Control-Matched Evaluation of Patellar Crepitus in Total Knee Arthroplasty
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Introduction
Patellar crepitus is reported in up to 13% of posterior cruciate-substituting (PS) total knee arthroplasty (TKA) patients. The symptoms of patellar crepitus are secondary to posterior peripatellar fibrous hyperplasia at the junction of the superior pole of the patella and the quadriceps tendon. This synovial hyperplasia becomes entrapped within the intercondylar box of the PS femoral component and cause painless or painful crepitation or clunk. Numerous etiologies for patellar crepitus have been proposed including component design and implantation position, degree of postoperative knee flexion, presence of patellar baja, and patellar thickness. The purpose of this report was to perform a control-matched study comparing patients with symptomatic patellar crepitus or clunk requiring surgical intervention to patients without crepitus with a single implant design to determine the clinical, radiographic, or surgical variables that may result in painful symptomatic patellar crepitus.

Methods
The surgical databases of two institutions were reviewed to find all patients who underwent knee arthroscopy or arthrotomy between 2002 and 2008 to treat symptomatic patellar crepitus. During this time period, greater than 4,000 TKA’s were performed at the two institutions. Chart review identified 60 patients implanted with the same implant system (PFC Sigma PS; Depuy, Inc) that underwent arthroscopy or arthrotomy for a diagnosis of patellar crepitus or clunk. A control group with a well functioning TKA with the same implant system without patellar crepitus that was matched for age, sex, and BMI was identified and statistical comparison of the two groups was performed. Information collected from the matched groups included patient demographics, history of previous knee surgeries, preoperative and postoperative range of motion, and time to presentation of symptoms. Surgical data collected were tibial, femoral, and patellar component size, patellar button shape, thickness of polyethylene bearing, and the need for lateral release. Radiographic data evaluated were preoperative and postoperative alignment, modified Insall-Salvati ratio, modified tendon length/patellar height, patellar thickness, posterior femoral condylar offset, posterior tibial tray offset, postoperative patellar tilt, posterior tibial slope, and flexion or extension of the femoral component.

Results
The mean time to presentation of patellar crepitus in the 60 subjects was 10.9 months. The incidence of patellar crepitus correlated with greater number of previous surgeries (1.18 vs. 0.42, p= 0.002), decreased patellar button size (35.6 vs. 37.1mm, p=0.002), shorter patellar tendon length (54.5 vs. 58.0mm, p=0.009), and increase in posterior femoral condylar offset (1.27mm vs. 0.18mm, p=0.023). Using a patellar component of 32 or 35mm significantly increased the risk of PC compared to the use of a 38 or 41mm component (p<0.01, RR=1.65, OR 2.78). Mathematical modeling results demonstrated decreased patellar tendon length created increased tendofemoral contact near the intercondylar box, while larger buttons decreased contact.

Conclusion
Shortened patellar tendon length and use of smaller patellar components may expose the quadriceps tendon to increased irritation as it traverses across the femoral component IB. Increasing posterior femoral offset may increase quadriceps tendon tension, further risking synovial tissue impingement within the intercondylar box of the femoral component.