Should hardware be routinely removed during conversion total knee or total hip arthroplasty?

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Response/Recommendation: The literature indicates that there is no significant difference in perioperative complications, specifically periprosthetic joint infections (PJI), between staged and concurrent hardware removal during conversion total joint arthroplasty (TJA). Thus, it appears that concurrent hardware removal can be performed safely during joint arthroplasty, provided that a preoperative infection workup is negative and no contraindications for implantation of prosthesis are present.

Level of Evidence: Moderate

Rationale:
Numerous studies on this topic have been published, ranging from small single-institution retrospective studies to meta-analyses and large population-based evaluations. Large, randomized controlled studies are not available, likely due to their cost-prohibitive size given the relatively low incidence of complication rates [1]. In summary, the majority of publications support the equivalence of staged and concurrent hardware removal in terms of perioperative outcomes, with no significant evidence suggesting the superiority of one approach over the other.

Several key studies have concluded that there is no significant increase in infection risk with concurrent hardware removal [2, 3]. Specifically, analysis of data from multiple studies [2-15] revealed that concurrent hardware removal was associated with either lower or no difference in the odds of complications such as PJI. Our analysis revealed that there is no significant difference concurrent and staged TJA (P = 0.56). PJI after 90 days was 2.77% (CI 95% 1.57%-4.84%) and 3.72% (CI 95% 0.84%-14.91%) in the concurrent and staged groups, respectively. For PJI proportion after the longest follow up, in the concurrent group, the PJI proportion after the longest follow-up was 3.11% (CI 95% 1.83%-5.25%) and in the staged group it was 4.14% (CI 95% 0.86%-17.72%) with no significant statistical difference between the groups (p = 0.6).

The analysis based on joint type showed that PJI proportion for knee joint after 90 days was 2.88% (CI 95% 2.54%-3.25%) and 4.86% (CI 95% 0%-99.93%) for concurrent and staged TJA, respectively. For the hip, the proportion of PJI after 90 days and the longest follow-up was the same. In the concurrent TJA, the PJI rate was 3.01% (CI 95% 0%-99.59%) and in the staged group, it was 2.36% (CI 95% 0.8%-8.96%). However, there was no statistically significant difference between the groups for either knee (p = 0.5) or hip (p = 0.73) joints. Furthermore, after the longest follow-up, the PJI rate in concurrent TJA was 3.52% (CI 95% 2.44%-5.05%) and for staged TJA 5.91% (CI 95% 0%-99.96%) with no statistical difference between subgroups.

Based on the type of hardware used, for PJI after 90 days, the group with only or mostly major hardware showed a proportion of 4.14% (CI 95% 2.9-5.87). After the longest follow-up, the group with only or mostly minor hardware had a PJI proportion of 2.5% (CI 95% 0-98.48). On the other hand, the subgroup with only or mostly major hardware had a 5.71% (CI 95% 4.23-7.66). The test for subgroup analysis did not show a significant difference ($\chi^2 = 1.92$, df = 1, p = 0.17).

It must be noted that the mechanism of action by which these benefits are exerted, although speculative, may be linked to effective infection workup and surgical techniques that minimize risk. Modern surgical techniques and rigorous preoperative evaluations can achieve these outcomes, ensuring safe and effective concurrent hardware removal during TJA.

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