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CORR Insights®: No Difference between Trabecular Metal Cones and Femoral Head Allograft in Revision TKA: Minimum 5-year Followup

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Where Are We Now?

A substantial increase in the volume of primary TKA in conjunction with increases in patient lifespan has resulted in an increased need for revision TKA. An analysis of revision TKA volume in Medicare beneficiaries showed revision

volume increased 105.9% from 1991 to 2010 [2]. There is some degree of bone loss associated with each revision procedure because of initial bone resection at the time of primary TKA, osteolysis from wear debris or other causes, and bone loss associated with component removal.

Minor bone defects (Anderson Orthopaedic Research Institute [AORI] Types 1 and 2 [4]) are usually managed simply with cancellous cavity bone grafting, bone cement with or without screws, or peripheral metal augments. Larger defects (AORI Types 2B and 3 [2]) make it more difficult to achieve durable implant fixation because of the loss of bone support. Historically, structural allografts have been used to reconstruct these defects, with 91%

demonstrating satisfactory function in a report of 46 subjects at a mean followup duration of 97 months [5], although problems with nonunion, late graft collapse, and the potential for disease transmission have been identified [1]. These problems have resulted in the development of metaphyseal sleeves and trabecular metal cones to enhance long-term fixation [3, 6, 7]. Short-term results with these devices have been favorable but have analyzed only a single method of defect management rather than comparative studies of multiple techniques. The current report is the first to compare different techniques (structural allograft versus trabecular metal cones). The authors observed no differences in pain relief, function, or repeat revision TKA rates between patients treated with the two approaches.

This CORR Insights® is a commentary on the article “No Difference between Trabecular Metal Cones and Femoral Head Allograft in Revision TKA: Minimum 5-year Followup” by Sandiford and colleagues available at: DOI: 10.1007/s11999-016-4898-9.

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Where Do We Need To Go?

Numerous questions remain regarding management of large bone defects in

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revision TKA. Will the findings of this small study, which includes a combined total of only 45 patients (30 femoral had allografts versus 15 trabecular metal cones), be confirmed in larger and more diverse revision TKA populations? Will the clinical results remain similar with longer followup duration since some reports of use of structural allografts have demonstrated failure due to graft resorption at followup intervals longer than 10 years? Should a revision TKA utilizing either of these techniques fail, what are the results of a repeat revision procedure? Does one technique result in a simpler or more complex re-revision procedure? For example, will use of a structural allograft provide restored bone stock for future revisions? Should infection occur, does an incorporated structural allograft or trabecular metal cone require total removal? How difficult is removal of a well-fixed trabecular metal cone and what are the technical tips for safe removal? Does removal of a well-fixed trabecular metal cone result in a substantial amount of retained third-body metallic debris particulate that may accelerate polyethylene wear in repeat revision procedures?

Allografts can be sterilized using multiple methods; to what degree are there clinically important tradeoffs among these approaches? Will irradiation of frozen grafts to reduce disease transmission result in unacceptable

reductions in mechanical strength compared to fresh-frozen allografts? Lastly, is use of modular stem extensions necessary for all revision TKA operations utilizing one or both of the techniques studied in the current evaluation? If so, how long should the stems be? Are short cemented stem extensions adequate or will longer stem extensions engaging diaphyseal bone prove more durable?

How Do We Get There?

Randomized comparative analyses of the two techniques with followup duration of a minimum of 10 years are necessary. While difficult to accomplish, a multicenter effort would likely be required to create a case volume adequate to draw firm conclusions. In such a study, it would be beneficial to include a third technique of using porous coated metaphyseal sleeves [3] as these are commonly used for Types 2B and 3 [2] bone defects.

All Type 2B and 3 bone defects [4] are not the same. Some have more loss of cortical rim support than others. The amount of bone loss using the AORI bone defect classification [4] is variable. A more-critical evaluation of defect size and shape is necessary to better discern whether structural bone allografts or trabecular metal cones are superior in the management of specific

bone defect geometries. Of course, bone defects also occur on the femur; are results different when dealing with femoral versus tibial defects? For example, Type 3 femoral defects have the potential for loss of collateral ligament support; does this influence which approach might be better?

These questions and others call for larger, longer-term, randomized and likely multicenter studies. To accomplish this, economic support from national organizations such as the Knee Society and the American Association of Hip and Knee Surgeons would be helpful as their memberships contain leaders in TKA with competent databases necessary to provide the required meaningful data.

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