

Porous Coated Anatomic (PCA) Total Knee Replacement: Early Experience in Bahrain

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ABSTRACT

The first forty consecutive Porous Coated Anatomic (PCA) total knee replacements were reviewed in order to study the early results and identify problems and factors responsible for early failure. The mean follow up was 24.5 months.

The most serious preoperative problem was small size bones rendering the use of jigs difficult.

The majority of early complications were related to wound healing and one of the factors responsible might have been the very early use of Continuous Passive Motion (CPM). Late complications included a case of patellar impingement and one of progressive instability.

There were 33 satisfactory knees (82.5%) and 7 failures (17.5%).

Factors responsible for the early failures were mainly poor patient selection and technical errors at operation.

The knee is the joint most commonly affected by osteoarthritis. This is particularly true in this part of the world where osteoarthritis of the knee is a cause of pain and disability to a great many people and at a relatively

young age. For those knees with advanced disease not suitable for conservative surgery and in which conservative measures are ineffective, joint replacement is the only option to achieve pain relief while preserving motion and correcting deformity. However, prosthetic replacement of the knee due to its anatomy and complex biomechanics is not without problems and the large number of prostheses that are available bear witness to this fact.

The prosthesis currently used in Salmaniya Medical Centre (SMC) for total knee replacement is the PCA which is a minimally constrained tricompartmental resurfacing prosthesis designed to retain the posterior cruciate ligament⁹.

The purpose of this paper is to review the early experience with PCA total knee replacement in Bahrain.

METHODS

From April 1990 to February 1992, forty consecutive modular total knee replacements were carried out on twenty eight patients. Twelve patients had bilateral knee replacement while sixteen had unilateral. There were nine men and nineteen women with ages ranging from 14 years to 79 years with a mean of 56.6 years. Men were generally older than the women. The mean age for men was 64 years whereas the women was 53. Majority of the patients were suffering from osteoarthritis. There were 22 patients with

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Table 1
Number of patients with adverse conditions

Chairbound (2-4 years)	3
Gross obesity	2
Severely incapacitated	
- cervical myelopathy	1
- severe deformity	2
Total	8

osteoarthritis and 6 with rheumatoid arthritis. Three of the patients were totally chair bound for 2 to 4 years and there was a number of other adverse conditions which are shown in table 1. Six patients had previous surgery to the knee (Table 2).

A standard operative technique was employed, using the second generation universal instrumentation. In some patients however the bones were too small for the existing jigs rendering the use of these jigs difficult. In these cases some improvisation was necessary and the prostheses used although the smallest available were a little larger than optimal. In the majority of patients the femoral component was left uncemented but the tibial base plate was cemented. In two patients a large defect of the medial tibial plateau necessitated bone grafting. In no case was a patellar prosthesis used. Instead the patella was debrided and osteophytes removed. Patellar tracking was carefully checked and appropriate lateral retinaculum release was done whenever necessary.

Table 3
Rating of results based on pain, residual deformity or instability and range of motion

Excellent to very good:	
- Painfree or minimal discomfort	
- No residual deformity	
- Range of motion 90 degrees or over	
Good:	
- Some pain on WB controlled by NSAIDS	
- Residual deformity < 10 degrees	
- Flexion 90 degrees or more	
Poor:	
- Moderate to severe pain	
- Residual deformity > 10 degrees or instability	
- Flexion < 90 degrees	

Table 2
Previous surgery in 40 knees

Upper tibial osteotomy	3
Synovectomy	1
Meniscectomy	1
Arthroscopic washout	1
Total	6

Postoperatively all patients received CPM with the Toronto apparatus as well as quadriceps and active assisted exercises. Weight bearing was allowed when the patient was able to straight leg raise usually around the seventh day.

Follow up ranged from 12 to 34 months with an average of 24.5 months. The results were assessed according to pain, residual deformity and range of motion as shown in Table 3. For a result to be considered very good the patient had to have no pain or only minimal discomfort, there should be no residual deformity and knee flexion should exceed 90 degrees.

RESULTS

Complications

There were 6 early complications most of them related to wound healing (Table 4).

Table 4
Complication in 40 PCA knee replacements

Early:	
- Subcutaneous haematoma & delayed wound healing	2
- Marginal skin necrosis & delayed wound healing	2
- Haemarthrosis	1
- Bell's palsy	1
	6
Late:	
- Septic arthritis (6/12 postop strep. pneum.)	1
- Impingement of patella	1
- Ligament laxity/instability	2
- Severe flexion deformity	3
	7

Table 5
Follow up surgery for the management of complications

Aspiration of haemarthrosis	1
Manipulation under anaesthesia	1
Hamstring lengthening / capsulotomy	2
Patelloplasty	1
Arthroscopic washout / drainage	1
	6

Late complications included one septic arthritis with streptococcus pneumoniae six months postoperatively, one patellar impingement in a patient with cervical myelopathy who subsequently developed progressive instability and in another patient ligament laxity with a degree of instability. The infected knee was treated with arthroscopic washout and intravenous antibiotics and the infection was successfully controlled but the knee remained painful and the final outcome was unsatisfactory. Three patients (4 knees) developed severe flexion deformity. One was a 14 year old girl chair bound preoperatively due to severe juvenile RA affecting many joints including the hips. The other two were elderly patients with very poor motivation.

Follow up surgery for the management of complications is shown in Table 5.

Outcome at a 2 year follow up

Out of the 40 knees 26 (65%) were rated as excellent or very good. The great majority were painfree and only a few had minimal pain. Flexion was 90 degrees or more with a maximum of 130 degrees. The average flexion for the group was 105 degrees. Seven knees were rated as good bringing the total number of satisfactory knees to 33 (82.5%).

There were 7 failures of which 6 were due to instability or severe flexion deformity and the seventh due to late infection.

DISCUSSION

In the past 25 years the treatment of severe arthrosis of the knee has been revolutionised by prosthetic replacement arthroplasty. With improved materials and better understanding of the complex biomechanics of the knee joint it has been possible to develop minimally

constrained total knee prostheses with greater expectations. Furthermore, developments in instrumentation have improved accuracy of orientation and implant to bone contact. The advent of porous coated metal surfaces for anchoring the prosthetic components to bone without bone cement has enabled us to eliminate or minimise the use of polymethyl-methacrylate (PMMA) with its problems and adverse effects^{6,7}.

Total knee replacement in Bahrain is still in its infancy and with a small series and relatively short follow-up it would be premature to draw any definitive conclusions, especially as the longterm demands placed upon the prostheses may be very different from other places owing to the social habits of the population of this area. Nevertheless some useful observations can be made.

The most serious pre-operative problem was small size bones rendering the use of the jigs difficult. Since then new jigs and extra small prostheses are available thus overcoming the problem.

Apart from the one late infection, which taking into account the type of organism, might well have been a primary haematogenous infection, there were no serious complications. The relatively high rate of early failure is principally due to poor patient selection although other factors such as technical errors and failure to anticipate problems were also responsible. The pre-operative state of the patient as a whole, associated hip problems and patient motivation appear to have a very important bearing on the outcome of total knee replacement.

With regard to the patellofemoral joint it appears that resurfacing of the patella is not a prerequisite for a good result provided due attention is paid to patellar tracking. Patellofemoral symptoms after failure to resurface the patella in total knee arthroplasty are known to cause concern and they have been encountered in a number of patients in this series^{10,11}. At the same time resurfacing the patella does not necessarily eliminate patellofemoral joint problems and it seems that the majority of these are self-limited and may be managed symptomatically^{1,2,3,5,8,9}.

The overall success rate of 82.5% provided there is no significant deterioration with time compares favourably with published results^{4,8,9}. With increasing experience and better patient selection one can expect the overall success rate to improve further.

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