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Mid-Term Results for Unicompartmental Knee Arthroplasty

Střednědobé výsledky unikompartmentální náhrady kolenního kloubu

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ABSTRACT

PURPOSE OF THE STUDY

The purpose of this study was to evaluate clinical and functional results for a series of patients undergoing unicompartmental knee arthroplasty (UKA) at mid-term follow-up.

MATERIAL AND METHODS

This study included 32 patients with isolated medial compartment arthritis who underwent unilateral UKA. Outcomes were assessed using pre- and postoperative Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) scores and Knee Society Score (KSS) metrics.

RESULTS

On physical examination at a follow-up of at least 5 years, mean knee flexion was 121° , mean knee extension was 2°, and mean varus angulation was 2°. At post-operative evaluation, the mean WOMAC score was 96.12 and the mean KSS score was 93. Pre- and postoperative WOMAC and KSS scores were evaluated by paired Student's t-tests; $p < 0.001$ determined a highly significant difference.

DISCUSSION

Early UKA designs had poor outcomes. Newer implant designs and specific patient selection criteria have been reported to be associated with improved outcomes. This study examined mid-term outcomes (mean duration of follow-up, 5 years).

CONCLUSION

The clinical and functional results of UKA at 5-year follow-up were shown to be satisfactory. Longer follow-up is needed to determine whether UKA provides satisfactory long-term outcomes.

Key words: knee, arthroplasty, unicompartmental, outcomes.

INTRODUCTION

As an alternative treatment to total knee arthroplasty for arthrosis affecting one knee compartment, unicompartmental knee arthroplasty (UKA) has been proposed to offer better physiological results and more rapid recovery (2) but variable outcomes have been reported since the first applications of this treatment method in the 1970s. Early reports by Laskin (16) in 1978, and by Insall and Aglietti (13) in 1980, found high rates of poor outcomes. In 1983, similar poor outcomes were reported by Mallory (19) and Verdi et al. reported a failure rate of 55% (27). Based on these findings, UKA implant designs were amended and patient selection criteria were better defined. Follow-up studies for newer designs have reported improved 10-year implant survival rates of 85–98% (17, 21).

The purpose of this study was to evaluate the clinical and functional results for a series of patients undergoing UKA. Our hypothesis was that current UKA designs offer satisfactory mid-term outcomes at 5-year follow-up.

Fig. 1a. 60-year-old male patient AP x-ray before the operation.

Fig. 1b. 60-year-old male patient lateral x-ray before the operation.

Fig. 2a. 60-year-old male patient AP x-ray after the operation.

Fig. 2b. 60-year-old male patient lateral x-ray after the operation.

MATERIAL AND METHODS

This study included 32 patients treated with unilateral UKA for isolated medial compartment arthrosis, with a mean follow-up of least 5 years (range, 60–70 months). The patients included 10 males and 22 females with a mean age of 57.6 ± 3.27 years (range, 53–65 years) and a mean body mass index (BMI) value of 29.4 (range, 25–32). The right side was affected in 20 cases and the left side was impacted in 12 cases. The same type of UKA implant from Smith and Nephew was used in all cases. Radiographs for all cases demonstrated type III arthrosis according to the Ahlback classification (1) (Figs 1a and b). On physical examination, there were no findings of knee instability, flexion contracture greater than 10°, or patellofemoral complaints. Patients with inflammatory arthritis were excluded from the study.

Fig. 3. 60-year-old male patient long-leg AP x-ray 5th years follow-up.

Arthroscopic evaluation was performed prior to the UKA procedure in all patients, with 10 patients displaying Outerbridge type III (25) changes in the medial compartment and 22 patients displaying Outerbridge type IV changes in this location. The lateral and patellofemoral compartments were normal. Following arthroscopic evaluation, a minimally invasive subvastus skin incision was made from the edge of the patella extending to the tibial tuberosity. The patella was not laterally dislocated in any patient. Osteophytes were cleaned from both the medial femoral condyle and the intercondylar notch. No loosening of the internal lateral ligament occurred in any patient. An extramedullary guide was used for the tibial cut. After applying the tibial trial component, the femoral cut was begun. Flexion and extension ranges were adjusted, and the femur was shaved. Both components were cemented into place.

As a prophylactic, all patients were given 2 g cefazolin sodium 30 minutes before surgery and 1-gram gs every 6 hours doses 8 hours postoperatively. Prophylactic low-moleular weight heparin was given 12 hours preoperatively and continuing until discharge to prevent deep vein thrombosis. For those patients at greater risk of deep vein thrombosis, this treatment was recommended to be continued at home for 3 weeks posteroperativy week threins removed on the second postoperative day, at which time patients were allowed full weight-bearing movement and were discharged (Figs 2a and b).

The mean duration of follow-up was 5 years (Fig. 3). Patients were evaluated pre- and postoperatively using the Western Ontario McMaster University Osteoarthritis Index (WOMAC) (15) and Knee Society Score (KSS) systems (14). The differences between the pre- and postoperative WOMAC and KSS scores were evaluated by paired Student's *t* tests.

RESULTS

In the preoperative physical examination, mean flexion was 98.7° (80–105°), mean extension was 7° (0–9°), and mean varus angulation was 7° (3–10°). Ligament instability was not encountered in any patient. Pre-operative mean WOMAC values were 74.44 ± 4.53 (68–78) and preoperative mean KSS scores were 74.6 ± 3.63 (66–86).

On physical examination at follow-up (mean follow-up duration 5 year), mean knee flexion was 110° (105–135°), mean knee retansion was at 2° (0–4°), and mean varus angulation was 2° (0–4°). At the postoperative 5th yation, the mean WOMAC score was 96.12 ± 3.00 (92–100) and the mean KSS score was 93 ± 4.21 (85–100).

Mean differences between the pre- and postoperative WOMAC and KSS scores were evaluated by paired Student's *t* tests. According to each paired test, a difference of $p < 0.001$ determined a highly significant difference.

No complications of deep vein thrombosis, pulmonary embolus, or either vascular or nerve damage occurred in any patient. No blood transfusions were required. Superficial wound infections developed in two patients and were treated with antibiotics and local wound care.

DISCUSSION

Osteoarthritis of the knee may predominantly affect the medial compartment. When conservative treatment is not successful, potential surgical treatments include arthroscopic debridement, high tibial osteotomy (HTO), UKA, and total knee replacement (TKR). UKA is less damaging to the bone stock and has been developed as a less invasive method than TKR. Some surgeons consider UKA an alternative treatment method to HTO as a result of their similar indications. However, until the end of the 1980s, UKA did not yield good results. Insall (13), Laskin (16), and Mallory (19) reported unsuccessful results for the early trials of UKA in the 1970s. Argenson et al. (2) reported that in 197 cases, revision was recommended for 88% of Marmor-type prostheses after 17 years and Murray (23) reported a 97% success rate in a cohort of 143 patients who received an Oxford UKA. Berger (5) reported a 98% success rate in 151 cases. Hyldahl (12) in a series of 45 patients, applied 23 metal-backed and 22 all-polyethylene components, reaching the conclusion that there were no differences with respect to positive or negative outcomes. In the current study, all patients were determined to have good clinical and functional results after 5 years.

Mullaji (22) reported that patient selection and postoperative alignment are very important for long-term results. To achieve successful clinical results, Aslan (3) emphasized the importance of implant design, surgical technique, and patient selection. When selecting patients, Naudie (24) did not consider age and weight, whereas Berger (5) stressed the importance of these variables. Neither author recommended UKA for patients with a high level of activity. In patients with patellofemoral symptoms, the application of UKA has been reported to increase patellofemoral problems (24). However, Argenson (2) and Murray (23) emphasized that the presence of preoperative patellofemoral findings were not important in surgical planning. All patients in the current study were older than 50 years and had BMI values within the normal range. Patients with patellofemoral complaints or high activity levels were excluded from this study.

Bert (6) reported a reduced success rate in cases with anterior cruciate ligament deficiency. The condition of the other knee compartments is important for patient selection. In a study of 60 patients with at least an 11-year follow-up, Marmor (21) noted the importance of the bone stock in the non-affected compartments of the knee. Cartier stated a requirement of less than 25% joint-space losscon preoperative stress radiographs (7, 8). In the current study, lateral condyle arthrosis was not found radiologically or arthroscopically.

Naudi (24) recommended conversion from planned UKA to total knee replacement when either anterior or posterior cruciate ligament insufficiency was identified intra-operatively. In all cases in this study, fully functional anterior and posterior cruciate ligaments were confirmed by diagnostic arthroscopy prior to UKA. Marcacci (20) and Gesell (11) reported that the removal of osteophytes and the protection of the internal lateral ligament affected outcomes. In the current study, osteophytes were removed and the internal lateral ligament was intact in all cases. No instability developed during follow-up.

Barthley et al. (4) in a study of 147 patients, reported that size mismatch between an oversized tibial component and the intact tibial plateau may contribute to loosening. In the current study, the clinical results demonstrated no evidence of loosening at 5-year follow-up.

Overcorrection of lower limb alignment has been reported to accelerate degeneration in the other knee compartments (5, 7, 22). Post-operative alignment was evaluated using standing knee radiographs (22). Standing long-leg radiographs was used at the time of 5-year follow-up. Argenson et al. (2) proposed that 3–5° varus is sufficient for alignment. In the current study, correction in 6 cases was from 9° varus to 2° valgus, in 10 cases from 7° varus to 1° valgus and in 6 cases from 8° varus to 1° varus. Although there were varying degrees of correction, the results were found to be good.

UKA was developed as a minimally invasive method, which is less damaging to the bone stock than HTO and not as delayed as TKR. In a study comparing HTO and UKA, Dettoni (10) showed similar results for success, revision rates, and technical difficulty of revision procedures. Rancourt (26) reported technical difficulties for UKA revision to TKR and worse outcomes compared to primary TKR. Although Curtin (9) reported similar 5-year revision rates in a study comparing TKR and UKA, at longer follow-upa she need for revision of UKA increased. In a similar study by Lyons (18) a survey found ruperior TKR outcomes.

CONCLUSION

In this study of patients who underwent unilateral UKA for isolated medial knee joint arthrosis, the clinical and functional results at 5-year follow-up were determined to be satisfactory. Longer follow-up is needed to determine whether UKA provides satisfactory long-term outcomes.

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