Mid-term Results of Isolated Patello-femoral Joint Replacement for Patello-Femoral Joint Arthritis: A United Kingdom District General Hospital Experience

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Abbreviations
PFJA Patello-Femoral Joint Osteoarthritis; KSS: Knee Society Score; OKS: Oxford Knee Score; TT: Tibial Tubercle; CPPD: Calcium Pyrophosphate dehydrates crystal deposition Disease

Introduction
Patellofemoral joint osteoarthritis (PFJA) affects 9.2% of patients aged more than 40 years [1]. However, despite its frequency, this condition has proven historically to be difficult to treat. In recent years a better understanding of the disease, the biomechanics of the joint and the improvements of prosthetic design have made patellofemoral joint replacement (PFJR) an attractive option.

The aim of the study is to report the clinic-radiological results, functional outcomes, survival analysis at intermediate follow-up (minimum of 5 years) of isolated PFJR for anterior compartment arthritis of the knee of a single center, single surgeon series in a United Kingdom district general hospital.

Materials and Method
A retrospective study was done of 21 patients with PFJA who underwent PFJR between March 2002 and January 2010 with a minimum follow-up of 60 months. Inclusion criteria were patients with PFJA who have failed to obtain satisfactory control of their symptoms after a trial of medical treatment which included: activity modification, medication, supplements, exercises, stretches, physiotherapy, braces and injections.

All operations were done by the senior author (QJA). All patients had antibiotic prophylaxis with Cefuroxime at induction and two postoperative doses after 8 and 16 hours. A standard medial parapatellar approach was used. We used the AVON Patello-Femoral arthroplasty (Stryker Howmevica Osteonics, Allendale, New Jersey) initially and the Femoro Patella Vialli FPV patellofemoral joint replacement (Wright Medical Technology UK). All prosthesis was cemented using third generation technique. Patients were mobilised the first day after surgery, full weight bearing with crutches and had physiotherapy. Most patients were discharged home the third day postoperatively. They were reviewed clinically at 6 weeks, 12 weeks, 6 months and yearly for 5 years.

We used the Knee Society score (KSS), the Oxford knee score (OKS) and ability to climb stairs as outcome measures. Plain radiographs taken preoperatively, immediately postoperatively (skyline view not performed), at 3 months and 12 months (3 views) were reviewed for signs of loosening. The end-point for survival analysis was revision for any reason (TKR, infection, fracture, etc.).

Results
The mean age at surgery was 62.7 years (49.9 - 78.4 years). There were seventeen females and 4 males. The mean follow-up was 5.2 years (4.0 - 9.0 years).
The preoperative Oxford knee score (OKS=60) was 16.9 (10 - 29). The postoperative Oxford knee score was 36.1 (21 - 48). The mean improvement in OKS was 19.2 (7 - 36). The preoperative Knee society score (KSS=100) was 65.3 (47 - 94). The postoperative Knee society score (KSS) was 87.6 (65 - 99). The mean improvement in KSS was 22.3 (5 - 45). The preoperative ability to climb stairs was 1.5 (0-3). The postoperative ability to climb stairs was 2.9 (2-5). The mean improvement in stair climbing ability at average follow-up of 5.3 years was 1.3 (1-2).

Table 1: Summary of case series.

Table 2: Improvement in Oxford knee score (OKS) (red preoperative, blue postoperative) and Knee Society score (KSS) (blue preoperative, red postoperative).
The survival rate was 95% at 9 years (Tables 1-3, Figure 1). One patient developed a superficial wound that cleared with antibiotics and no deep wound infections were recorded. One patient had stiffness that needed manipulation under anaesthesia with improvement. One patient needed revision to total knee replacement due to progression of medial compartment osteoarthritis and pain. There were no fractures in our series.

Discussion

The demographics of the series are similar to other series with women more frequently impacted [1-5]. This is due to differences in knee anatomy, previous knee injury, kinematics and hormonal influences. Anatomic factors that may play a role include narrower femurs, patella alta, trochlear dysplasia, thinner patella, large quadriceps angle, weakened vastus medialis, contracted lateral retinaculum, patellar tilt, malalignment, absent or redundant medial patellofemoral ligament and differences in condylar size. Another important factor is a history of knee injury. It has been well established that women have increased incidence of ACL injuries and that these injuries lead to future osteoarthritis. Postmenopausal women, in particular, have an increased risk of developing arthritis and this has been linked to the decrease in oestrogen.

The greatest prevalence of chondral wear is on the lateral patellar facet[6]. Other causes of PFJA may include microtrauma, weight and activity level and genetic quality of the cartilage. For those patients who have end stage PFJA and debilitating symptoms other surgical alternatives are transfer of the tibial tubercle (TT), patellectomy and total knee replacement. Tibial tubercle transfer can be particularly indicated in younger patients. It has been used infrequently mainly because of the deformity created and the concerns about skin necrosis and nonunion.

The key principles in successful TT transfer are according to Fulkerson [7]:

a. Restore or maintain proper balance of the extensor mechanism.

b. Transfer load of a painful, degenerated area onto better cartilage. Transfer the tibial tuberosity medially to unload the lateral aspect of the patella and interiorly to unload the distal aspect.

c. Address retinacular sources of pain.

d. Perform tibial tubercle transfer in a way that allows early motion and prompt healing [5].

Patellectomy is simple and safe but has the drawback that it reduces the strength of the quadriceps and can result in chronic weakness in extension, extension lag or trochlear wear due to the contact of the tendon over time. The use of total knee arthroplasty for the treatment of isolated PFJA has been reported as an effective method in older age groups [5]. However, it may appear that a tricompartmental arthroplasty is an excessive response to a unicompartmental condition.

In the early days of PFJR the results were unsatisfactory due to problems related to patient selection, lack of understanding of the extensor mechanism, surgical technique and durability of the implant. However, prosthesis design has evolved to produce improved outcomes. Mont et al [5] reported a series of 43 PFJR with a seven year follow-up and a survival rate of 95%. Van

Table 3: Results of stair climbing (dark red preoperative, light red postoperative).
Jonbergen et al [3] published long-term (13.3 years) results with survivals of 84% at 10 years and 69% at 20 years. Their rate of revision was higher in obese patients.

We believe PFJR is primarily indicated in patients with isolated PFJA who are young for a TKR (less than 55 years-old). The procedure should not be done in patients with inflammatory arthritis or calcium pyrophosphate dehydrates crystal deposition disease (CPPD). It is most effective for treating patellofemoral dysplasia and it should be used cautiously in patients with considerable maltracking or malalignment. In such cases, a lateral retinacular release or even a tibial tubercle transfer may be considered.

In addition PFJR has the advantage of maintaining knee biomechanics, preserving the menisci and cruciates, early mobilization, higher function and less invasiveness compared with total knee replacement. Our clinical results and survivorship are similar to the ones reported by other groups using the same implants [8]. Our case series has small number of patients but has in favor that it has been performed by a single knee surgeon in a District General hospital.

Conclusion

a. PFJR is a safe and effective treatment for PFJA.
b. Mid-term results are promising and postpones the need for total knee replacement making it suitable for younger patients
c. It has a low complication rate.
d. Survival is similar to recent series (95% survival at 5.2 years).

References