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Authors: Richard Page, Akin Cil, Gokhan Karademir

QUESTION 6: Is there a role for routine exchange of all well-fixed implants in revision shoulder arthroplasty without clinical or radiographic signs of infection?

RECOMMENDATION: Unknown. Even in the setting of possible subsequent unexpected positive cultures, there is sparse literature on the routine exchange of well-fixed implants in revision shoulder arthroplasty.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 96%, Disagree: 0%, Abstain: 4% (Unanimous, Strongest Consensus)

RATIONALE

Periprosthetic shoulder infection is one of the most challenging complications of shoulder arthroplasty [1,2]. The difficulty of diagnosis and treatment is attributed to *Cutibacterium acnes* which is a microorganism with low antigenicity [3]. Unlike knee and hip PJI, laboratory tests may be inadequate for diagnosing indolent infection caused by this agent [2]. The prevalence of *Cutibacterium acnes* has been reported to be as high as 50% of intraoperative cultures obtained at the time of revision surgery for a painful and stiff total shoulder arthroplasty [1]. This determination led to the definition of a new clinical entity: "Unexpected positive intraoperative cultures." Due to the fact that this bacterium is a member of the normal skin flora of the shoulder region, it is unknown whether a positive culture should be interpreted as a contamination or a definitive infection [4,5]. Due to the inadequacy of gram stain and frozen-section, and long incubation time; it is difficult to make a decision regarding implant removal during revision surgery [2]. Moreover, in the case of the well-fixed implants, the explant procedure can be difficult and have associated morbidity [5–7].

There is lack of evidence regarding the role for revision of well-fixed implants in revision shoulder arthroplasty without clinical or radiographic signs of infection [2,8]. In a study by Pottinger et al., [8] it has been reported that implants may need to be removed in patients who have risk factors for positive culture. McGoldrick et al. [9] have suggested single-stage reimplantation in the presence of loose implants. However, the authors have not commented on well-fixed implants. Similarly, Grosso et al. [6] have reported low recurrence with the removal of all components and single-stage reimplantation in the patients with unexpected positive intraoperative cultures. On the other hand, Topolski et al. [10] and Kelly et al. [11] reported high recurrence with the retention of implants. Lutz et al. [12] have evaluated infection with *Cutibacterium acnes* in the patients who underwent osteosynthesis or arthroplasty in the shoulder, knee or hip regions and reported that the absence of sepsis findings could not exclude the infection. The authors emphasized that the removal of the implants was important in the success of the treatment of *Cutibacterium acnes* infection of prosthetic material.

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