

Custom Patellofemoral Arthroplasty of the Knee: An Eleven Year Follow-Up

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INTRODUCTION

While interest in patellofemoral arthroplasty (PFA) for isolated, end-stage patellofemoral arthritis has grown substantially in recent years, its published clinical results have shown varying degrees of success due primarily to shortcomings in the designs of so-called “off-the-shelf” prostheses [2-4,8]. Custom PFA, in which the trochlear prosthesis is custom-made to fit the individual patient’s patellofemoral groove, was developed to address these limitations [6,8].

Our initial experience with custom PFA was published in 2006 and reported 100% survivorship with excellent or good Knee Society scores in all knees at a mean duration of follow-up of 6 years (range, 2.7 to 9.9 years) [6]. The study was a retrospective review of a consecutive series of custom PFAs performed by a single surgeon at a single institution between March 1995 and August 2002. There were 25 PFAs performed in 22 patients (three staged bilaterals), 16 of whom were female. Mean age at the time of index arthroplasty was 45 years (range, 23 to 51 years). The surgical technique and design methodology of the custom trochlear prosthesis have been previously described in detail [5,7,8].

The objective of the present study was to evaluate the longer-term success of custom PFA in the original patient cohort.

METHODS

The original cohort of patients was selected to undergo PFA with a customized trochlear prosthesis based upon the presence of isolated, end-stage, patellofemoral arthritis in their affected knee. The radiographic evaluation scale described by Ahlback [1] was used to evaluate the severity of the disease in each knee compartment on the basis of sclerosis, joint-space narrowing, subluxation, and the presence of osteophytes. Only patients whose medial and lateral compartments scored less than or equal to 1 point on the Ahlback scale were indicated for PFA. The patellofemoral compartments for all knees scored at least 4 points. The mean preoperative Knee Society functional score was 49 points, and the mean preoperative Knee Society objective score was 52 points. At a mean duration of follow-up of 6 years, the mean Knee Society functional score was 89 points, and the mean Knee Society objective score was 91 points, and no patient had required additional surgery or had component loosening.

For assessment of longer-term follow-up, a validated questionnaire [9] was adapted and administered to each patient via telephone. The questions were designed to assess the status of each patient’s custom PFA(s) as well as their degree of knee function.

RESULTS

The questionnaire was completed for all 25 knees (Table 1). No knees from the original study were lost to follow-up. At a mean duration of 11.3 years (range, 7.8 to 14.9 years) from the time of the index arthroplasty, all 25 PFAs were still in place (Figure 1) and all patients reported themselves as being very satisfied with the arthroplasty. There were no reports of weakness, instability, or additional surgery. Two patients reported that their PFA prevented them from participating in sports activities. All knees experienced some pain, but no patients took medication because of their knee pain. All 22 patients reported that they would undergo custom PFA again.

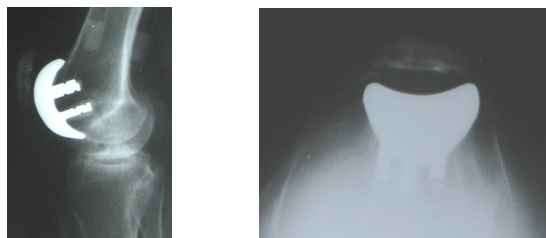


Figure 1. Post-operative radiographs at 132 months (11 years) demonstrating proper prosthesis position without evidence of loosening, and minimal disease progression in the tibiofemoral compartments (the Ahlback scores at 11 years are 1 point for the medial tibiofemoral compartment and 0.5 points for the lateral tibiofemoral compartment). This female patient was 37 years old at the time of index arthroplasty.

DISCUSSION

This 11 year follow-up study demonstrates that custom patellofemoral arthroplasty is a safe and effective treatment for patients with isolated patellofemoral arthritis of the knee. These results compare favorably with those involving so-called “off-the-shelf” patellofemoral arthroplasties that have been reported on over the past 30 years [2-4,8].

We believe the major factors that contribute to the success of custom patellofemoral arthroplasty are as follows: (a) a strict inclusion criteria based on preoperative radiographic evaluation; (b) a meticulous attention to soft-tissue balance and patellofemoral tracking at the time of arthroplasty; and (c) a patient-specific design and manufacturing methodology that ensures accurate and precise anatomic fit while simultaneously providing proper patellofemoral alignment and medial-lateral constraint.

Question	Answer
Has your custom PFA been replaced?	No: 25 out of 25 Yes: 0
Does your PFA keep you from doing anything that you would like to do?	No: 23 out of 25 Yes: 2 out of 25
How satisfied are you with your PFA?	Very Dissatisfied: 0 out of 25 Somewhat Satisfied: 0 out of 25 Very Satisfied: 25 out of 25
Have you had additional surgery on this knee since your PFA?	No: 25 out of 25 Yes: 0
How often do you take pain medication because of pain in this knee?	Never: 25 out of 25 Sometimes (1-2x per week): 0 Often (>1 per day): 0
If you have pain, where is the pain coming from?	Inside of Knee: 3 out of 25 Kneecap area: 21 out of 25 Outside of Knee: 1 out of 25
Does this knee feel weak or unstable?	No: 25 out of 25 Yes: 0
Would you undergo PFA with this custom implant again?	No: 0 Yes: 25 out of 25

Table 1. The original cohort included 25 PFAs in 22 patients. Each patient from the original cohort answered via telephone these questions, which were selected and adapted from the validated “Total Knee Function Questionnaire” [9]. All patients were successfully contacted and no knees were lost. Average time from index PFA to completion of the questionnaire was 11.3 years (range, 7.8 to 14.9 years).

REFERENCES

- [1] Ahlback (1968) Osteoarthritis of the knee. A radiographic investigation. *Acta Radiol Diagn (Stockh)* Suppl 277:7-72.
- [2] Leadbetter, Ragland, Mont (2005) The appropriate use of patellofemoral arthroplasty: an analysis of reported indications, contraindications, and failures. *Clin Orthop Rel Res* 436:91-99.
- [3] Leadbetter, Seyler, Ragland, Mont (2006) Indications, contraindications, and pitfalls of patellofemoral arthroplasty. *J Bone Jt Surg* 88-A (Suppl 4):122-137.
- [4] Lonner (2007) Patellofemoral arthroplasty. *J Am Acad Orthop Surgeons* 15:495-506.
- [5] Sisto, Henry, and Sarin (2010) Patient-Specific Patellofemoral Arthroplasty. *Techniques in Knee Surgery*. In Press.
- [6] Sisto and Sarin (2006) Custom patellofemoral arthroplasty of the knee. *J Bone Jt Surg* 88-A:1475-1480.
- [7] Sisto and Sarin (2007) Custom patellofemoral arthroplasty of the knee. Surgical Technique. *J Bone Jt Surg* 89-A (Suppl 2):214-225.
- [8] Sisto and Sarin (2008) Patellofemoral Arthroplasty with a Customized Trochlear Prosthesis. *Ortho Clinics North America* 39:355-362.
- [9] Weiss, Noble, Condit, Kohl, Roberts, Cook, Gordon, and Mathis (2002) What functional activities are important to patients with knee replacements? *Clin Orthop Rel Res* 404:172-188.