



Patellofemoral Arthroplasty: Early Demographic and Radiological Analysis for Less Complications and Better Results

MD. Julio C. Fernandes^{1*}, MD. Pierre Ranger¹, Luis Fernando Jordao Dos Santos²

¹Université de Montreal/CIUSS du NIM, Hôpital du Sacre Cœur de Montreal, Montreal, QC, Canada

²Medical Assistant, Knee Surgeon at Trauma Center Serviços Medico Hospitalares, Brazil

*Corresponding Author: MD. Julio C. Fernandes, Université de Montreal/CIUSS du NIM, Hôpital du Sacre Cœur de Montreal, Montreal, QC, Canada.

DOI: 10.31080/ASOR.2022.05.0631

Received: October 12, 2022

Published: November 11, 2022

© All rights are reserved by MD. Julio C. Fernandes., et al.

Abstract

Background: Isolated patellofemoral arthritis represents around 15 to 20% of all patients with knee pain. Patellofemoral Arthroplasty has become an interesting option for severe patellofemoral joint arthritis because of the good results obtained with new implants designs.

Methods: This retrospective study has revised 117 medical records of patients submitted to patellofemoral joint arthroplasty between 2007 and 2017 at Sacre Coeur and Jean Talon Hospitals in Montreal - QC, Canada.

Results: The study has shown patellofemoral arthrosis in 52,9% of cases, followed by trochlear dysplasia (41,8%) and these are the most important factor to guide patients to surgery specially in young women (2,3:1/F:M) around fifties (50,3 yo average). Patellofemoral arthroplasty is preceded by another surgical treatment in 24,6% of cases. Patellar malalignment is present in 86,3% of patients divided in lateral displacement (24,7%), tilt patellar lateral (41,1%) and patellar height (20,5%). Patellar overstuffing is the most frequent early complication observed in 12,8% of patients. Other clinical complications had the same rate for TKA and UKA.

Conclusion: Patellofemoral Arthroplasty is a less aggressive option to treat isolated PF Arthrosis presenting the same rates of Total Knee Arthroplasty. Patellar alignment should be evaluated preoperatively and reestablished to reach good results.

Keywords: Patellofemoral Arthroplasty; Demographic; Radiological; Better Results

Introduction

Isolated patellofemoral arthritis is a common degenerative knee disease [1] representing approximately 10 to 24% of all patients with knee pain. Recently, there has been a renewed interest in the use of Patellofemoral Arthroplasty (PFA) for severe chondrosis or patellofemoral joint arthritis [2]. This trend occurred in consequence of the good shortcomings results achieved with new patellofemoral implants designs [3].

In spite of these advantages and improvements, several studies have reported PFA failure rates up to 20% [1] and some authors still remain using Total Knee Arthroplasty (TKA) to treat isolated patellofemoral osteoarthritis. Then, good results after PFA depend

primarily on careful patient selection, implant design and surgical technique. Strict inclusion and exclusion criteria are mandatory for a long-term survivorship and satisfactory outcomes [4].

The aim of this article is to analyze the medical records of the patients submitted to a PFA from 2007 to 2017 at Hospital du Sacre Coeur de Montreal/Hospital Jean Talon to identify the demographic variables, radiological results and complications rates for the patellofemoral joint replacement procedure.

Materials and Methods

We retrospectively revised medical records from patients submitted to Patellofemoral Arthroplasty at Hospital du Sacre

Coeur de Montreal and Hospital Jaen Talon, both parts of Orthopedic Service of University of Montreal - QC, Canada between January 2007 and December 2017.

We collected information available in the patient’s medical records, based on Leadbetter, *et al.* [2].

The initial diagnosis, indications and contra indications for surgery was based on the surgeon’s evaluation; we later on matched these to current indications and contra indications for PFA in Pisanu, *et al.* [5].

Indications	Contraindications
Advanced Primary PFOA	ABSOLUTE
Post traumatic PFOA	Tibiofemoral OA
Trochlear Dysplasia	PF Malalignments
Patellar Subluxation or mild patellar tilt	Knee instability (ligaments/ meniscus)
Fail extensor mechanism unloading procedures	Limb Malalignments Valgus > 8 degrees / Varus > 5 degrees
Age > 40 y	Acute Infection Systemic Inflammatory arthropathy Medial or lateral joint pain Chronic regional pain/Psychogenic pain
	RELATIVE Quad Atrophy Patella Baja BMI > 30 Kg/m2

Table 1: Indications and Contraindications for PFA.

Concerning to radiological evaluation of patellofemoral joint, we classified the patients obeying the topics described by Farr, *et al.* [6] pre and postoperatively. This imaging studies aim to identify biomechanical problems associated to patellar position, trochlear morphology, tibiofemoral arthritis, limb alignment and other cause to instability.

We analyze the surgical technique respecting what was presented by Farr [6] concerning to skin incision, articular approach and bone cuts.

Regarding to thromboprophylaxis Senay, *et al.* [9] criteria was applied. The antibiotic management based on American Academy of Orthopedic Surgeon’s recommendations [7]. Bleeding control and blood transfusion criteria was evaluated based on El Baheiry [10].

We’ve also analyzed records about management of tourniquet use, drains, surgery time and length of stay based on AAOS [7] and the different aspects of complications established by Lustig, *et al.* [11] determined the analysis criteria.

Results

Our series has 101 consecutive patients, involving 117 knees, 39 males and 62 females with a mean age of 50,3 (range from 30 to 83 years) with prevalence in left side (57%) and 16 of bilateral cases. Body Mass Index (BMI) average is 28,7 Kg/m² performing from 20,01 to 41,78 and we had 14 patients (13,8%) with BMI > 30 KG/m².

The time between the onset of symptoms and the surgery varies from 6 months to 10 years and 1 to 2 prior procedures had been made before the patellofemoral arthroplasty. Isolated arthroscopic debridement or arthroscopy followed by tibial tubercle osteotomy was done to 29 cases (24,7%).

The leading surgical indication is patellofemoral arthrosis (62 cases - 52,9%) followed by trochlear dysplasia (49 cases - 41,8%). The preoperative radiologic joint evaluation showed patellofemoral joint arthrosis (Iwano Classification) Grade I in 57,3%; Grade II in 24,7% and Grade III in 15,8% of patients. The femorotibial joint

arthrosis (Kelgren-Lawren Classification) showed Grade I in 53,1%; Grade II 30,3% and Grade III 10,1% of patients. Normal axial alignment is present in 109 patients (93%).

Trochlear dysplasia presented in 49 cases represents 41,8% of total cases and varying from classification A (24 cases); B (19 cases); C (4 cases) and D (2 cases).

The lateral patellar displacement pre-operatively varies from 2 to 33 mm (average 8,7 millimeters) and 29 patients (24,7%) presented more than 10 mm. Post-operatively displacement from 0 to 11 (average 2 millimeters). Patellar tilt greater than 15 degrees is present in 48 cases (41,1%) pre-op and 19 cases (16,4%) post-op. Patella Alta (Caton-Deschamps Index - CDI > 1,2) is present in 24 cases (20,5%) pre-op and 49 cases (41,8%) post-op.

All cases we have used the Onlay Design Patellofemoral Joint Prosthesis from 3 different brands: Avon (Stryker) 3 cases; Journey PFJ Smith and Nephew 109 cases and Zimmer Gender Solution PFJ System 5 cases. Anteromedial approach and arthrotomy performed in 108 cases however we had 9 cases (7,7%) of lateral arthrotomy.

Analyzing the length of stay we found 86,1% of three days hospitalization and the drain was not used anymore. Tourniquet was not used for 9 cases (7,7%) and the rest used only for the cement time with the average time of 7 minutes varying 6 to 9 min. The surgery average time was 41 min varying from 35 to 53 minutes.

Even according with American Academy of Orthopedic Surgeons recommendations for antibiotics and thromboprophylaxis we had 02 cases (3%) of superficial infection and 04 cases (5%) of DVT (deep venous thrombosis) and no cases of PTE (pulmonary thromboembolism).

Early surgical complication rate was 12,8% involving 15 cases. Increased peripatellar pain caused by patellofemoral overstuffing as the main complication present in 12 cases. We revised these cases in 7 total knee arthroplasties (TKA) and 3 PFJ downsizing and 2 cases of reconstruction of MPFL one of it with anteromedialization of tibial tubercle. The Femorotibial arthrosis progression is present in 4 (3,41%) cases and no revision surgery was indicated because

of it.

Discussion

Demographic aspects of our study provide the same as shown by Lonner [12], patients younger than 55 years old are the best candidates for patellofemoral arthroplasty. Van der List, *et al.* [1] have mentioned the prevalence higher in females and we matched 2,3:1 (F:M). Body Mass Index (BMI) was observed and had no influence in our series like Leadbetter [2].

The wide length of time between the beginning of symptoms and the PFA is done by the results of prior procedures listed by Leadbetter [2,3] and the level of patellofemoral biomechanics restoration. It means PFA is not the first choice to treat but it's a good solution associated with biomechanical restoration.

Pisanu, *et al.* [5] have described that radiologic pre-op evaluation is important to identify the knee related risk factor and presence of patellofemoral osteoarthritis, malalignment and trochlear dysplasia; like observed in our series 93% of patients had at least one or more of that radiological finding.

Otherwise the contraindications described by Leadbetter [2], we operated patients with tibiofemoral arthrosis greater than Grade 1 and it has not changed the outcomes. No patient has to be re-operated due the femorotibial arthrosis progression. In the other way of thinking Gupta, *et al.* [13], those patients presenting patellofemoral instability were operated for patellofemoral joint replacement in association with procedures to restore the normal patellofemoral tracking.

Patellar overstuffing represents the main early post op complication leading to an anterior knee pain [11,14] and the same was noted in our series. Correct patellar tracking and avoid malalignment at the end of patellofemoral arthroplasty procedure is necessary. After 2016 we addicted the reconstruction of MPFL to keep the correct alignment and the results are promise. No late complications were observed according to Lustig [11].

The onlay trochlear design reduces the early patellar instability [15] and this design was chosen as default for our series. A lateral approach is an option to restore the normal patellar alignment and avoid an additional lateral release after the PFA.



Figure 1: Image file of a successful PFJ to restore patellofemoral alignment.

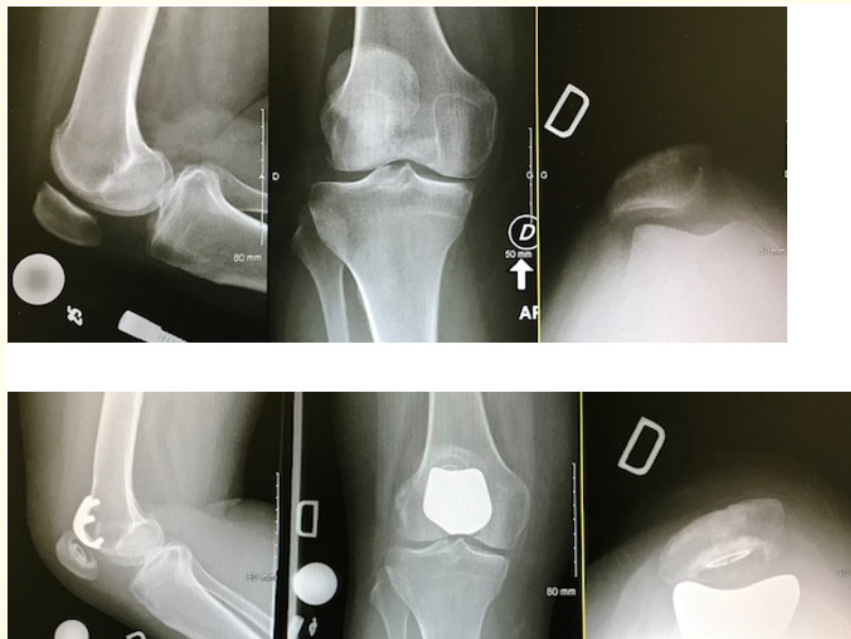


Figure 2: Image file of an in successful PFJ. Lateral patellar overstuffing.

In spite of being a less complexity and less aggressive surgery, comparing to TKA, our series of patellofemoral joint arthroplasty presents the same rate for length of stay, deep venous thrombosis and infection [8]. Tourniquet is not necessary even for the cement time and it is a surgery that takes less than one hour. Selected patient can be included in the protocol of prosthesis day hospital [16].

As a failure factor for the study concerning low relevance we can mention the fact that it is a retrospective study of medical records and radiographic analysis. Reduced follow-up time of cases, with more than 75% of the cases analyzed with a follow-up of less than 5 years.

Conclusion

The concept of Patellofemoral Arthroplasty remains interesting option when thinking to restore the normal articular surface but specially to provide the correct patellofemoral joint alignment and avoid a major aggressive procedure like complete joint replacement. Patellofemoral prosthesis is not able to correct the alignment and biomechanical of patellofemoral joint alone. This series demonstrate that it is possible to reach good results with PFA when patellar tilt and lateral displacement are corrected. The correct patient evaluation and selection added to experienced

Bibliography

1. Van der List JP, et al. "Why do patellofemoral arthroplasties fail today? A systematic review". *Knee* 24.1 (2017): 2-8.
2. Leadbetter WB., et al. "The appropriate use of patellofemoral arthroplasty: an analysis of reported indications, contraindications, and failures". *Clinical Orthopaedics and Related Research* 436 (2005): 91-99.
3. Leadbetter WB., et al. "Indications, contraindications, and pitfalls of patellofemoral arthroplasty". *Journal of Bone and Joint Surgery* 88.4 (2006): 122-137.
4. Lonner JH and Bloomfield MR. "The clinical outcome of patellofemoral arthroplasty". *Orthopedic Clinics of North America* 44.3 (2013): 271-280.
5. Pisanu G., et al. "Patellofemoral Arthroplasty: Current Concepts and Review of the Literature". *Joints* 5.4 (2017): 237-245.

6. Farr J 2nd and Barrett D. "Optimizing patellofemoral arthroplasty". *Knee* 5 (2008): 339-347.
7. Walker T, et al. "Patellofemoral arthroplasty: the other unicompartamental knee replacement". *Instructional Course Lectures* 62 (2013): 363-371.
8. Quinn RH., et al. "Surgical Management of Osteoarthritis of the Knee". *Journal of the American Academy of Orthopaedic Surgeons* 26.9 (2018): e191-e193.
9. Senay A., et al. "Incidence of symptomatic venous thromboembolism in 2372 knee and hip replacement patients after discharge: data from a thromboprophylaxis registry in Montreal, Canada". *Vascular Health and Risk Management* 14 (2018): 81-89.
10. El Beheiry H., et al. "Tranexamic acid administration to older patients undergoing primary total hip arthroplasty conserves hemoglobin and reduces blood loss". *Canadian Journal of Surgery* 61.3 (2018): 177-184.
11. Lustig S., et al. "Patellofemoral arthroplasty, where are we today?" *Knee Surgery, Sports Traumatology, Arthroscopy* 20.7 (2012): 1216-1226.
12. Lonner JH. "Patellofemoral arthroplasty: pros, cons, and design considerations". *Clinical Orthopaedics and Related Research* 428 (2004): 158-165.
13. Gupta RR., et al. "Scientific evidence for the use of modern patellofemoral arthroplasty". *Expert Review of Medical Devices* 7.1 (2010): 51-66.
14. Lustig S. "Patellofemoral arthroplasty". *Orthopaedics and Traumatology: Surgery and Research* 100.1 (2015): S35-43.
15. Rodriguez-Merchan EC. "Surgical treatment of isolated patellofemoral osteoarthritis". *HSS Journal* 10.1 (2014): 79-82.
16. Koh IJ., et al. "The Patient's Age and American Society of Anesthesiologists Status Are Reasonable Criteria for Deciding Whether to Perform Same-Day Bilateral TKA". *Journal of Arthroplasty* 30.5 (2015): 770-775.
17. Grelsamer RP, et al. "The pathophysiology of patellofemoral arthritis". *Orthopedic Clinics of North America* 39.3 (2008): 269-274.

18. Lonner JH. "Patellofemoral arthroplasty". *Orthopedics* 33.9 (2010): 653.
19. Minkowitz RB and Bosco JA. "Patellofemoral arthritis". *Bulletin of the NYU Hospital for Joint Diseases* 67.1 (2009): 30-38.
20. Willekens P, *et al.* "Outcome of patellofemoral arthroplasty, determinants for success". *Acta Orthopaedica Belgica* 81.4 (2015): 759-767.