Treatment

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QUESTION 1: Is there a role for irrigation and debridement with implant retention when treating acute elbow periprosthetic joint infection (PJI)? Should modular implant parts be exchanged?

RECOMMENDATION: Surgical debridement, antibiotic and implant retention (DAIR) is a viable option for management of acute elbow PJI. Modular implant exchange should be considered.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 100%, Disagree: 0%, Abstain: 0% (Unanimous, Strongest Consensus)

RATIONALE

Total elbow arthroplasty (TEA) has historically been associated with a high risk of PJI. In 1983, Morrey et al. described this association and recommended the use of antibiotic-impregnated cement to reduce the risk of PJI after primary TEA [1]. Although infection rates have improved since then, PJI remains a potentially catastrophic complication of TEA. TEA implant revision is technically challenging, particularly given the relative lack of progress that has been made in TEA implant revision systems over the past 30 years. No comparative study exists to discern the superiority of DAIR versus explantation. Both strategies have been described, with varying degrees of success for both options [1–6].

Of the studies available for review, treatment recommendations varied. Given the variation in patient age and general health, bacteriology, mechanical circumstances, soft-tissue coverage and the retrospective nature of the study designs, it is difficult to make definitive recommendations about the indications for irrigation and debridement with retention of components. Alternative options include removal and reimplantation of new components in a single-stage or two-stage exchange with interval antibiotic cement spacer and resection arthroplasty.

Although no studies exist comparing DAIR with more invasive options, some patients do respond well to isolated irrigation and debridement [5]. There is extensive data to support the role of DAIR in the hip and knee arthroplasty literature. Because TEA systems rely on cement mantle fixation, explantation of well-fixed components leads to significant bone loss and morbidity.

Thus, DAIR may be offered to patients with infection of TEA in the presence of well-fixed components. The following general rules may need to be obeyed in performing DAIR in these patients.

1. If the components are well-fixed, removal of these implants will cause damage to the humerus and ulna, making the revision more challenging. Therefore, all attempts should be made to retain these using repeated irrigation and debridement, oral antibiotic suppression and soft-tissue coverage, even if that includes free tissue transfer.
2. If one component is found to be loose during DAIR, then the well-fixed component may be left in place while exchanging the other component.
3. In the presence of both components being loose, both components (and as much of the cement as possible) should be removed. An antibiotic-impregnated cement may be inserted with intravenous antibiotic treatment. The culture results would then dictate the length, dose and the type of antibiotic therapy needed.

Because resection arthroplasty leads to poor patient-reported outcome scores [6], we recommend that this option be reserved as a final "salvage" option after all other methods have failed or when the patient is not medically stable for two-stage exchange. Given the technical ease and low morbidity, we recommend that any modular components be removed and replaced in every case.

It is important to note that the method by which DAIR is performed influences the outcome of this surgical procedure. It is strongly recommended that clear margins for debridement of infected tissues are obtained, the modular components are taken out, the infected joint is irrigated copiously with antiseptic agents such as dilute betadine and the new modular parts are inserted after new drapes are used.

REFERENCES

[1] Morrey BF, Bryan R. Infection after Total Elbow Arthroplasty. J Bone Joint Surg Am. 1983;4295:330–338.

[2] Achermann Y, Vogt M, Spormann C, Kolling C, Remschmidt C, Wüst J, et al. Characteristics and outcome of 27 elbow periprosthetic joint infections: results from a 14-year cohort study of 358 elbow prostheses. Clin Microbiol Infect. 2011;17:432–438. doi:10.1111/j.1469-0691.2010.03243.x.

[3] Peach CA, Nicoletti S, Lawrence TM, Stanley D. Two-stage revision for the treatment of the infected total elbow arthroplasty. Bone Joint J. 2013;95 B:1681–1686. doi:10.1302/0301-620X.95B12.31336.

[4] Spormann C, Achermann Y, Simmen BR, Schwyzer HK, Vogt M, Goldhahn J, et al. Treatment strategies for periprosthetic infections after primary elbow arthroplasty. J Shoulder Elbow Surg. 2012;21:992–1000. doi:10.1016/j.jse.2011.10.007.

[5] Streubel PN, Simone JP, Morrey BF, Sanchez-Sotelo J, Morrey ME. Infection in total elbow arthroplasty with stable components: outcomes of a staged surgical protocol with retention of the components. Bone Joint J. 2016;98-B:976–983. doi:10.1302/0301-620X.98B7.36397.

[6] Yamaguchi K, Adams R a, Morrey BF. Infection after total elbow arthroplasty. J Bone Joint Surg Am. 1998;80:481–491.