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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A B S T R A C T

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
committed patella fractures, chondromalacia, patellofemoral
osteoarthritis, patellar dislocations, infections, or patellar neo-
plasms. 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 commiunitive
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) con-
firmed 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 forma-
tion 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.
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 postoperative, she had an ROM from 0° to 145°. The patient filled 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 femorotibial 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 patellar 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
year Kouk et al. [8] published a case report about a robot-assisted unicompartmental 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 1

| Time               | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Preoperative       | 0   | 4   | 4   | 2   | 2   | 2   | 0   | 0   | 1   | 2   | 4   | 4   |
| 3-mo postoperative | 3   | 4   | 4   | 3   | 3   | 3   | 2   | 4   | 3   | 4   | 4   | 4   |
| 1-y postoperative  | 4   | 4   | 4   | 4   | 4   | 4   | 3   | 4   | 4   | 4   | 4   | 4   |

### Table 2

| 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                                    |
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 unicompartmental knee arthroplasty as a treatment option.

We judged a unicompartmental 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 unicompartamental 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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