INDIAN JOURNAL OF ORTHOPAEDICS
April 2006
Volume 40 : Number 2 : P. 74-77

Unicondylar knee arthroplasty in unicompartment osteoarthrits : early results

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Background: Knee Arthritis in most patients begins and remains confined to medial compartment. Unicondylar knee replacement (UKR) can be better alternative in these selected patients.

Methods: Eighty one consecutive unicondylar knee arthroplasties in 60 patients of isolated medial compartment arthritis were done using Allegrato unicondylar knee. Patients were followed up at 6-month interval with average follow up 1.8 yrs. Knee society score was used for comparative evaluation of these patients.

Results: The mean pre operative knee society score of 62 improved to post op. score of 94. No complication reported so far except one case of tibial base plate dislocation requiring re fixation. Our short-term results are good to excellent with 100 % survival at avg. follow up of 1.8 years.

Conclusion: UKA is better alternative with many advantages in selected patients of early symptomatic medial compartment arthritis. However proper patient selection improvised design, exacting surgical technique and experienced team with established center are must for uncompromising results.

Key-words: Unicondylar knee arthroplasty (UKA); Medial compartment arthritis (MCA); Unicondylar knee replacement (UKR).

Introduction

Osteoarthritis of knee is common affection in our country compared to western world. Even in United States, arthritis or rheumatism is a major and foremost cause of disability in adults (2.2 times compared to heart disease) [1]. The ICMR survey conducted in 1984-85 of elderly persons over 60 yrs of age attending geriatric clinics showed 40% suffer from diseases of locomotive system [2]. There are an estimated around 20 million people in our country suffering from symptomatic knee arthritis that requires some kind of treatment-either medical or surgical. The total cost of AORC (arthritis & other rheumatic conditions) in the United States in 1997 was $86.2 billion (including $51.1 billion in direct costs and $35.1 billion in indirect costs), approximately 1% of the U.S. gross domestic product (GDP) [3]. In most patients of osteoarthritis knee, involvement begins with medial compartment. In almost 70% of patient's arthritis remain confined to medial compartment till their death. These are a potential group of patients, which can be benefited from more conservative surgery in form of partial replacement surgery, Unicondylar knee arthroplasty when surgery is opted for management of arthritis. It is estimated that out of all the patients who have been advised for total knee replacement almost 30% of them can be well managed with unicondylar knee arthroplasty only.

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Materials and methods

Patient selection: This retrospective plus prospective study was conducted to evaluate the results of unicondylar knee arthroplasty in patients of symptomatic medial compartment arthritis operated between July 2002 and February 2006 by a single surgeon at our institute. Eighty eight patients, 27 male and 51 female patients were selected having medial compartment arthritis[4]. One hundred and three unicondylar knee replacement surgeries (53 unilateral and 25 bilateral) were done using Allegrato unicondylar knee. Age of patients ranged from 40 to 78 years with average age of 52.5 years. Patients were selected after thorough clinical and radiological evaluation and only those with medial unicompartmental disease were selected.

Patients were graded according to classification proposed by Romagnoli[5] for medial compartment arthritis (Table I).

Table I. Classification

Grade	Features	Recommneded treatment
1	Joint space narrowing	AscopyHTO//unispacer
2	Obliteration of joint space	HTO+A"Scopy/unispacer UKA
3	Obliteration+translation+ mild PF involvement	UKA
4	As above _ ACL deficiency	UKA/TKA

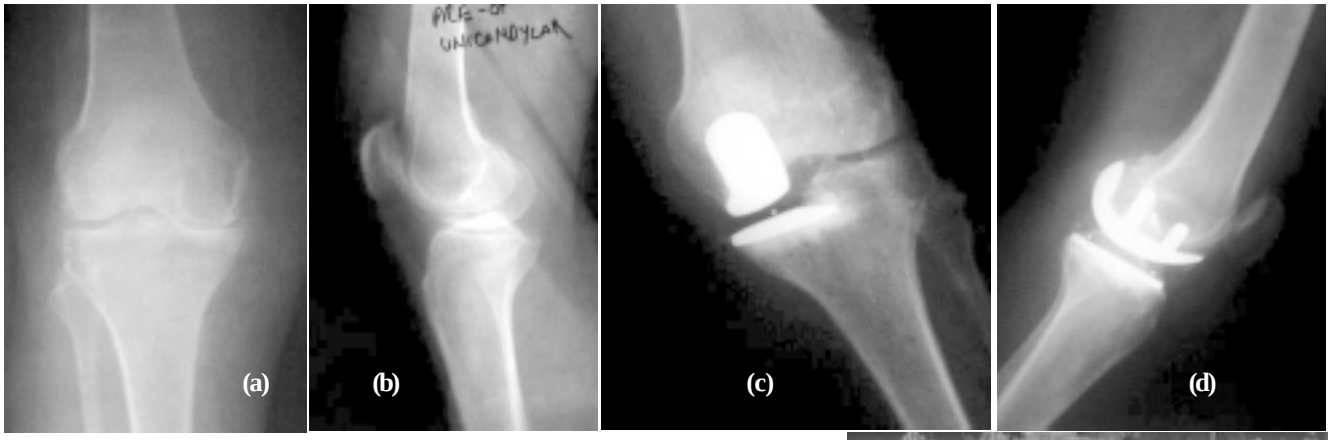

Fig. 1 (a,b) ***X-rays AP and lateral view showing medial compartment osteoarthritis,*** **(c, d)** ***Post-operative X-rays,*** **(e)** ***Clinical photogrpahs showing flextion at knee-joint.***

Those patients with bi compartment or tri compartmental involvement, those with cruciate deficiency or with inflammatory arthritis were excluded. Those with more than 15^0 varus deformity and with flexion deformity more than 10^0 or passive range of motion less than 80^0 were also excluded All patients were subjected to routine radiological investigation along with valgus stress view. Those with fixed varus deformity were also excluded from study[4].

Pre-operative evaluation: On pre operative evaluation 76 knees were of arthritis grade 2 and 27 knees were of arthritis grade 3. Average pre operative varus deformity was 6 deg (range 4 to 12 deg). The range of movement was between 80 to 95 deg (avg. 85 degrees). Average preoperative walking distance was 1.1 Km (range 0.4 to 1.8 Km). Overall Knee society score preoperatively was from 44 to 72 with average of 62.

Operative technique: All patients were operated under regional anesthesia (spinal and or epidural anesthesia). Minimally invasive surgery was done using medial para patellar incision. Minimal soft tissue release was done.

Tibial cut was perpendicular to metaphyseal axis in frontal plane. Precaution was taken to avoid avulsion or fracture of cruciate ligament or intercondylar eminence. Posterior slope was kept between 0 to 3 deg in saggital plane.

Femoral resurfacing was done at right angle to tibial cut at the edge of medial supracondylar line. With knee in extension a mark was made at the edge of trial tibial component, which marked the superior limit for femoral component to avoid patellofemoral impingement. With this reference, femoral zig was used to make distal femoral condylar cut.

Trial reduction was done and thickness of tibial base plate selected to keep the residual knee alignment in under corrected position so as to avoid lateral compartment overloading. Osteophytes if any were removed from intercondylar notch. Patelloplasty was done when required based on per operative findings. Multiple drill holes were made on femoral side for better cementing and criss cross-superficial cuts made on tibial side for the same.

Pulsatile lavage wash was given to remove bone flecks and expose marrow cavities for cement penetration. Components were fixed using single pack of high viscosity cement. After seating tibial component, femoral component was inserted and knee extended with application of static pressure on implants till cement set solidly. After cementing a thorough pulsatile wash was given again. Anatomic closure was done with knee in 90 deg flexion with use of negative suction drain. Postoperative radiological evaluation was done in anesthesia recovery room.

Average operative time was 1 hour 5 minutes (from skin to skin). Total blood loss both intra operative and post operatively in suction drain was around 300 ml on an average.

Post operatively patients were put to foot pump and static quadriceps exercise on the same day of surgery after recovery of anesthesia. Prophylaxis for deep vein thrombosis was given

in selected very elderly patients or in whom there was a risk factor. Knee range of motion, hamstring stretching and quadriceps strengthening exercise was started as soon as patients were comfortable, usually on 2nd postoperative day. Full weight bearing walking was allowed with use of stick support. Special emphasis was laid on gait training. Almost all patients were discharged by 5th postoperative day (range from 3rd day to 7th day post operatively).

Results

Though routine evaluation was done a regular interval, at 6-month post operative thorough clinical and radiological evaluation was done and findings recorded for comparative evaluation for this study. Knee society score was used to compare the overall functional results. Knee society score improved to an average of 94(range 90 to 96). Knee flexion increased to an average of 126 deg (range 114 to 142 deg). There was an excellent improvement in walking distance, with average 5.3 km (range 2.8 to 6.5 km). On radiological evaluation the tibiofemoral alignment ranged from 2 degree valgus to 4 deg varus; an average of 2 deg varus (Fig. 1). There was no evidence of osteolysis, loosening or change in position of component fixation on comparative radiological evaluation till date with one exception.

There were no major intraoperative or postoperative complications like fracture of tibial spine or cruciate injury. There is no single patient reported with infection so far. There was only one patient with complication where there was dislocation of tibial base plate at 1 year Follow up. This patient required re- exploration and refixation of base plate. No patient required revision to total knee arthroplasty or bilateral unicondylar knee. Using conversion in TKR as end point or failure results were 100% survivals at average follow up 2.2 years.

Discussion

Since in most patients of knee arthritis have predominantly medial compartment involvement, unicondylar knee replacement can be a better alternative to total knee replacement in selected patients. Advantages of unicondylar knee replacement are small incision, minimal soft tissue resection, shorter operative time, less blood loss, less chances of infection, better bone stock conservation (important consideration for future conversion to total knee replacement), option to convert to bi- unicondylar replacement if there is involvement of opposite compartment, rapid and more predictable recovery, more post operative range of motion and overall higher patient satisfaction. Though our study is of short term follow up (avg. follow up 2.2 yrs), there are many published results world over that has established the role of unicondylar knee replacement surgery in management of early knee arthritis with predictable long term results (87% to 98% with 6 to 15 year follow up)[7-14]. According to results shown by Ramagnoli, there is 96.9% survival at 9-12 yrs and 90% at 14 years with his experience of 1000 UKA using Allegrato unicondylar knee[5, 6]. Similar good to excellent results, 90% to 94% survival at 10 years, were documented by using Miller Galante unicondylar knee[15, 16].

Though high tibial osteotomy is considered as an alternative management modality in unicompartmental arthritis, the draw backs are, limited indications (in early grade 1/ 2 medial compartment arthritis), no long lasting and reproducible results (80% to 90% at 5years & 50 to 65% at 10 years)[17-22,] and compromised results of future definitive surgery (results of TKA after HTO are comparable to revision surgery and not with primary TKA). We obtained good to excellent early results of unicondylar knee replacement surgery. However thorough clinical and radiological evaluation for strict patient selection, improvised design, improved surgical technique, an experienced team and a well-established center are pre requisites for achieving uncompromising results.

Unicondylar knee replacement is an attractive option with better predictable results in management of early osteoarthritis knee or symptomatic unicompartmental disease. As no disease modifying drugs are available surgical option has to be resorted at some point of time, UKA is a better alternative to high tibial osteotomy or total knee replacement with many advantages. However proper patient selection, better surgical technique, better design and an established replacement center are pre requisites to achieve reproducible and long lasting results.

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