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Patellofemoral arthroplasty conversion to total knee arthroplasty: Retrieval analysis and clinical correlation

Alexander B. Christ ^{*}, Elexis Baral, Chelsea Koch, Beth E. Shubin Stein, Alejandro Gonzalez Della Valle, Sabrina M. Strickland

Hospital for Special Surgery, 535 East 70th Street, New York, NY 10021, United States

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ABSTRACT

Background: Patellofemoral arthroplasty (PFA) can be a successful, bone-sparing treatment for isolated patellofemoral arthritis. However, progression of tibio-femoral arthritis or incorrect indications may predispose patients to early conversion to total knee arthroplasty (TKA). The purpose of this study was to review the clinical cases and perform retrieval analysis of PFA conversions to TKA at our institution.

Methods: Twenty one patellofemoral arthroplasties in 18 patients that were converted to TKA were identified through our implant retrieval registry. Sixteen implants were available for review by biomechanical engineers, who recorded surface markings, wear patterns, and integrity of fixation. Patient charts were reviewed and time to conversion, tourniquet time, conversion implant, additional surgeries, infections, and Kellgren & Lawrence grade of the tibio-femoral joint on pre-operative radiographs were recorded.

Results: PFAs converted to TKAs at our institution were implanted for an average of 2.7 years. The most common reason for conversion was pain, but most patients had significant tibio-femoral arthritis, as indicated by an average Kellgren & Lawrence grade of 2.6. The average tourniquet time for these conversions was 67 min. These patients underwent an average of one additional surgery per PFA converted, and the infection rate of these conversions was approximately 14%.

Conclusion: Success of PFA depends upon correct patient selection rather than implant failure or wear. Conversion of PFA to TKA is technically similar to primary TKA, with similar post-operative pain relief and range of motion. However, infection rates and complications requiring further surgery are more consistent with results seen in revision TKA.

Level of evidence: IV

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1. Introduction

Patellofemoral arthroplasty is a surgical option for patients with symptomatic patellofemoral arthritis who have failed conservative management. Proponents of PFA believe it to be a less invasive, bone-conserving option for patients with isolated anterior

^{*} Corresponding author.

E-mail addresses: christa@hss.edu (A.B. Christ), barale@hss.edu (E. Baral), kochc@hss.edu (C. Koch), shubinstein@hss.edu (B.E. Shubin Stein), gonzaleza@hss.edu (A. Gonzalez Della Valle), stricklands@hss.edu (S.M. Strickland).

compartment arthritis, when compared to TKA. It preserves the native tibio-femoral articulation, allows for kinematics that closely resemble the native knee, and may allow shorter postoperative rehabilitation times [1].

PFAs are also viewed by many as a bridging procedure that can delay TKA in younger patients. Although PFAs have demonstrated lower survivorship than primary TKA, they have generally been performed on a younger patient demographic, and the most common reason for conversion is progression of tibio-femoral arthritis [2]. Several small studies suggest that conversion of PFA to TKA is a technically straight-forward operation and that patient outcomes are more similar to primary TKA than revision TKA [3–5]. Also, many modern designs utilize patellar buttons which are compatible with TKAs, simplifying the conversion procedure.

Despite these advantages, PFA has remained controversial because of mixed results in the literature [2]. PFA requires strict indications and careful patient selection, and mechanical issues due to implant malposition or design have been leading causes of early failure [2,6]. Although several reports describe the appearance of PFA implants at the time of revision or conversion to TKA [5,7], to our knowledge there are no reports analyzing retrieved PFAs in the literature. Our report correlates clinical cases and retrieval analysis of PFAs converted to TKAs at a single institution.

2. Materials and methods

2.1. Retrieved implants

Twenty one patellofemoral arthroplasties in 18 patients that were converted to TKA at our institution were identified through our implant retrieval registry. Sixteen implants were available for review by biomechanical engineers, who recorded surface markings, wear patterns, and integrity of fixation after visual inspection under low-power magnification. Surface scratching was graded as mild, moderate, or severe. Wear patterns were reported in a descriptive manner, including the location, type of wear, and suspected source. Whether cement or bone was present on the back of the patellofemoral component was noted as well.

2.2. Patient review

Patient charts were retrospectively reviewed and general patient demographics were recorded. Initial surgeon, conversion surgeon, length of implantation, reason for conversion, tourniquet time, PFA implant, and conversion implant were recorded. Whether the patella was resurfaced was recorded as well. Initial PFA surgeon impression and operative note were reviewed when available. If the initial operative note or date was not available, the procedure date was designated as the first day of the known month or year that the PFA was implanted. Radiographs prior to conversion were examined and tibio-femoral arthritis was graded based on the Kellgren & Lawrence scale. Patient post-operative clinic notes were obtained and additional surgeries, infections, complications, and range-of-motion and pain scores at final follow-up were recorded.

3. Results

3.1. Demographic information

At our institution, 21 PFAs were converted to TKAs from 2001 to 2011. Half were originally implanted at our institution, and half came from outside hospitals. Conversion procedures were performed by 14 different surgeons. Our cohort was 66% female, with an average age of 50.3 years (range 31.7 to 82.3) at the time of PFA implantation and 52.9 years at the date of conversion. PFAs revised at our institution were implanted for an average of 2.7 years (range 0.2 to 13.3). Average BMI at the time of conversion was 29.9 (range 19.8 to 36.9). Of the 21 PFA implants, 19 were second-generation or anterior cut-type prostheses. The initial diagnosis prior to PFA was osteoarthritis in 16/21 patients, post-traumatic in 4/21 patients, and rheumatoid arthritis in one patient. The most common reason for conversion was persistent pain, which was responsible for 48% of conversions. One third (7/21) of conversions were performed for mechanical symptoms, such as patellar clunk or dislocation. Approximately 14% of patients were converted for progression of tibio-femoral arthritis, defined as new symptoms after a pain-free period following their PFA procedure. Significant tibio-femoral arthritis was present at the time of conversion, as indicated by an average Kellgren & Lawrence grade of 2.6.

3.2. Conversion implants

Conversion TKA implants were all posterior stabilized, likely reflecting the bias of our institution. Two TKAs required a poly with a highly constrained post. Two TKAs required additional components: one used a short femoral stem, and one used a five-millimeter distal femoral augment. The patella was revised in 9/21 conversions. Average tourniquet time was 67 min (range 31 to 121).

3.3. Retrieval analysis

Of the 16 PFAs retrieved that were available for review, 10 had minor scratching, four had moderate scratching, and none had severe scratching. Two implants had severe patellar wear, both of which were in the same patient who had bilateral valgus

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