

HK64: Should Collateral Ligaments Be Removed During One-Stage Exchange Arthroplasty for Periprosthetic Joint Infection (PJI) of the Knee?

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Response/Recommendation:

Collateral ligaments should generally be preserved during one-stage exchange arthroplasty for Periprosthetic joint infection (PJI). Removal should only be considered when ligaments are irreparably damaged or extensively involved in infection. Evidence indicates that single-stage revisions using hinged implants versus unhinged implants achieve comparable success rates in infection control and functional outcomes.

Level of Evidence: Limited

Delegate Vote:

Rationale:

Periprosthetic joint infection (PJI) following total knee arthroplasty (TKA) is a challenging complication with significant morbidity. One-stage and two-stage exchange arthroplasty are the two most commonly accepted management protocols for PJI, with one-stage exchange gaining momentum due to the comparable infection control rates and improved functional outcomes. [1] Unfortunately, regardless of the treatment protocol, the failure rate for revision due to PJI remains high. [1–3] Sacrificing the collateral ligaments to perform a complete and radical soft-tissue resection is advocated by some in a single-stage exchange. However, this approach carries potential disadvantages and must be carefully weighed against its risk.

In a study by Ohlmeier et al. [4], the authors investigated the outcomes of various implant designs used in single-stage revision for PJI. The study analyzed 161 patients divided into groups based on the type of implant revision: bicondylar TKA to rotating-hinge implant, rotating-hinge to rotating-hinge implant, rotating-hinge to full-hinge implant, and full-hinge to full-hinge implant. At a mean follow-up of six years, the overall revision rate was 23%, with 9% of patients experiencing a recurrent PJI. While group-specific revision rates ranged from 16% to 29%, the authors found no statistically significant differences in survival rates or functional outcomes among the groups ($p = 0.902$). Despite the relatively small sample sizes in each group, the study concluded that constrained and non-constrained implants had comparable survivorship and infection control outcomes, supporting the flexibility of implant choice based on patient-specific factors.

Collateral ligaments are essential for maintaining the mechanical stability and natural biomechanics of the knee. Sacrificing these ligaments to perform a complete and radical soft-tissue resection is a measure that should only be reserved for cases where the ligaments are significantly affected or impaired by infection or structural damage. Hinged constrained implants, often required when collateral ligaments are sacrificed, are less bone-preserving, which

can make potential future revisions more challenging for surgeons and more morbid for patients. The increased bone loss and technical complexity associated with such implants underscore the importance of preserving collateral ligaments whenever possible. Furthermore, highly constrained implants, while providing stability in the absence of ligaments, can introduce increased stress at the bone-implant interface. This stress significantly raises the risk of aseptic loosening and implant failure, compromising the long-term success of the revision procedure. By maintaining the collateral ligaments, surgeons can achieve a more natural knee kinematics, enhance patient satisfaction, and reduce the risk of long-term complications.[5,6]

In cases where collateral ligaments are directly involved in infection or are significantly damaged, their removal may be unavoidable to ensure adequate infection control and joint stabilization. Such scenarios necessitate careful planning for implant selection and reconstruction to restore functionality and stability. Studies have shown that the use of constrained implants, such as rotating-hinge or full-hinge designs, is often required in these cases. [5,7,8]

Preserving tissue while performing thorough debridement is a delicate matter and can be a double-edged sword. While retaining native structures like collateral ligaments is crucial, inadequate debridement risks incomplete infection control, jeopardizing the success of the revision. Striking the right balance is critical for achieving optimal outcomes in one-stage revisions for periprosthetic joint infections (PJI). Systematic and meticulous debridement protocols emphasize the importance of preserving native tissue, including ligaments, whenever feasible, as this approach improves functional recovery and stability. Ligament retention reduces dependence on constrained implants, which are associated with increased stress on the bone-implant interface and are less bone preserving.[9–11] However, ligament preservation should not compromise infection control, as thorough debridement remains paramount to long-term success.[5,9,12] The evidence collectively supports the conclusion that preserving collateral ligaments during one-stage revisions can optimize functional outcomes and long-term implant performance, provided that infection control is not compromised.[5,6,13,14]

In conclusion, collateral ligament preservation during one-stage exchange arthroplasty for knee PJI is recommended whenever possible. Retaining these ligaments helps maintain the natural biomechanics of the knee, reduces the reliance on constrained implants, and preserves bone stock, which is critical for the long-term success of the reconstruction. Exceptions to this recommendation should be limited to cases where the collateral ligaments are irreparably damaged or directly involved in the infection, necessitating their removal to achieve adequate infection control. In such cases, careful preoperative planning and intraoperative decision-making are essential to ensure stability and functionality through alternative reconstruction techniques. By prioritizing ligament preservation, this approach effectively balances the goals of eradicating infection, restoring function, and minimizing both surgical morbidity and the complexity of potential future revisions.

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