

# Surgical Treatment of Isolated Patellofemoral Osteoarthritis

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**Abstract** *Background:* Isolated patellofemoral (PF) osteoarthritis (OA) affects 9% of persons older than 40 years. Nonoperative treatment should be exhausted fully before surgical treatment. *Questions/Purposes:* The purpose of this article is to review the literature after 2008 with the aim of answering the following question: Which of the following surgical procedures has the highest survival rate and the lowest revision rate in advanced isolated PF OA: patellofemoral arthroplasty (PFA), total knee arthroplasty (TKA) or lateral facetectomy. *Methods:* The search engine was MedLine. The keywords used were: PF OA and PFA. Three hundred and fifty-three articles were found between 2008 and 25 July 2013. Of those, only 23 were selected and reviewed because they were strictly focused on the topic and the question of this article. *Results:* The types of studies reported so far have a low level of evidence (levels III and IV). Most of them are prospective case series (level IV). Some are systematic reviews of level III studies. Reported survival rate of lateral facetectomy is 85% at 5 years, 67% at 10 years and 47% at 20 years. Reported failure rate of lateral facetectomy is 26% at 10 years and 16% at 12 years. The reported average time of reoperation is 8 years and 37% of such procedures fail. Survival rate of PFA has been reported to be 87.5% on average (range, 60–100%). The revision rate of PFA is 20%. Recent improvements in PFA design have resulted in improvements in short- and medium-term results, similar to those of TKA. *Conclusions:* There is still no gold

standard for the surgical treatment of isolated PF OA. However, PFA or TKA appear to be the most recommendable treatment in cases that do not respond to conservative treatment.

**Keywords** isolated patellofemoral joint osteoarthritis surgical treatment

## Introduction

Patellofemoral (PF) osteoarthritis (OA) is a relatively common condition, affecting up to 24% of women and 11% of men over the age of 50 years who have symptomatic PF OA [21]. Isolated OA of the PF joint occurs in 9% of patients over 40 years of age [12]. Mild isolated PF OA has been also associated with symptoms of pain, stiffness, and functional limitation [6]. Patients over 40 years of age and women are more often affected [21]. Options of treatment are varied and not sufficiently justified by the literature [2, 6, 12]. In isolated PF OA, relief of pain can be achieved by conservative treatment, non-arthroplasty procedures, and arthroplasty (patellofemoral arthroplasty (PFA) and total knee arthroplasty (TKA)) treatment [8]. However, the results have been variable [18].

The purpose of this article is to review the MedLine literature after 2008 with the aim of answering the following question: (1) What are the outcomes of each type of surgical procedure (PFA, TKA, and lateral facetectomy) and (2) which has the higher reported rate of success and durability.

## Methods

A review has been performed on the surgical treatment of isolated PF OA. The search engine was MedLine (PubMed). The keywords used were: patellofemoral osteoarthritis and patellofemoral arthroplasty. Three hundred and fifty-three articles were found from 2008 to 25 July 2013. Of those, only 23 were selected and reviewed because they were strictly focused on the topic and the questions of this article.

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## Results

The types of studies reported have a low level of evidence (levels III and IV). Most of them are prospective case series (level IV), although some of them are systematic reviews of level III studies.

Regarding lateral facetectomy, the reported survival rate of the procedure is 85% at 5 years, 67% at 10 years, and 47% at 20 years [14, 15, 22]. Failure rate of lateral facetectomy has been reported to be 26% at 10 years and 16% at 12 years [14, 15, 22]. Becker et al. [2] analyzed knees in patients with isolated PF OA (Ahlbäck grades III and IV) that had been treated by partial lateral facetectomy, lateral release, and medialization of the tibial tubercle. The subjective outcome was based on the Western Ontario McMaster Osteo-Arthritis Index and the McCarroll score. The objective outcome was based on anteroposterior flexion weightbearing views, lateral views, and 45° axial views. Becker et al. did not recommend combined lateral

facetectomy, lateral release, and medialization of the tibial tubercle in isolated PF OA [2]. Wetzels and Belleman [22] studied patients treated with lateral facetectomy at an average follow-up of nearly 11 years. During follow-up, 37% had failed and were revised to either TKA, PFA, or total patellectomy. Average time to reoperation in the failure group was 8 years. The Kaplan–Meier survival rates with reoperation as endpoint were 85% at 5 years, 67% at 10 years, and 47% at 20 years, respectively. The study demonstrated that a satisfactory outcome after lateral patellar facetectomy for isolated PF OA can be expected in approximately 50% of the cases at 10 years follow up. Montserrat et al. [14, 15] reported the long-term results of lateral facetectomy plus Insall's realignment procedure to treat isolated PF OA in patients with a follow-up between 10 and 14 years. The failure rate (need for TKA) in the whole series was 26% and 16%.

Regarding PFA, the survival rate of the procedure is 87.5% on average (range, 60–100%). The revision rate of



**Fig. 1.** a–e Patellar maltracking of an inlay style patellofemoral arthroplasty (PFA) (first generation) implanted in a patient with severe painful patellofemoral (PF) osteoarthritis (OA). Revision arthroplasty was required with a contemporary onlay style trochlear design (second generation) implanted perpendicular to the anteroposterior axis of the femur: **a** 45° axial preoperative view. **b** Anteroposterior postoperative radiograph after implanting the inlay design. **c** Lateral view after the implantation of the inlay design. **d** 45° axial view before revision showing severe patellar maltracking of the inlay design. **e** 45° axial view after revision PFA with a contemporary onlay design showing good patellar tracking.

PFA is 20% [14, 17, 18, 23]. Delanois et al. stated that PFA was most successful in patients who have isolated PF OA secondary to trochlear dysplasia or patellar fracture and in patients who were younger than 60 years [5]. Therefore, they recommended TKA for older patients who had isolated primary or idiopathic PF OA. Dahm et al. reported that PFA yields clinical outcomes comparable to that of TKA as treatment for isolated PF OA and may be a less invasive option [4]. Mont reported a 95% Kaplan–Meier survival rate at 5 years after PFA [14]. The survival rate of the LCS design of PFA has been reported to be 73% at 4.5 years and 48% at 5.5 years, respectively, with a revision rate of 20% (most revisions due to patellar maltracking) [1, 23]. With the Avon design of PFA, the reported survival rate at 5 years has been between 95% and 100% [17, 18]. Beitzel et al. reported satisfactory results at 2 years follow-up in a group of patients with an asymmetric trochlear design [3]. Hutt et al. reported that the results of revision of a PFA were less satisfactory than primary TKA [8]. Dy et al. performed a systematic review of patients who underwent PFA or TKA for PF OA with minimum 1.5 year follow-up [7]. There was a higher likelihood of any reoperation and revision in first-generation PFA compared to TKA. When comparing second-generation PFA to TKA, there was no significant difference in reoperation, revision, pain, or mechanical complications (Fig. 1). Another systematic review showed that second-generation resurfacing implants (onlay style prostheses) gave better mid-term results than first-generation implants (inlay style prosthesis) [13]. The main causes of failure of first-generation implants were patellar maltracking in the short-term and progression of tibiofemoral OA in the long term.

Nonsurgical treatments of PF OA have been reviewed citing studies of varying quality [20]. In general, these studies found that nonoperative treatment (taping, physiotherapy, and injection therapy) yielded unpredictable and insufficient short-term relief of PF pain. TKA with patellar resurfacing yielded good and durable results. Nonetheless, many studies still maintain that nonoperative and conservative surgical techniques should be tried before PFA or TKA are considered [19].

## Discussion

The purpose of this article was to review the literature after 2008 with the aim of answering the following question: Which type of surgical procedure is more effective regarding the survival rate and the revision rate in advanced isolated PF OA: PFA, total knee arthroplasty, or lateral facetectomy.

The quality of studies reported so far on the topic is poor (low level of evidence, levels III and IV). Most of them are prospective case series (level IV), although some are systematic reviews of level III studies.

Arthroplasty options can provide predictable pain relief, whereas other surgical measures often have unsatisfactory results [9–11]. While TKA yielded excellent results in >90% of patients with isolated PF OA, it is not desirable in patients who are young and active. Early PFA (first generation)

showed a high incidence of patellar maltracking, catching and subluxation, inadequate soft tissue balancing, and component malposition. However, contemporary onlay style trochlear components (second generation), implanted perpendicular to the anteroposterior axis of the femur, have reduced the patellar maltracking that was so prevalent with inlay style prostheses. With onlay trochlear designs, early patella instability problems have been reduced, leaving late tibiofemoral degeneration as the primary cause of failure of PFA. The rate of tibiofemoral degeneration is approximately 20% at 15 years. Finally, the results of TKA did not appear to be compromised by the presence of a prior PFA.

Partial lateral facetectomy may provide a satisfactory outcome for some patients up to 10 years follow-up [16]. However, other authors did not recommend the procedure [2]. Regarding a combined surgical technique (lateral facetectomy plus a proximal realignment) does little to extend the success of the procedure [4, 5].

Both PFA and TKA are successful approaches, but the complication rates after PFA are concerning. Patients who undergo first-generation PFA rather than TKA are more likely to experience complications and require reoperation or revision; a subgroup analysis suggested a relation to implant design [7]. There is no significant difference reported in reoperation, revision, pain, or mechanical complications between second-generation PFA and TKA, and PFA can yield clinical outcomes comparable to that of TKA while being a less invasive surgical option. In spite of the good short-term results of PFA for isolated PF OA, the rate of revision is high suggesting that TKA may be the best option in patients older than 60 years of age [5]. On the contrary, in patients younger than 60 years and those with PF OA due to trochlear dysplasia or patellar fracture PFA can be advocated. The Kaplan–Meier survival rate of PFA at 5 years is 95% [14]. The survival of the LCS design of PFA has been reported to be 73% at 4.5 years and 48% at 5.5 years [1, 23]. With the Avon, design the reported survival at 5 years has been between 95% and 100% [17, 18].

In conclusion, there is still no gold standard for the treatment of isolated PF OA and its optimal treatment is unclear at present. Recent literature appear to indicate that PFA is most successful in patients who have isolated PF OA secondary to trochlear dysplasia or patellar fracture and in patients who are younger than 60 years. TKA, however, is most successful in older patients who have primary or idiopathic isolated PF OA [5]. Nonoperative treatment should be explored fully before PFA or TKA are considered. Prospective randomized studies are needed for the future to address the unanswered question: which surgical procedure (PFA, TKA, or lateral facetectomy) has the highest survival rate in the long term?

## Disclosures

**Conflict of Interest:** E. Carlos Rodriguez-Merchan, MD, PhD has declared that he has no conflict of interest.

**Human/Animal Rights:** This article does not contain any studies with human or animal subjects performed by the author.

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