

Evaluation of the Tissue Response to a Knee Hemiarthroplasty

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Statement of Purpose:

One form of unicompartmental arthroplasty for the treatment of osteoarthritis of the medial compartment of the knee utilizes an intra-articular metallic spacer. This implant functions to correct malalignment in young, active patients. Previous versions of this implant, namely the MacIntosh and McKeevee implants, had satisfactory short-to-midterm results, but their usage subsided with improvements in the results for total knee arthroplasty. Recently, a new version of the intra-articular spacer, the UniSpacer Knee System (Centerpulse) was introduced which conforms to the articular surface of the distal femur, does not require mechanical fixation, and is available in several sizes (1).

As there is no fixation to bony interfaces, the UniSpacer implant is a self-centering implant. The concave proximal surface articulates with the convex articular cartilage of the medial compartment of the distal femur. The flat distal surface of the implant articulates with the tibial plateau; the medial meniscus is resected back to a stable rim.

Previous experiences with hip arthroplasties have indicated that articulation of metal against articular cartilage can adversely affect the articular cartilage. The aim of this study was to evaluate the effect of an intra-articular metallic spacer on the articulating cartilage and underlying bone in patients that have undergone unicompartmental arthroplasty with the UniSpacer Knee System.

Methods:

Tissues from the articulating surfaces from 3 cases were submitted to our laboratory for analysis. These were obtained from patients that were undergoing explantation of their implants within one year of their original surgery for reasons other than infection. The specimens were cut sagittally so as to include both the articulating cartilage and the subchondral bone. All specimens were fixed in 10% buffered formalin. Tissue samples were processed using both routine decalcified and undecalcified techniques. Samples were decalcified slowly using EDTA, processed and embedded in paraffin. 5 μ sections were stained with hematoxylin-eosin. Additional specimens remained undecalcified and were processed for embedding in polymethylmethacrylate. They were cut and ground using the EXAKT System. Slides were surface stained with Stevenel's Blue. Microscope slides were reviewed with special reference to evidence of foreign-body reaction and debris particles.

Results / Discussion:

The histopathology for each of the specimens was consistent with a diagnosis of osteoarthritis, although

specific features varied from specimen to specimen. These features included disruption of the articular surface (all), cell loss (2), focal areas of clusters of chondrocytes (2), fissuring extending to subchondral bone (1), disorientation of cells (1), pannus overgrowth (1), and trabecular thickening underlying areas of cartilage erosion. Based upon these samples, it is not possible to determine if there was accelerated wear of the cartilage.

There was no evidence of foreign body reaction or bony erosion. No granulomas were detected.

Conclusions:

The UniSpacer Knee System is an implant that can be used for the treatment of osteoarthritis of the medial compartment of the knee with no resection of the articulating tissues. Concern has been raised as to whether the implant adversely affects the tissues articulating against it. While our study indicates that osteoarthritis is present, there is no evidence to support that a foreign body reaction has been elicited. Further research is needed to evaluate the potential biochemical and immune responses.

References:

- (1) Hallock RH and Fell BM: Clin Orthop 416: 154-163, 2003.
- (2) Kofoed And Kofod J Injury 14: 531-540, 1983.