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Lateral Patellar Facetectomy and Medial Reefing in Patients With Lateral Facet Syndrome After Patellar-Retaining Total Knee Arthroplasty

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ABSTRACT

We analyzed clinical outcomes of partial lateral patellar facetectomy and medial reefing in patients with lateral patellar facet syndrome with painful patellar-retaining total knee arthroplasty. 34 patients were followed for a mean of 40 months. All 34 patients were matched with those having secondary patellar resurfacing without facetectomy. Both groups experienced significant pain relief and range of motion improvement. The facetectomy group had higher Kujala scores than those in patellar resurfacing group. Patients with facetectomy had significantly less pain postoperatively. There were significant differences in postoperative lateral patellar tilt and congruency angle in both groups. The mid-term results for LPF with medial reefing are promising to resolve pain in patients with lateral patellar facet syndrome in patellar-retaining TKA. Therapeutic level III (retrospective comparative study).

Total knee arthroplasty (TKA) is a common, effective surgical procedure in patients with painful knee osteoarthritis [1–4]. However, the potential risk of poor functional outcome and persistent knee pain with patient dissatisfaction is up to 30% [5–8]. Patients expectations with respect to postoperative pain relief and physical activity level are often not fulfilled [9]. Within the cohort of unsatisfied TKA patients, persistent anterior knee pain is the most frequent cause [10–14]. Etiological factors for anterior knee pain may include lateral patellar facet syndrome, retropatellar arthritis in the case of a non-resurfaced patella, low grade infection, malposition of prosthesis components, soft tissue pathology (e.g. arthrofibrosis, incision discomfort, bursitis, tendinitis), neurologic problems (e.g. neuromas, loss of sensation), patellar instability and fracture [13,15–17].

Partial lateral patellar facetectomy (LPF) has been shown to be a simple and reliable treatment option in patients with isolated patellofemoral osteoarthritis [18–22]. Zhang et al [23] evaluated functional outcome of this procedure in patients with patellar-retaining TKA and showed that the patients who underwent partial LPF with primary TKA had better functional outcome at 36 months than the patients without LPF. However, there are no studies addressing the efficacy of partial LPF in patients with patellar-retaining TKA and painful lateral patellar facet syndrome.

Therefore, the purpose of this study was to

(1) determine the intraoperative and perioperative complication rate;
(2) determine postoperative pain relief;
(3) and postoperative functional and radiologic outcomes of LPF and medial reefing;
(4) compare the obtained results to patients who underwent secondary patellar resurfacing without LPF.

Patients and Methods

Patients

After obtaining institutional review board approval, we prospectively collected data from a consecutive series of 34 knees with isolated partial LPF with medial reefing. The study was conducted in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 2000. The protocol was approved by the Ethics Committee of the University of Bonn (Reference Number 250/09), Germany. All participants provided informed written consent prior to

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surgery and study. Unilateral procedures were performed in 34 patients between October 2000 and February 2008 at three medical centers. All 34 patients were matched to 34 patients with similar demographic factors who had undergone secondary patellar resurfacing without lateral facetectomy during the same period of time. LPF and medial reefing was a new procedure in these medical centers. Most surgeons would treat patellar facet syndrome in the presence of TKA with secondary patellar resurfacing. Therefore more patients with secondary patellar resurfacing were available for an accurate matching process. The two groups were of similar age, gender, body mass index, and preoperative American Society of Anaesthesiologists classification (Table 1). The minimum follow-up was 36 months in both groups.

The indication for revision surgery in all 68 knees was persistent or increasing lateral patellar pain after the primary TKA without patellar resurfacing due to the lateral patellar facet syndrome. The lateral patellar facet syndrome was defined as persisting lateral parapatellar pain, a decreased mediolateral patellar glide test of less than one quadrant, and a decreased lateral patellar tilt test [24]. Other causes of anterior knee pain were excluded by a three steps approach for painful TKA:

(1) low grade infection: a synovial-fluid leukocyte count of more than 1700 per mm^3 or a finding of more than 65% neutrophils [25,26];
(2) component loosening and malpositioning diagnosed with conventional x-rays including standard AP, lateral, patellar axial 45°, and long leg views. In addition, in all patients bone and CT-scans: femoral and/or tibial valgus or varus component malalignment resulting in a mechanical axis deviation of more than 5°, excessive elevation of joint line (Caton index <0.8 [27]), excessive patellar tendon shortening with patella baja (modified Insall–Salvati index <0.8 [28,29]), rotational malposition of femoral component of more than 3° internal or external rotation in relation to the epicondylar axis and tibial component of more than 20° of internal rotation compared to the tibial tuberosity as assessed using CT scan as described by Berger et al [30];
(3) epicutaneous testing for acute and delayed allergic reactions against prosthesis component alloys and bone cement ingredients [31].

Primary Total Knee Arthroplasty

Primary TKA systems in the partial LPF group included 8 Genesis II CR (Smith & Nephews), 6 PFC Sigma CR (DePuy), 4 LCS CR (DePuy), 4 Innex CR (Zimmer), 2 Nexgen CR (Zimmer), 2 PFC Sigma PS, 2 Duracon CR (Stryker), 2 TC-Plus (Plus Orthopaedics), 2 EndoModell hinged (LINK), 1 Scorpio TS and 1 TC-3 (DePuy). Prostheses in the secondary patellar resurfacing group included 6 LCS CR (DePuy), 5 PFC Sigma CR (DePuy), 5 Genesis II CR (Smith & Nephews), 3 MRH hinged (Stryker), 4 Nexgen CR (Zimmer), 3 TC-Plus (Plus Orthopaedics), 2 HLS Noetos (Tornier), 2 PFC Sigma PS, 1 EndoModell hinged (LINK), 1 Scorpio CR (Stryker), 1 Scorpio TS (Stryker) and 1 TC-3 (DePuy). The average time from the primary TKA to the partial LPF and the secondary patellar resurfacing was 69.1 ± 31.0 months (range, 36.5 – 122.8 months) and 75.4 ± 32.9 months (range, 36.0 – 128.7 months), respectively. The average time from the primary procedure to the revision was comparable in both groups ($P = 0.581$).

Surgical Technique

All revision procedures were performed through the standard medial parapatellar approach used for the primary surgery. Six synovial biopsies were taken intraoperatively. Frozen-section pathologic investigations and paired cultures confirmed the absence of infection in all cases.

For LPF, osteophytes were trimmed followed by patellar denervation using electrocautery. Facetectomy was performed using a reciprocating saw, removing 1 to 1.5 cm of the lateral border of the patella. The aim was to remove as much lateral facet as required to change any concave surface to an ascending slope appearance and reduce the mediolateral size to the patellar size as measured from distal to proximal. A rongeur was used to smooth the edges of the resection. Care was taken not to harm the lateral superior genicular artery by peeling the bone off the patellar aponeurosis. The tourniquet was opened to achieve hemostasis. Central tracking of the patella was evaluated with the "no thumb test" [32]. No further lateral retinacular release was necessary. Closure of the knee was performed with an overlap of about 1 cm of the medial parapatellar capsule, paying special attention to tighten the medial patellofemoral ligament. Care was taken to pull the patella medially just until the lateral patellar margin was less proud (no lateral patellar overhang) than the lateral femoral condyle between 30° to 90° of knee flexion.

For secondary patellar resurfacing, the approach, denervation and osteophyte removal was the same as in the LPF group. The articular patellar surface was resected using an oscillating saw and only cemented all-polyethylene patellar components with three pegs were implanted. Patellar resurfacing components matched the specific design and manufacturer of the implanted components in all knees. Calipers were used to define the pre-resection thickness of the patella and were used after patellar component implantation to confirm that the component-bone complex did not increase the thickness as compared to the unresurfaced patella. The component was placed flush to the medial patellar margin following the principle of maximum coverage without overhang to improve central tracking of the patellar polyethylene in the trochlear groove of the femoral component. The patellar bone stock was between 12 and 16 mm in all cases [32]. The tourniquet was opened to achieve hemostasis. Central tracking was evaluated with the "no-thumb-test". In 13 of 34 cases a lateral retinacular release was necessary to achieve central tracking of the patella. The lateral release was done 1.5 cm lateral to the patellar margin. The arthrotomy was closed with standard interrupted sutures.

All patients were managed with a preoperative “single-shot” antibiotic prophylaxis using intravenous cefuroxime (1.5 g) after intraoperative biopsies were taken. All patients received thromboprophylaxis with subcutaneous low-molecular-weight heparin (Fragmin, 5000 IU), starting 12 hours preoperatively and continuing daily for six weeks postoperatively.

Clinical Examination

All patients were seen pre-operatively and post-operatively in our outpatient clinic by independent reviewers who had not performed the operations. The clinical examination involved assessment of range of motion (ROM) using a goniometer and measurement of heel to bottom distance. The patellar tilt test was evaluated in 20° of flexion and judged as pathologic if the lateral patellar margin could not be elevated from the lateral femoral condyle by manual force. The lateral patellar glide test was judged as pathologic if the patella could not be displaced by 10 mm by manual force [24]. Furthermore, the presence or absence of tenderness, effusion, atrophy, crepitus, and apprehension was noted. Patient rated their pain on a visual analog scale (VAS) ranging from 0 (no pain) to 10 (maximal pain) [33]. Knee joint status was assessed pre-operatively and post-operatively using the Knee Society Score (KSS) [34] and WOMAC score [35]. The anterior knee status was assessed using the subjective Kujala patellofemoral score, assessed by a questionnaire and administered by an independent physician. This questionnaire (ranging from 0 points [worst function] to 100 points [excellent function]) evaluated subjective symptoms and functional limitations in patellofemoral disorders [36].