Simultaneous Unicompartmental Knee Arthroplasty and Lateral Patellar Facetectomy for Bicompartmental Degenerative Disease

Robert A Magnussen MD, Evrard Gancel MD, Elivre Servien MD PhD, Matthias Jacobi MD, Guillaume Demey MD, Philippe Neyret MD, Sébastien Lustig MD PhD

ABSTRACT

Introduction: Unicompartmental knee arthroplasty (UKA) is a treatment option in patients with unicompartmental degenerative disease. Compared to total knee arthroplasty (TKA), the advantages of UKA include accelerated recovery and cruciate ligament retention. These advantages, along with emerging evidence that mild patellofemoral joint osteoarthritis does not compromise results of UKA, have encouraged expansion of the indications for UKA. Symptomatic lateral patellofemoral joint degenerative disease is a common cause of UKA revision. Partial lateral patellar facetectomy can provide relief from symptoms of lateral patellofemoral degenerative disease. We hypothesize that simultaneous UKA and lateral patellar facetectomy provides durable pain relief and functional improvement in a patient population with degenerative disease of one tibiofemoral compartment and the lateral patellofemoral joint.

Materials and methods: Between 2004 and 2008, 11 lateral UKA’s were performed in association with partial lateral patellar facetectomy in 11 female patients (mean age: 66.7 years) with degenerative changes in one tibiofemoral compartment and the lateral patellofemoral joint. Patients were followed clinically and radiographically for a mean of 5 years.

Results: No patient underwent revision surgery in the follow-up period. The mean International Knee Society (IKS) knee score improved from 64.9 ± 11.2 points preoperatively to 87.5 ± 12.6 points at final follow-up (p = 0.01). The mean IKS functional score improved from 65.9 ± 23.5 points preoperatively to 83.2 ± 23.3 points at final follow-up (p = 0.012). The mean Kujala score was 84.3 ± 13.5 points postoperatively. Progression of patellofemoral OA was observed in one patient.

Conclusion: Simultaneous UKA and partial lateral patellar facetectomy is a viable treatment option for symptomatic degenerative disease involving one tibiofemoral compartment and the lateral patellofemoral joint. This treatment approach may be a useful alternative to TKA or bicompartmental arthroplasty in a carefully selected patient population.

Level of evidence: Case series—Level IV.

Keywords: Bicompartmental osteoarthritis, Unicompartmental knee arthroplasty, Lateral patellar facetectomy.

INTRODUCTION

Osteoarthritis isolated to one compartment of the knee is relatively common. Unicompartmental knee arthroplasty (UKA) is a viable treatment option in these patients, providing durable pain relief and functional improvement.1-5 Potential advantages of UKA over total knee arthroplasty (TKA) include less pain, more rapid functional recovery, and the retention of both cruciate ligaments leading to more normal gait patterns.6-9

Because of the advantages noted above, it is desirable to extend the indications of UKA to include patients with disease affecting the patellofemoral joint. Classically, patellofemoral joint osteoarthitis was considered a contraindication to UKA10,11 however, several recent studies have demonstrated no adverse effects of patellofemoral articular cartilage loss on outcomes, particularly when the medial facet is involved.12-17 Lateral facet involvement, particularly in cases with lateral patellar grooving or bone loss portends worse outcomes.12,13

Patellofemoral degenerative change has been shown to be a source of anterior knee pain in patients with normal tibiofemoral joints.18 Because the lateral patellar facet is the most frequent location of patellofemoral osteoarthitis,19 several authors have reported partial lateral patellar facetectomy as a treatment option. Reported results have generally been good, with improved pain and function at both short- and medium-term follow-up.20-22 The majority of treatment failures were related to the development and progression of patellofemoral osteoarthitis.20-22

We hypothesize that simultaneous UKA and lateral patellar facetectomy provides durable pain relief and functional improvement in a patient population with degenerative disease of one tibiofemoral compartment and the lateral patellofemoral joint.

MATERIALS AND METHODS

Patient Population

Between January 2004 and May 2008, 132 UKAs were performed at our institution, including 77 medial UKAs and 55 lateral UKAs. Twelve of the lateral UKAs were performed in association with partial lateral patellar facetectomy in 12 female patients with degenerative changes in the lateral tibiofemoral compartment and the lateral patellofemoral joint. One patient received a lateral UKA following a medial UKA in the same knee. In order to maintain group homogeneity, this patient was excluded. The
remaining 11 UKAs in 11 patients (six right knees and five left knees) form the study group. The average age at the time of the UKA was 66.7 years (range: 49-79 years). The mean patient weight was 62.7 kg (range: 49-80). The mean body mass index was 23.9 kg/m² (range: 19.1-29.3 kg/m²). The patellofemoral osteoarthritis was stage 1 in 9 cases and stage 2 in 2 cases.

Surgical Indications

Candidates for UKA demonstrated isolated lateral compartment narrowing with complete or near complete joint space loss. Patients with a coronal plane deformity greater than 14° of knee valgus were excluded along with patients in whom a stress radiograph did not demonstrate reducibility of any coronal plane deformity. The integrity of the anterior cruciate and medial collateral ligaments was verified clinically and radiographically. Finally, patients were required to have at least 90° of flexion and an extension deficit of less than 10°. Weight alone was not considered an absolute contraindication, although UKA was generally avoided in patients weighing over 80 kg.

Partial lateral patellar facetectomy was performed concurrently in patients with: (1) Objective evidence of lateral patellofemoral degenerative disease, and (2) localized lateral patellar tenderness on physical examination. Patients with severe medial or central patellofemoral degeneration or discrete patellofemoral articular cartilage defects were excluded. Preoperative radiographs and International Knee Society (IKS) outcome scores were obtained for all patients.

Prosthesis

The HLS Uni Evolution (Tornier, Grenoble, France) was utilized in all patients. The femoral implant is symmetric and made from cobalt-chrome. This tibial component is polyethylene without a baseplate.

Operative Technique

All operations were performed by one of the authors who developed the combined technique. The partial lateral patellar facetectomy was performed first as previously described. With a tourniquet in place and the patient supine, the knee was approached through a lateral parapatellar incision. A lateral retinacular release allowed visualization of the lateral border of the patella without injuring the vastus lateralis (Fig. 1). Between 1 and 1.5 cm of the lateral border of the patella, including osteophytes and 1 to 2 mm of articular cartilage were resected (Figs 2 and 3). Any osteophytes on the lateral trochlea were also...
The incision was extended distally, demonstrating degenerative change of lateral femoral condyle (LFC) and lateral tibial plateau (LT).

Postoperative clinical and radiographic follow-up was performed prospectively at 2 months, 6 months, 1 year and every 2 years thereafter in all patients. Any subsequent operations on the index knee were recorded along with any complications, including deep vein thrombosis, pulmonary embolism, infection, patellar instability or fracture, or implant failure. Clinical results were assessed with physical examination and International Knee Society (IKS) scores.\(^2\) Patients were also asked during clinic visits if they were satisfied with their results. Patellofemoral joint symptoms were evaluated with a Kujala score.\(^2\) Radiographic outcomes were assessed by a standardized protocol at follow-up including standing AP, lateral, and full leg length views, and an axial view in 30° of knee flexion. Overall mechanical axis, patellar tracking, and progression of degenerative disease in the patellofemoral compartment were recorded. The classification system of Iwano et al. was used to assess the severity of patellofemoral osteoarthritis.\(^1\) Data were collected and analyzed retrospectively to assess the results of UKA combined with partial lateral patellar facetectomy for treatment of unicompartmental and patellofemoral degenerative disease.

**Assessment of Results**

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**Statistical Analysis**

Statistical analysis was performed with Stata (College Station, TX, USA). Preoperative and postoperative IKS scores and range of motion were compared using Wilcoxon’s test. Statistical significance was defined as p < 0.05.

**Results**

Eleven patients were followed clinically and radiographically for a mean of 60.3 months (range: 39-91 months). No implant revision was required during the follow-up period.

**Functional Results**

Ten patients (90%) were satisfied with their knee function at final follow-up. The mean IKS knee score improved from 64.9 ± 11.2 points (range: 44-81 points) preoperatively to 87.5 ± 12.6 points (range: 60-100 points) at final follow-up (p = 0.01). The mean IKS functional score improved from 65.9 ± 23.5 points (range: 15-100 points) preoperatively to 83.2 ± 23.3 points (range: 40-100 points) at final follow-up (p = 0.012) (Table 1). The mean Kujala score was 84.3 ± 13.5 points (range: 63-100 points) postoperatively.

The mean maximum knee flexion was 133.2 ± 8.4° (range: 115-150°) preoperatively and 134.1 ± 6.6° (range:
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120-140°) at final follow-up (p = 0.78). No patients exhibited a flexion contracture preoperatively. Postoperative, 2 of 11 patients exhibited a flexion contracture of 5°.

**Radiographic Results**

No visible loosening or significant polyethylene wear occurred (Fig. 6). On standing full-length plain radiographs, the mean hip-knee-ankle angle was 5.4 ± 3.1° of valgus (range: 0-12°) preoperatively and 3.5 ± 1.9° of valgus (range: 0-7°) postoperatively (p = 0.09). Generally, improvements in the radiographic stage of patellofemoral osteoarthritis were noted at final follow-up compared to preoperative values (Table 2). Progression of patellofemoral arthritis was observed in one patient during the follow-up period. The patient progressed from grade I preoperative to grade II at final follow-up 7 years later according to the classification system of Iwano et al.19

**Complications**

No complications were noted during the follow-up period.

**DISCUSSION**

This study is a medium-term retrospective analysis of the results of 11 patients in whom simultaneous UKA and partial lateral patellar facetectomy were performed for degenerative disease limited to the lateral tibiofemoral compartment and the lateral patellofemoral joint. Our results indicate that this treatment strategy is a viable option for these patients as good pain control and functional outcomes were achieved.

Although some UKA femoral component designs have been noted to impinge of the patella,26 this complication is relatively rare and several authors have demonstrated no significant differences in patellofemoral joint forces and kinematics following UKA.27,28 This finding suggests that treatment strategies for patellofemoral joint pathology, such as partial lateral facetectomy, that are successful in patients with isolated patellofemoral involvement will also find success in patients undergoing UKA.

The only previous results of the combination of a non-arthroplasty procedure to treat patellofemoral arthritis with a UKA were reported by Antoniou et al in 1996.29 They utilized the patelloplasty technique described by Ficat et al30 and Marmor et al31 to resurface the entire patella with fibrocartilage and noted relief of patellofemoral pain in 90% of patients at 6 years postoperative.29

Other options are available for the treatment of associated unicompartamental and patellofemoral degenerative disease. When the patellofemoral disease is asymptomatic, conservative management of the patellofemoral joint has been shown to be effective, with no adverse effects on outcome of UKA noted in this patient population.12-15 When patellofemoral disease is symptomatic, some authors have reported good results through the combination of

<table>
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<th>Table 2: Patellofemoral osteoarthritis grade</th>
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<tr>
<td>Preoperative</td>
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<td>---------------------------------------------</td>
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<tr>
<td>Grade 0—no evidence of osteoarthritis</td>
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<tr>
<td>Grade I—remodeling of the osseous anatomy</td>
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<td>Grade II—narrowing, joint space &gt; 3 mm</td>
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<tr>
<td>Grade III—narrowing, joint space &lt; 3 mm</td>
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<td>Grade IV—significant bony contact</td>
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IKS: International Knee Society; SD: Standard deviation
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Simultaneous UKA and partial lateral patellar facetectomy is a viable treatment option for symptomatic degenerative disease involving the lateral tibiofemoral compartment and the lateral patellofemoral joint. Durable pain control and functional improvement were noted at medium-term follow-up. This treatment approach may be a useful alternative to TKA or bicompartimental arthroplasty in a carefully selected patient population.

CONCLUSION

Simultaneous UKA and partial lateral patellar facetectomy is a viable treatment option for symptomatic degenerative disease involving the lateral tibiofemoral compartment and the lateral patellofemoral joint. Durable pain control and

REFERENCES

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ABOUT THE AUTHORS

Robert A Magnussen (Corresponding Author)
Assistant Professor, Department of Orthopaedic Surgery, The Ohio State University, OH, USA, e-mail: robert.magnussen@gmail.com

Evrard Gancel
Attending Surgeon, Department of Orthopaedic Surgery, Hôpital de la Croix-Rousse Centre Albert Trillat, France

Elvire Servien
Attending Surgeon, Department of Orthopaedic Surgery, Hôpital de la Croix-Rousse Centre Albert Trillat, France

Matthias Jacobi
Attending Surgeon, Department of Orthopaedic Surgery, Orthopädie am Rosenberg, Switzerland

Guillaume Demey
Attending Surgeon, Department of Orthopaedic Surgery, Hôpital de la Croix-Rousse Centre Albert Trillat, France

Philippe Neyret
Attending Surgeon, Department of Orthopaedic Surgery, Hôpital de la Croix-Rousse Centre Albert Trillat, France

Sebastien Lustig
Attending Surgeon, Department of Orthopaedic Surgery, Hôpital de la Croix-Rousse Centre Albert Trillat, France