

# Patellofemoral Pain and Arthritis in Latter Middle-Aged Patient, with Marginal Osteophytes and General Patellofemoral Chondrosis

Stefano Zaffagnini, Giacomo Dal Fabbro, Margherita Serra, and Elizabeth A. Arendt

## 21.1 Case Presentation

A 58-year-old female university professor presented with bilateral chronic knee pain worse on the left side. In particular, the patient complained of worsening left knee pain with stair climbing and rising from a chair, associated with recurrent knee swelling. The patient denied prior knee trauma or surgery, and prior episodes of patellar dislocation. Medical co-morbidities included a post-Hashimoto disease hypothyroidism which treated with levothyroxine. No other pathologies were reported in patient's history.

Clinical examination showed a slight swelling left knee with a physiological valgus limb alignment. Acute pain was evoked by palpation of the anterior left knee, and the patellar grind test

(Clarke's sign) was positive. Full knee range of motion was present, with associated crepitance to active knee motion.

The left knee MRI showed a severe patellofemoral osteoarthritis with marginal osteophytes and general chondrosis concentrated laterally (Fig. 21.1). Moreover, further imaging including MRI examination showed no evidence of coronal knee deformity, tibiofemoral joint osteoarthritis, or tibiofemoral bony edema.

## 21.2 Evaluation and Treatment by Presenting Physician (Stefano Zaffagnini)

Based on the history, clinical examination, and imaging evaluation, I have assessed that patient's anterior knee pain and crepitation were attributable to isolated patellofemoral osteoarthritis.

At first, a conservative treatment strategy was chosen: a left knee intra-articular corticosteroid injection was performed, and daily ice-therapy, vastus medialis oblique muscle enforcement, and internal rotary footbeds were recommended. Moreover, the patient received recommendation to avoid bike, climbing or descending stairs, and walking on inclined terrain. One month later an intra-articular injection with hyaluronic acid with high molecular weight was performed.

---

S. Zaffagnini (✉)  
IRCCS—Istituto Ortopedico Rizzoli—Clinica  
Ortopedica e Traumatologica II, Bologna, Italy

University of Bologna, Bologna, Italy  
e-mail: [Stefano.zaffagnini@unibo.it](mailto:Stefano.zaffagnini@unibo.it)

G. Dal Fabbro · M. Serra  
IRCCS—Istituto Ortopedico Rizzoli—Clinica  
Ortopedica e Traumatologica II, Bologna, Italy  
e-mail: [giacomo.dalfabbro@studio.unibo.it](mailto:giacomo.dalfabbro@studio.unibo.it);  
[margherita.serra2@studio.unibo.it](mailto:margherita.serra2@studio.unibo.it)

E. A. Arendt  
Department of Orthopedic Surgery, University of  
Minnesota, Minneapolis, MN, USA  
e-mail: [arend001@umn.edu](mailto:arend001@umn.edu)



**Fig. 21.1** Sagittal and axial view showed a severe patellofemoral osteoarthritis with osteophytes and chondrosis (a–c). Frontal view showed no evidence of tibiofemoral osteoarthritis (d)

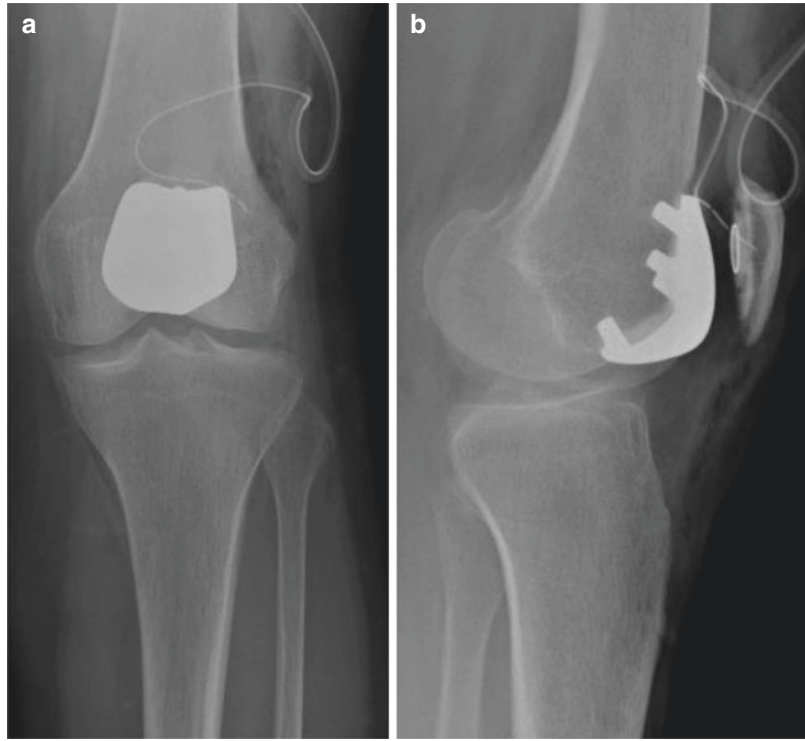
However, after 6 months patients presented with persistent anterior knee pain, complaining of serious limitations during normal daily activities.

In literature, satisfactory clinical outcomes were provided after surgical treatment of isolated patellofemoral osteoarthritis with patellofemoral arthroplasty [1]. Furthermore, in the current patient, the non-operative strategies did not lead to any clinical improvement. Thus, the present patient was indicated for patellofemoral arthroplasty.

### 21.2.1 Surgical Treatment

The patient was positioned supine, under regional anesthesia supplemented with sedation. The entire low extremity was prepared and draped. A straight midline skin incision was carried out; subsequently parapatellar medial arthrotomy was performed. Before proceeding with the arthroplasty, the joint was carefully inspected to confirm that the tibiofemoral compartment was free of disease or degeneration

**Fig. 21.2** Post-operative X-ray. Antero-posterior view (a); lateral view (b)



signs. The osteophytes bordering the intercondylar notch were removed. With the appropriate cutting guides, the femoral and patellar surface were prepared, and a patellofemoral joint prosthesis was implanted (Journey PFJ Smith&Nephew, London UK, trochlear component size x-small, patellar component symmetric  $29 \times 7.5$  mm). The patella was resurfaced restoring the original patellar thickness and medializing the component on the native patella.

Finally, the patellar tracking during flexion and extension was assessed and provided a satisfactory result. At the end of the surgery post-operative image of the operated knee was performed (Fig. 21.2).

### 21.2.2 Post-operative Management

Patient started physical therapy the first day after surgery with isometric exercise to enhance quadriceps muscle strength. Progressive weight bearing using crutches was allowed during the first 15 days postoperatively. After 15 days patient was allowed to achieve full weight bearing to

gradually stop using crutches as motion and strength allowed. After 21 days patients started swim, resumed all normal daily activities, and returned to work.

---

### 21.3 Commentary and Treatment Recommendation from Dr. Elizabeth Arendt

I agree that with the stated history, physical exam, and imaging, that a patellofemoral arthroplasty is a preferred surgical option. In my hands, at the age of 58, one would have to be physiologically younger than age 58 with a near pristine tibiofemoral joint to have this be a preferred option.

For surgical treatment, regional anesthesia supplemented with peri-articular multimodal pain cocktail is performed. A straight midline incision is used, with a vastus muscle splitting incision to enter the joint.

With the trial prostheses in place, a trial of capsular closure is performed to assess patella tracking through passive knee motion. Although this does not guarantee good tracking of the

patella actively, one should look for patellar tracking in two key areas:

1. As the patella enters the groove in early flexion, if there is any deviation of the femoral prosthesis into a varus alignment, one can create a type of J tracking. This is unusual but clearly can be an unexpected complication.
2. When the knee goes from full flexion to extension, if there is any prominence of the metal component's distal edge, this will create a type of jumping of the patella into the groove in deep flexion. This typically can happen when you have a slight (native) femoral valgum; in order to achieve a flush surface between your lateral prosthesis and the native cartilage, one has to recess the medial side. In such a case if one leaves the medial side flush (not recessed) it may cause lateral sided prominence and a hop into the groove from deep flexion to extension.

From the enclosed lateral X-rays, one can identify mild knee hyperextension. With knee hyperextension and relative patella alta, the surgeon must be mindful not to have the patellar button exceed the length of the femoral arthroplasty flange when the knee is hyperextended. In this case the patient has normal height and there was no concern. One might consider placing the button as inferior as possible on the native patellar bone, to avoid a catch in knee hyperextension.

A drain is not used; the tourniquet is deflated after closure of the capsulotomy, and typically the patient is able to go home on the same surgical day.

Postoperatively, the patient's knee is placed in a soft compressive dressing, weight bearing as tolerated is allowed, using strength motion and pain as a guide to advance to full weight bearing. Stair climbing in a tandem fashion is discouraged until appropriate quad strength is achieved.

In cases where there has been significant bone erosion, the patient is warned that there may be a feeling of relative tightness of their knee in flexion, especially in the early rehabilitation phase, as the patella is now relocated centrally with patella height and trochlea groove restoration.

Full motion is expected to be achieved post-operatively.

Realistic activity expectation is discussed, with the knowledge that quadriceps muscle activity, already compromised pre-operatively, will take months to achieve greater strength than the pre-operative state.

---

## 21.4 Post-operative Follow-Up

At 1 year follow-up the patient referred to carried out daily and slight physical activities, such as trips to the hills or pilates class, with no limitations in her left knee. She was satisfied with the outcomes and doing well with no complaints of left knee pain. On clinical examination patient had not crepitation or apprehension sign, a full active and passive range of motion with no evidence of swelling or effusion. The knee X-ray examination showed the correct placement of the prosthetics components (Fig. 21.3).

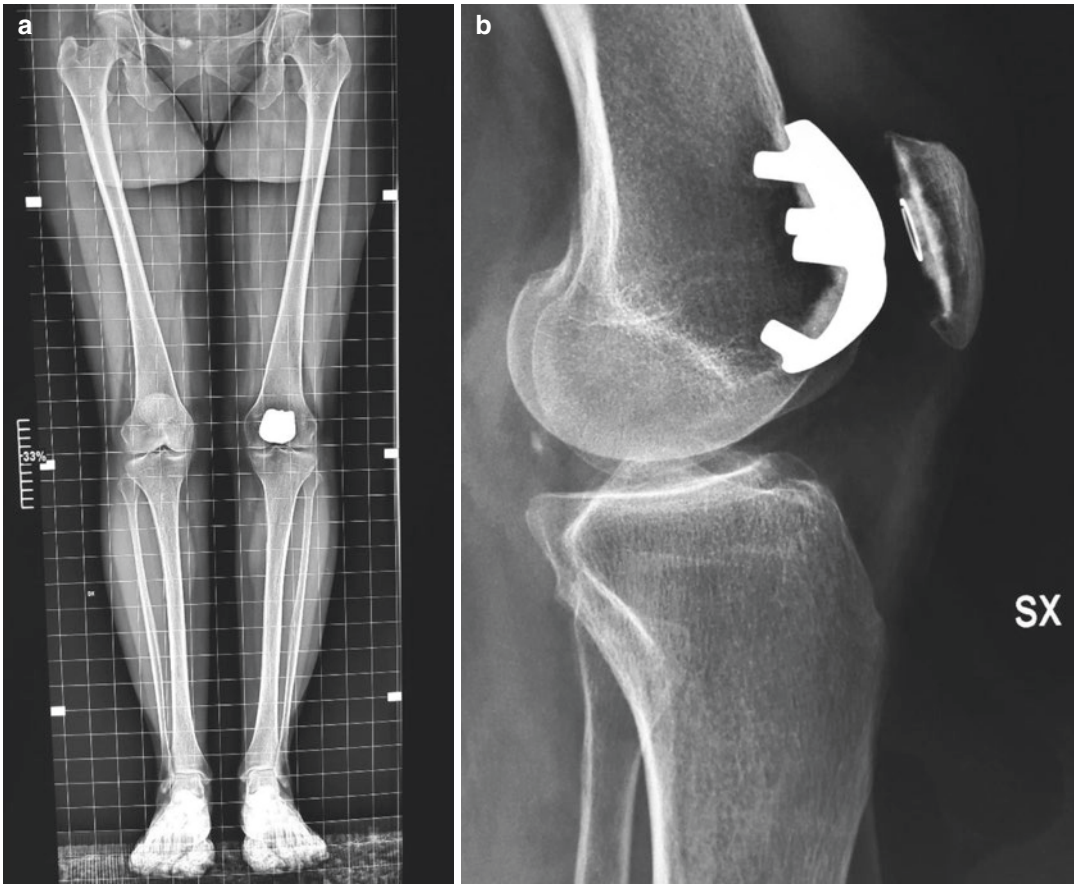
---

## 21.5 Patellofemoral Arthroplasty: Current Concepts and Evidence

Patellofemoral osteoarthritis (PFOA) is described radiographically in up to 36% of the population [2] and isolated PFOA accounts for 10–24% of all patients presenting with knee pain [3]. In particular, middle-aged female and high-BMI patients tend to be more often affected by PFOA [4]. While the total knee arthroplasty represents the standard for treatment of knee OA, patellofemoral (PF) arthroplasty has emerged as an excellent option for patients presenting with isolated PFOA.

Patient selection and precise indications are crucial to obtain satisfactory clinical outcomes. The ideal patient is one with isolated anterior knee pain due to an isolated PFOA confirmed at imaging examination, felt during daily activities such as climbing stairs or rising from a chair. On physical examination is important to assess the stability of the patella as well as the knee in its entirety. Imaging exams must be used to exclude





**Fig. 21.3** 1 year follow-up X-ray. Full standing weight bearing view (a); lateral view (b)

tibiofemoral disease and to identify existing deformity or dysplasia [5]. In these patients, when the first line conservative management fails (including treatment with anti-inflammatory drugs, injections and physical therapy), the surgical treatment is recommended. Despite, in clinical practice the PF arthroplasty is more often reserved for younger or middle-aged patients, if the tibiofemoral joint is unaffected, PF implants represents a good options regardless of patient's age. In support of this treatment choice, the revision to total knee arthroplasty after PF arthroplasty resulted relatively uncomplicated [6, 7].

However, controversy remains about the management of isolated PFOA. A systematic review provided fairly good outcomes of PF arthroplasty [1]; in another systematic review, in which the total knee replacement and the PF arthroplasty

for the treatment of isolated PFOA were compared, similarity was reported between the two procedures in terms of complications and reoperation rate [8]. On the other hand, a later systematic review suggested that the reoperation rate for PF arthroplasty may be higher than the reoperation rate for total knee arthroplasty [9]. A 5- and 10-year revision rate of 9.75% and 18.70% respectively for PF arthroplasty compared with 2.16% and 3.39% for cemented total knee arthroplasty was reported in the National Registry for England, Wales, Northern Ireland and Isle of Man (NJR) [10]. However, more recently published studies reported lower revision rates of PF arthroplasty in the setting of isolated patellofemoral OA, when compared to prior studies [1]; moreover a meta-analysis showed that second-generation PF implants had equivalent reoperation

and revision rates, pain and mechanical complications when compared to total knee arthroplasty [11]. These findings suggest that, while the first generation PF arthroplasty offset the potential advantages of maintaining the knee's native soft tissues, the second-generation PF arthroplasty incorporated changes in implant design and instrumentation, showing promising results in the properly selected patient population. Furthermore, a recent randomized trial, in which the cost effectiveness analysis was performed, showed that patients with isolated PFOA achieved better short-term outcomes at lower costs from treatment with PF arthroplasty than from total knee arthroplasty [10].

### Take Home Message

Isolated patellofemoral arthroplasty should be considered approaching latter middle-aged patient, often female, whose presenting complaint is anterior knee pain, and imaging reveals isolated PFOA. Patellofemoral arthroplasty represents an excellent treatment option, and in the management of patients with isolated patellofemoral osteoarthritis must always be considered.

### References

1. van der List JP, Chawla H, Zuiderbaan HA, Pearle AD. Survivorship and functional outcomes of patellofemoral arthroplasty: a systematic review. *Knee Surg Sports Traumatol Arthrosc.* 2017;25(8):2622–31.
2. Davies AP, Vince AS, Shepstone L, Donell ST, Glasgow MM. The radiologic prevalence of patellofemoral osteoarthritis. *Clin Orthop Relat Res.* 2002;(402):206–12.
3. Duncan RC, Hay EM, Saklatvala J, Croft PR. Prevalence of radiographic osteoarthritis—it all depends on your point of view. *Rheumatology (Oxford).* 2006;45(6):757–60.
4. Collins NJ, Oei EH, de Kanter JL, Vicenzino B, Crossley KM. Prevalence of radiographic and magnetic resonance imaging features of patellofemoral osteoarthritis in young and middle-aged adults with persistent patellofemoral pain. *Arthritis Care Res (Hoboken).* 2019;71(8):1068–73.
5. Hurwit D, Strickland S. Indications for patellofemoral arthroplasty in isolated patellofemoral arthritis. In: Dejour D, Zaffagnini S, Arendt EA, Sillanpää P, Dirisamer F, editors. *Patellofemoral pain, instability, and arthritis.* Berlin: Springer; 2020. p. 507–9.
6. Hutt J, Dodd M, Bourke H, Bell J. Outcomes of total knee replacement after patellofemoral arthroplasty. *J Knee Surg.* 2013;26(4):219–23.
7. Parratte S, Lunebourg A, Ollivier M, Abdel MP, Argenson JN. Are revisions of patellofemoral arthroplasties more like primary or revision TKAs. *Clin Orthop Relat Res.* 2015;473(1):213–9.
8. Vasta S, Papalia R, Zampogna B, Espregueira-Mendes J, Amendola A. Current design (onlay) PFA implants have similar complication and reoperation rates compared to those of TKA for isolated PF osteoarthritis: a systematic review with quantitative analysis. *J ISAKOS.* 2016;1(5):257–68.
9. Woon CYL, Christ AB, Goto R, Shanaghan K, Shubin Stein BE, Gonzalez Della Valle A. Return to the operating room after patellofemoral arthroplasty versus total knee arthroplasty for isolated patellofemoral arthritis—a systematic review. *Int Orthop.* 2019;43(7):1611–20.
10. Fredborg C, Odgaard A, Sørensen J. Patellofemoral arthroplasty is cheaper and more effective in the short term than total knee arthroplasty for isolated patellofemoral osteoarthritis: cost-effectiveness analysis based on a randomized trial. *Bone Joint J.* 2020;102-b(4):449–57.
11. Dy CJ, Franco N, Ma Y, Mazumdar M, McCarthy MM, Gonzalez Della Valle A. Complications after patello-femoral versus total knee replacement in the treatment of isolated patello-femoral osteoarthritis. A meta-analysis. *Knee Surg Sports Traumatol Arthrosc.* 2012;20(11):2174–90.