SH36: How much is humeral loosening associated with infection? Should concomitant glenoid loosening and humeral loosening be seen as a greater risk factor? Should it still be included in the minor criteria?

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Response: Unknown. Humeral loosening in isolation may be associated with PJI and should be included in the minor criteria; independent of glenoid loosening.

Strength of Recommendation: Limited

Delegate Vote: 46 (85%) agree; 3 (6%) disagree; 5 (9%) abstain

Rationale: A formal comprehensive literature search was performed to address this matter. Scopus and PubMed were searched on September 17, 2024, using the following MeSH terms: (("Shoulder Joint"[Mesh]) AND Infection [Mesh] AND "Prosthesis Failure"[Mesh]) OR (humer* [tiab] AND loose* [tiab] AND infect* [tiab] AND (arthropl* [tiab] OR prosth* [tiab]) NOT elbow [tiab] NOT fractur* [tiab]). A second search was also performed the same day specifically for glenoid loosening, using the following MeSH terms: (humer* [tiab] AND glen* [tiab] AND loose* [tiab] AND infect* [tiab] AND (arthropl* [tiab] OR prosth* [tiab]) NOT elbow [tiab] NOT fractur* [tiab]). A total of 107 and 38 articles were found for the first and second search, respectively. After a first screening, a total of 8 articles were included for a detailed review of the data. Of these, only 4 studies contained information directly related to the question (Sanko 2024, Patel 2021, Lucas 2016, Pottinger 2012).

In the 2018 consensus on diagnostic criteria for periprosthetic shoulder infection, humeral loosening was designated as a minor criterion with a weight of 3 points, whereas glenoid loosening was not mentioned.

Although substantial literature suggests a link between humeral loosening and infection, studies predating the 2018 consensus primarily associate loosening with positive cultures rather than confirmed infections. For example, Pottinger et al. (2012) reviewed 193 revision shoulder arthroplasties without overt clinical evidence of infection, reporting a 56% incidence of unexpected positive intraoperative cultures. They found humeral loosening and osteolysis were associated with three-fold and ten-fold increases, respectively, in the likelihood of positive C. acnes cultures. However, this study included patients revised for diverse reasons (e.g., pain, loosening, or stiffness) and grouped single positive cultures with cases involving multiple cultures, making it challenging to draw conclusions about the loosening-infection relationship. Interesting literature has emerged concerning this relationship after the 2018 consensus. Patel et al. (2021) retrospectively analyzed 87 first-stage revision shoulder arthroplasties and found humeral loosening in 35.6% of cases, 74.2% of which had definite or probable infections (OR 7.2, 95% CI 2.67–19.37, P = .0001). However, while humeral loosening showed high specificity (100%) for infection, its sensitivity was low (45%), making the absence of loosening a stronger indicator of low infection probability than its presence.

Sanko et al. (2024) also investigated humeral loosening and infection, reporting that 52% of intraoperatively observed loosening cases were aseptic. Notably, they found glenoid loosening to be associated with septic humeral loosening, while its absence correlated with aseptic cases. Despite introducing a potential link between glenoid loosening and infection, their small sample size (25 aseptic and 23 septic revisions) limits the generalizability of their findings. Similarly, Lucas et al. (2016) observed associations between loose glenoid components and positive cultures, but the overall rate of culture positivity did not differ significantly between loose and secure components.

Finally, it should be added that most studies included evaluate loosening intraoperatively, with few assessing it radiologically preoperatively (Pottinger et al., 2012; Sanko et al., 2024, focusing only on the glenoid component), limiting its utility in guiding surgical revision for suspected infections.

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