SH18: Does prior corticosteroid injection increase the risk of PJI after primary or revision shoulder arthroplasty?

Liaison: Benjamin Zmistowski
Lead delegate: Álvaro Auñón
Supportive delegates: Mohit Gilotra, Emilio Calvo

Response/Recommendation: Corticosteroid injection within three months of shoulder arthroplasty has been associated with an increased risk of PJI.

Strength of Recommendation: Moderate. At least one high quality study or multiple moderate-quality studies

Delegate Vote: 46 (96%) agree; 0 disagree; 2 (4%) abstain

Rationale: Intra-articular corticosteroid injections are frequently utilized in the conservative course of glenohumeral arthritis, both for diagnostic and therapeutic purposes. In total knee arthroplasty(TKA), preoperative injections that were applied within 3 months increased the risk of prosthetic joint infection(PJI)(1,2). However, it is debated whether prior corticosteroid injection increases the subsequent risk of periprosthetic infection following subsequent shoulder arthroplasty. Several studies have investigated the potential link between preoperative corticosteroid injections and the risk of periprosthetic joint infection (PJI) following shoulder arthroplasty.

Koh et al(3) studied the presence of *Cutinebacterium acnes* in positive deep wound cultures, but found no statistical correlation between prior corticosteroid injections and positive deep *C. acnes* cultures. Rashid et al.(4) conducted a retrospective matched-cohort study of 83 patients aiming to assess whether pre-operative corticosteroid injections had an impact on infective complications. They observed no significant relationship ($p > 0.05$) between preoperative corticosteroid injections and the development of PJI.

Werner et al.(5) reviewed 8420 patients from the national database of Medicare patients, dividing them into three groups based on the timing of injection relative to arthroplasty. Patients who underwent shoulder arthroplasty within three months of a corticosteroid injection exhibited significantly higher infection rates at 3 months (3.0% vs. 1.5%; OR: 2.0, $p=0.007$) and 6 months (4.6% vs. 2.4%; OR: 2.0, $p=0.001$) compared with matched controls. No significant differences were observed for injections performed between 3 and 12 months prior to surgery.

Nezwek et al.(6) analyzed 756 cases and found no association between prior corticosteroid injections and postoperative infection. Instead, prior non-arthroplasty shoulder surgery and rheumatoid arthritis were identified as independent risk factors for PJI.

Lemme et al.(7) included a total of 57,537 patients from the PearlDiver Patient Records Database While preoperative injections were not directly linked to an increased risk of infection, patients who had one or more injections demonstrated a higher risk of revision at 6 months (1 injection: OR: 1.56, $p < 0.0001$; ≥2 injections: OR: 1.39, $p = 0.0203$) and 1 year (1 injection: OR: 1.53, $p < 0.0001$; ≥2 injections: OR: 1.44, $p = 0.0019$).

Stadecker et al.(8) studied 4,252 patients to examine whether the timing of injections influenced revision and PJI rates. They reported that corticosteroid injections administered within three months prior to arthroplasty were associated with higher rates

of revision ($p < 0.001$), with 71.4% of revisions due to PJI, compared with 28.6% secondary to aseptic causes.

Baksh et. al(9) analyzed 25,422 patients undergoing shoulder arthroplasty and identified a significantly increased PJI risk at 1 year (OR: 2.29, $p = 0.007$) and 2 years (OR: 2.03, $p = 0.016$) for injections given within 1 month of surgery. No increased risk was observed when injections were administered more than 4 weeks before surgery (all $p \geq 0.396$).

Recently, three systematic reviews were published analyzing the effect of preoperative corticosteroid injections on the risk of periprosthetic joint infection (PJI) following primary total shoulder arthroplasty. Schoell et al.(10) found a statistically significant association between preoperative corticosteroid injections and an increased risk of PJI (odds ratio [OR]: 1.13, $p < 0.0001$). However, they did not note a statistically significant time-dependent relationship with does of steroid and PJI. Chowdury et al.(11) identified a time-dependent relationship between corticosteroid injections and postoperative infections. They found that administering corticosteroid injections within three months prior to shoulder arthroplasty was associated with a significantly increased risk of PJI (RR 2.30, $p=0.02$). Lucenti et al.(12) concluded that patients who received corticosteroid injections within three months of shoulder arthroplasty exhibited a notably higher incidence of infection compared to those without recent injections. Their study also demonstrated a significantly elevated risk of PJI at 90 days postoperatively for patients who underwent shoulder arthroplasty within one month of a corticosteroid injection.

References

1. Cancienne JM, Werner BC, Luetkemeyer LM, Browne JA. Does Timing of Previous Intra-Articular Steroid Injection Affect the Post-Operative Rate of Infection in Total Knee Arthroplasty? The Journal of Arthroplasty. 2015 Nov;30(11):1879–82.

2. Kim YM, Joo YB, Song JH. Preoperative intra-articular steroid injections within 3 months increase the risk of periprosthetic joint infection in total knee arthroplasty: a systematic review and meta-analysis. J Orthop Surg Res. 2023 Feb 28;18(1):148.

3. Koh CK, Marsh JP, Drinković D, Walker CG, Poon PC. Propionibacterium acnes in primary shoulder arthroplasty: rates of colonization, patient risk factors, and efficacy of perioperative prophylaxis. Journal of Shoulder and Elbow Surgery. 2016 May;25(5):846–52.

4. Rashid A, Kalson N, Jiwa N, Patel A, Irwin A, Corner T. The effects of pre-operative intra-articular glenohumeral corticosteroid injection on infective complications after shoulder arthroplasty. Shoulder & Elbow. 2015 Jul;7(3):154–6.

5. Werner BC, Cancienne JM, Burrus MT, Griffin JW, Gwathmey FW, Brockmeier SF. The timing of elective shoulder surgery after shoulder injection affects postoperative infection risk in Medicare patients. Journal of Shoulder and Elbow Surgery. 2016 Mar;25(3):390–7.

6. Nezwek TA, Dutcher L, Mascarenhas L, Woltemath A, Thirumavalavan J, Lund J, et al. Prior shoulder surgery and rheumatoid arthritis increase early risk of infection after primary reverse total shoulder arthroplasty. JSES International. 2021 Nov;5(6):1062–6.

7. Lemme NJ, Yang D, Lama C, Testa EJ, Dworkin M, Modest JM, et al. The effect of pre-operative shoulder injections on post-operative opioid use, infection and revision following shoulder arthroplasty. Shoulder & Elbow. 2023 Sep;15(1_suppl):87–94.

8. Stadecker M, Gu A, Ramamurti P, Fassihi SC, Wei C, Agarwal AR, et al. Risk of revision based on timing of corticosteroid injection prior to shoulder arthroplasty. The Bone & Joint Journal. 2022 May 1;104-B(5):620–6.

9. Baksh N, Etcheson JI, Liu S, Ikwuazom CP, Chen Z, Dubin JA, et al. Pre-operative corticosteroid injection within 1 month of total shoulder arthroplasty is associated with increased risk of periprosthetic joint infection. Arch Orthop Trauma Surg. 2023 Apr 14;143(9):5609–14.

10. Schoell K, Crabb R, Simpson E, Deshpande V, Gardner V, Quilligan E, et al. Preoperative corticosteroid injections are associated with a higher periprosthetic infection rate following primary total shoulder arthroplasty: a systematic review and meta-analysis. Journal of Shoulder and Elbow Surgery. 2024 Dec;33(12):2734–42.

11. Chowdhury A, Islam S, Ranaboldo T, Shean K, Wilcocks K, Sampalli SR, et al. The safety of corticosteroid injection prior to shoulder arthroplasty: A systematic review. Shoulder & Elbow. 2024 Jun 14;17585732241261659.

12. Lucenti L, Panvini FMC, De Cristo C, Rapisarda D, Sapienza M, Testa G, et al. Do Preoperative Corticosteroid Injections Increase the Risk of Infection after Shoulder Arthroscopy or Shoulder Arthroplasty? A Systematic Review. Healthcare. 2024 Feb 24;12(5):543.