequent surgery (5). Although months from index procedure to revision was reported (50, range 0.75 – 155), results were not differentiated based on acute vs. subacute/chronic presentation. The most common infecting organism was Staph A. and none of the patients were infected with cutibacterium. Contrary to these results, one final study in the hip literature reported on 10 patients who underwent revision with retained cement, with a successful eradication of infection in only 2 (6). Reaming or burring of the remaining cement mantle was not routinely performed. Nine of the 10 patients were diagnosed and treated in the subacute or chronic postoperative period and only one of these was a treatment success.

There are no studies specifically investigating the effect of bone graft removal on eradication of infection.

References:

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