

Case report

Unicondylar knee arthroplasty following a patellectomy

Jantine Brauns, MD^{*}, Hans Feyen, MD

Orthopaedic Department, Sint-Dimpna Hospital, Geel, Belgium

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ABSTRACT

We present a case of a 59-year-old woman with a history of a right-sided patellectomy. She presented with right-sided anteromedial osteoarthritis. A unicondylar knee arthroplasty was performed. In the literature, we found only a few similar cases, with varying results. The woman in this case showed excellent postoperative clinical results. We concluded that a patellectomy may not be a contraindication for unicondylar knee arthroplasty in patients with isolated medial compartment osteoarthritis.

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Introduction

Patellectomy is a relatively old treatment method used in case of comminuted patella fractures, chondromalacia, patellofemoral osteoarthritis, patellar dislocations, infections, or patellar neoplasms. The effect of this procedure on the knee function cannot be ignored [1]. It will increase the risk of femorotibial arthrosis in a non-osteoarthritic knee and can worsen the mechanical conditions in osteoarthritis. The reason is an altered extensor mechanism of the knee and a decrease in anteroposterior (AP) stability.

Several options for the treatment of osteoarthritis in post patellectomy patients had been studied [2–11]. We found only a few case reports describing the use of a unicondylar knee arthroplasty (UKA) as a treatment option [8,9]. We judged a UKA to be a viable option in this patient despite the slight increase in AP laxity due to the absence of the patella.

Case history

A 59-year-old woman presented to an outpatient clinic because of right-sided medial knee pain. This patient has been followed in

our clinic for bilateral knee pain for 10 years. She had a history of a right-sided patellectomy 20 years ago, because of a communitive patellar fracture, and a left mobile-bearing UKA (Oxford; Zimmer-Biomet, Warsaw, IN) 1 year ago. The results of the left knee surgery were excellent.

Clinical examination of her right knee revealed tenderness on the medial joint line. There was a full range of motion (ROM). Valgus and varus stress tests, in full extension and 30° flexion, were stable. There was no posterior sagging. The Lachman and Anterior drawer tests for anterior cruciate ligament (ACL) integrity were also negative. The patient had a body mass index of 24.5. Radiographs showed a complete anteromedial cartilage loss with preserved cartilage status laterally (Figure 1A, B).

An additional magnetic resonance imaging (Figure 2) confirmed osteoarthritis at the medial knee compartment with osteophytosis, diffuse grade 4 cartilage defect, and subchondral edema. The lateral compartment was intact. There was a normal occurrence of the cruciate ligaments (ACL and posterior cruciate ligament) and collateral ligaments (lateral collateral ligament and medial collateral ligament).

Surgery was performed under spinal anesthesia. Intraoperative evaluation of the anterior femur revealed hypertrophic bone formation in the trochlea, due to the chronic sliding of the quadriceps tendon and fibrotic scar of the patellectomy in the trochlear groove. This was ignored and a classic medial UKA was performed.

The first day after the operation, she started with mobilization. The patient was discharged on the second day after surgery with a physical therapy program.

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^{*} Corresponding author. Orthopaedic Department, Sint-Dimpna Hospital, J.B. Stessensstraat 2, 2440 Geel, Belgium. Tel. +32 14/57 70 13.

E-mail address: jantine.brauns@gmail.com



Figure 1. Preoperative lateral (a) and anteroposterior stress (b) radiographs of the right knee showing classic anteromedial osteoarthritis. Status after right sided patellectomy.

To compare the knee function preoperatively vs postoperatively, the patient completed the (modified) Oxford Knee Score (OKS) [1,4-6,12]. Preoperatively, the patient reported an OKS of 25, which may indicate moderate to severe knee arthritis.

Two weeks after surgery, the patient reported minimal pain. She had an ROM from 0° to 100°. She walked with one crutch. At the 3-month follow-up visit, she showed good progression. There was no need for painkillers anymore. She had no pain on examination and there was good mobility (ROM from 0 to 143°) and stability of the right knee. The gait pattern was normal. Plain radiographs of the right knee were normal (Figure 3A, B). She reported an OKS of 41, which indicates a satisfactory joint function. At 1 year post-operative, she had an ROM from 0° to 145°. The patient filled out an OKS of 47 (Table 1). She reported only little difficulty with kneeling down and getting up afterwards.

Discussion

This case report showed a possible place for UKA in patellectomized patients with isolated anteromedial knee arthrosis and no instability (cruciate ligaments intact).

The primary function of the patella is to increase the lever arm of the extensor mechanism of the knee, reducing the amount of force needed to extend the knee. When removing the patella, the quadriceps forces needed to extend the knee has to be larger. The patellar tendon will fall into the intercondylar groove. This will shorten its lever arm and increase the force and load on the femotibial joint [13].

The patella also plays a decisive role in the AP stability of the knee. It forms, together with the quadriceps, patellar tendon and cruciate ligaments, a 4-bar linkage system. During flexion, the patella positions the patella tendon and quadriceps parallel to the posterior and ACL, so they can work in harmony [10,11]. When removing the patella, this system is disrupted.

With this theory in mind, it is not incomprehensible that patellectomized patients undergoing a total knee arthroplasty (TKA) showed mixed postoperative clinical results, with instability

as one of the most common complications [5,12]. Several studies are done in patellectomized patients with varying types of TKA (posterior-stabilized or cruciate-retaining TKAs) with varying results [2,11].

In the literature, we found only a few cases of UKA in a patellectomized patient (Table 2). Marmor and Insall et al described good long-term results in patients with a history of patellectomy undergoing a unicompartmental arthroplasty for isolated medial osteoarthritis [7-9]. However, Capra et al [3] reported in 1992 the revision of all 3 patients (Marmor prosthesis) due to lateral disease progression. In 2011, Pang et al [10] described good quadriceps strength and clinical outcomes for placement of a minimal invasive fixed-bearing UKA (ZUK; Zimmer) after 5 years of follow-up. Last

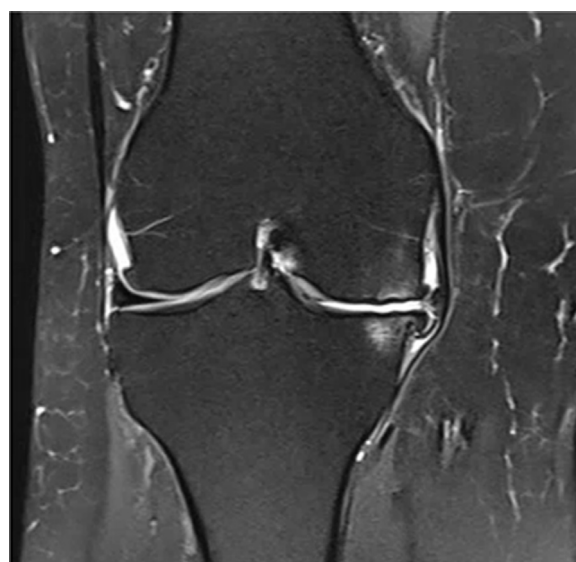


Figure 2. Preoperative magnetic resonance imaging confirmed the indication.

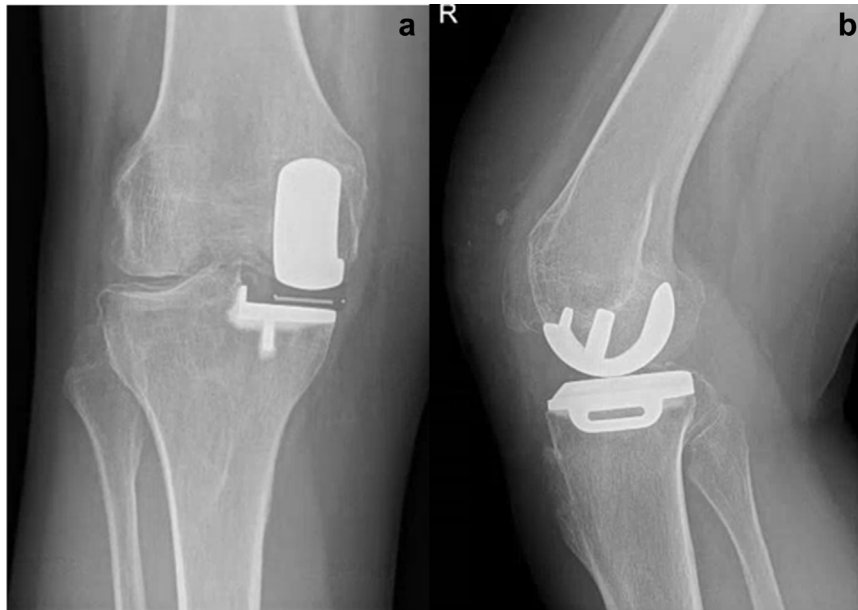


Figure 3. Anteroposterior (a) and lateral (b) radiographs 3 months postoperative.

Table 1
Summary of oxford knee scores.

Time	1	2	3	4	5	6	7	8	9	10	11	12	Score
Preoperative	0	4	4	2	2	2	0	0	1	2	4	4	25
3-mo postoperative	3	4	4	3	3	3	2	4	3	4	4	4	41
1-y postoperative	4	4	4	4	4	4	3	4	4	4	4	4	47

year Kouk et al. [8] published a case report about a robot-assisted unicondylar arthroplasty (MAKOplasty) in a patient with severe medial compartment osteoarthritis following patellectomy. Results were excellent after 1 year of follow-up with an International Knee Documentation Committee of 65.69.

As described above, the AP stability of the knee decreases after a patellectomy because of disruption of the 4-bar linkage system. With the placement of a UKA, the ACL, an important link in the linkage system, is retained. Although AP instability is a contraindication for placement of a UKA, the slight increase in laxity due to the absence of the patella was not deemed to be a contraindication with the ACL being functionally intact. Moreover, we believe that the intact ACL might positively affect recovery and postoperative function.

Other advantages of a UKA compared to a TKA are faster mobilization, shorter hospital stay, and faster rehabilitation.

There are a few limitations in this study. The implant we used in this case was the Oxford Partial Knee system from Zimmer-Biomet. We have to be careful when extrapolating the results of this study to other partial knee systems. Moreover, we presented only one

case and the follow-up period is rather short (1 year). Long-term follow-up is needed to evaluate the effect of the patellectomy on implant survival since femorotibial contact forces may be increased.

After this study, we can conclude that a patellectomy may not be a contraindication for UKA surgery in patients with isolated medial compartment osteoarthritis. We can also ignore intraoperative hypertrophic trochlear osteophytosis. Further higher powered studies about this subject are needed to support our conclusion.

Summary

A patellectomy is a relatively old treatment method used in case of comminuted patella fractures and other patellar pathology.

This case report describes a case of a UKA performed on a patellectomized patient.

After this study, we conclude that a patellectomy may not be a contraindication for UKA surgery in patients with isolated medial compartment osteoarthritis.

Table 2
Literature about UKA after patellectomy.

Author (year)	Number of patients	UKA	Follow-up (mo)	Outcome
Insall (1976)	15 (3 lateral + 12 medial)	Guepar	24–42	67% good/excellent
Marmor (1987)	2 (1 bilateral)	Marmor	72–132	91% good/excellent
Capra (1992)	3 (medial)	Marmor	99.6	2 revisions for lateral disease progression (+1 after 10 years)
Pang (2011)	1 (medial)	ZUK (Zimmer)	60	Good clinical outcome and quadriceps strength
Kouk (2018)	1 (medial)	MAKOplasty partial knee resurfacing system (Stryker)	12	Excellent IKDC 65.59

Conclusions

Several options for the treatment of osteoarthritis in post patellectomy patients had been studied. We found only a few case reports describing the use of a unicondylar knee arthroplasty as a treatment option.

We judged a unicondylar knee arthroplasty to be a viable option in this patient despite the slight increase in anteroposterior laxity due to the absence of the patella.

After this study, we conclude that a patellectomy is not a contraindication for unicondylar knee arthroplasty surgery in patients with isolated medial compartment osteoarthritis. An additional conclusion is that we can ignore intraoperative hypertrophic trochlear osteophytosis.

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