SH4: Is testosterone supplementation associated with increased risk of shoulder PJI?

Liaison: Benjamin Zmistowski
Lead delegate: Christopher Joyce
Supportive delegates: Jacob Kirsch

Response: There may be an association between testosterone supplementation and of shoulder PJI.

Strength of Recommendation: Limited.

Delegate Vote: 50 (100%) agree; 0 disagree; 0 abstain

Rationale: A literature review seeking information on any associations between testosterone supplementation and shoulder prosthetic joint infection (PJI) was performed. A comprehensive search of PubMed and Scopus databases included the terms "shoulder", "prosthetic", "testosterone", and "infection". Inclusion criteria for this review were studies performed in English language, level I to IV evidence studies reporting on association between testosterone supplementation or levels and risk of shoulder PJI. Studies were excluded if they did not have pertinent subject matter, non-English language, nonhuman studies, case reports, review papers, studies with less than 10 patients, and technique papers. These yielded 16 total results, four of which met inclusion criteria and were reviewed[3–6].

Literature review revealed two published studies that demonstrated correlation between testosterone supplementation and shoulder PJI. Both studies are retrospective cohort studies. No randomized controlled trials or other prospective analyses on the subject matter exist, limiting the strength of the recommendation for this study question.

One study performed a database search of male shoulder arthroplasty patients, 3.4% of whom used testosterone supplementation. The testosterone supplementation group was younger; less comorbid; less obese; and had increased prevalence of hypogonadism, depression, diabetes, benign prostate hypertrophy, erectile dysfunction, and decreased libido. The patients with testosterone supplementation within 6 months of surgery had a 3.4% rate of shoulder PJI compared to 2.4% in the non-supplementation group, meeting statistical significance. The infection rate in patients receiving testosterone supplementation greater than 6 months prior to surgery was 2.8%, which did not meet clinical significance in comparison to the non-supplementation group.[6] A second study retrospectively reviewed a cohort of 342 total shoulder revisions and compared the groups based on *C. acnes* infection and all other reasons for revision. The authors found that *C. acnes* infection patients were younger, more likely male, osteoarthritis diagnosis, lower ASA, lower body mass index. Additionally, the *C. acnes* group had a significantly higher likelihood of being on testosterone supplementation (8% vs 2%).[4] Another recent study published as a poster presentation matched patients using testosterone supplementation within one year of shoulder arthroplasty to patients without supplementation. The authors found that supplemental testosterone use was associated with increased reoperation rate at 2 years post-operatively (9.6% vs 4.0%) with an odds ratio of 2.1 with multivariable analysis.[1]

Additional studies have found a significant association between testosterone supplementation and increased skin and wound edge *C. acnes* prevalence. Matsen, et al., evaluated the microbiome of shoulder arthroplasty patients. The authors found that *C. acnes* was the most common bacteria cultured on 72% of unprepared skin and 34% of the wound edge. Additionally, increased dermal *C. acnes* load was associated with testosterone supplementation, males, younger age, lower ASA, and prior shoulder surgery.[3] Schiffman, et al. evaluated 51 shoulder arthroplasty patients with pre-operative sex-hormone laboratory markers. The authors found that *C. acnes* load on the skin and wound edge associated with free serum testosterone and total testosterone levels. Multivariate analysis showed that serum testosterone is an independent predictor of high skin *C. acnes* bacterial load. Furthermore, testosterone supplementation was associated with higher total and free serum testosterone levels and higher burden of *C. acnes*.[5] Of note, a vascular surgery study retrospective comparative cohort study of interest linked exogenous testosterone use to higher risk of venous graft infection. The authors found a significant increased risk of graft infection in hypogonadal men with testosterone supplementation with a Hazard ratio of 1.94 compared to controls.[2]

In summary, there is moderate evidence to support an association between increased skin and wound *C. acnes* load and testosterone supplementation. Additionally, low level, retrospective evidence associating testosterone supplementation and increased risk of shoulder PJI exists. However, only four published retrospective studies provide evidence on the matter, three of which came from a single institution. Without high level evidence, we cannot make a strong conclusion on the association between testosterone supplementation and risk of shoulder PJI.

References:

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