COMPREHENSIVE SURGICAL MANAGEMENT OF ARTHRITIC KNEE

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ABSTRACT

Total knee arthroplasty is not the only available surgical option for arthritic knees. It varies according to patient's age and severity of the disease. 105 arthritic knees were surgically treated at the Joint Replacement Centre of Army Hospital (R&R) in last 4 years. 77 knees were osteoarthritic and 28 were rheumatoid. 24 of these were treated by arthroscopic debridement, 7 underwent unicompartmental knee replacement and 74 underwent total knee replacement using Freeman Samuelsun (F/S) or Low Contact Stress (LCS) implants. The indications, contraindications, results and complications of these procedures are discussed.

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KEY WORDS : Arthroscopic debridement knee; Knee arthroplasty; Osteoarthritis; Rheumatoid arthritis; Unicompartmental knee replacement.

Introduction

Surgical management of arthritic knee has progressed greatly in the past 30 years and is often indicated when conservative measures can no longer provide sufficient pain relief and maintenance of function. Various surgical procedures are being performed, depending on the patient's age, functional expectations, patient activity demands, the underlying disease and degree of cartilaginous loss.

With modern imaging modalities arthritis of the knee has taken an ugly look. The well known deformities of varus/valgus seen on plain radiographs are greatly exaggerated by scans showing intricate details of articular cartilage damage, torn menisci, loose bodies and attenuated ligamentous structures. Much like an 80% triple vessel block begging for coronary artery bypass, the arthritic knee presents an end stage look wanting replacement. But somewhere in all these high tech images, the picture, which is missing, is the clinical one and so also the story of different surgical options utilized in the past, some quite successfully. Yes, total knee replacement is the ultimate in the surgeon's armamentarium but do all patients require it? Is surgery prescribed for reasons other than the requirements of the patient and the dictates of good surgical practice? At the Joint Replacement Centre at Army Hospital (R&R), we have reviewed 105 cases of arthritic knees treated by arthroscopic debridement, unicompartmental knee replacement and mobile/fixed bearing total knee replacements. The philosophy and approach to these procedures is discussed.

Material and Methods

Between Jan 1995 and Oct 99, 105 arthritic knees were surgically treated in the Joint Replacement Centre of Army Hospital (R&R). 77 knees were osteoarthritic and 28 were rheumatoid. 24 of these were treated by arthroscopic debridement. This procedure was carried out in patients less than 60 years of age with diffuse joint pain and minimal radiographic changes (joint space intact). Of these, one was subsequently given a unicompartmental knee replacement.

6 patients underwent seven unicompartmental knee replacements (one bilateral single stage replacement i.e. medial and lateral compartment on right and left knees respectively). Unicompartmental knee replacement was carried out in patients with isolated medial/lateral compartment arthritis. Initially this procedure was used in patients less than 60 years of age, but later on it was done even in patients above 75 years of age with unicompartamental arthritis.

74 knees were replaced in 59 patients, with F/S (61) and LCS (13) prostheses. 15 were bilateral cases, in which 5 had a one-stage procedure. Total knee replacement was done in patients with end-stage arthritis involving both compartments of knee joint.

Clinical evaluation of the patient was done by using the 100 point score system that assigns 50 points for pain, 20 points for range of motion, 10 points for alignment, 10 points for stability and 10 points for strength (Table-1).

Patients were thoroughly evaluated before surgery. Detailed history, clinical examination, routine and special investigations were carried out. Standing radiographs that included hip, knee and ankle on the same film were taken preoperatively. Preoperative preparation for replacement arthroplasty was started 48 hours before surgery. Antibiotic prophylaxis was started 24 hours before surgery and was continued for 7 to 10 days postoperatively. Low dose heparin was also given till patient was mobilized. Sutures were removed after 2 weeks and the operated knee was subjected to controlled passive motion exercises. Closed suction drain was put in all cases and removed after 2-3 days. Post operatively, a score of 91 to 100 points was designated as excellent, 81 to 90 points good, 71 to 80 points fair and below 70 points poor. In arthroscopic debridement the preoperative protocol remained the same but single bolus dose of antibiotic prophylaxis was used and

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TABLE 1
Scoring system for arthritic knee

Symptoms	Points	Maximum score	Minimum score
Pain	50	No pain	0
Stability	10	0-5 degrees	0
Deformity	10	0-5 degrees	> 15 degrees
Mobility	20	> 105 degrees	- 5 degrees
Quadriceps strength	10	> 75%	> 20 degrees
			0
			1-30 degrees
			0
			50% strength

TABLE 2
Age distribution

Age group (yrs)	No of cases	Percentage
10-30	Nil	
31-40	6	5.81
41-50	8	7.71
51-60	32	30.41
61-70	36	34.21
71-80	22	20.91
Above 80	1	0.95
Total	105	

TABLE 3
Operative procedures

Procedure	No of cases	Percentage
Arthroscopic debridement	24	22.85
Unicondylar knee	7	6.66
FS TKR	61	58.09
LCS TKR	13	12.30
Total	105	100

FS TKR - Freeman Samuelson total knee replacement

LCS TKR - Low contact stress total knee replacement

knee immobilized in Robert Jones (RJ) bandage for 48 hours, after which the knee was mobilized.

Results

All the patients operated at this centre were serving/retired army personnel and their dependents. The commonest age group affected was between 61-70 years (34.21%) and male to female ratio was 1:2 (Table-2). Commonest indication was osteoarthritis (73.40%), followed by rheumatoid arthritis (26.60%) (Table- 3). Arthroscopic debridement was carried out in 24 cases and excellent/good results were seen in 70% cases. Unicondylar knee replacement was done in 7 cases with excellent/good results in 90% cases. The average range of movement after unicondylar knee replacement was 0-120 degrees. F/S total knee replacement was done in 61 cases, excellent/good results were observed in 90% of cases with average range of movement 0°-90°. LCS total knee replacement was done in 13 cases, excellent/good results were observed in 80% cases with better range of movement (0°-110°). Our complication rate in the series was 4.1%, but long term follow

up especially in context of loosening and implant failure is obviously not available at present.

Discussion

Surgical management of arthritic knee has become synonymous with total knee replacement but we feel that surgical options vary with age, underlying disease, deformity, bone quality and patient's anticipated

Fig. 1 : Preoperative X-ray photograph of knee joint showing advanced osteoarthritic changes

Fig. 2 : Postoperative X-ray photograph of knee joint showing Freeman Samuelson total knee arthroplasty

Fig. 3 : Preoperative X-ray photograph of knee joint showing osteoarthritic changes

Fig. 5 : Preoperative X-ray photograph of knee joint showing osteoarthritic changes mainly localized in medial tibiofemoral compartment.

Fig. 4 : Post-operative X-ray photograph of knee joint showing low contact stress (New Jersey) knee arthroplasty.

usage.

Arthroscopic debridement

Magnuson introduced the concept of debridement of the knee as early as in 1941 [1]. O'Conner (1982) advocated arthroscopic debridement as an alternative treatment for osteoarthritis of the knee [2]. Timoney

Fig. 6 : Postoperative X-ray photograph of knee joint showing unicondylar knee arthroplasty of medial tibiofemoral compartment

et al (1990) retrospectively reviewed 109 patients who underwent arthroscopic debridement of the knee for osteoarthritis. Arthroscopic debridement offered measurable relief for 63% of the patients for a significant period of time [3]. Ogilvie-Harris (1991) carried out a total of 551 arthroscopic procedures for degenerative osteoarthritis of the knee. 68% patients had at least 2 years or more relief from pain and symptoms. The results were much better in normally aligned knees [4]. Harwin (1999) carried out a retrospective review of 204 knees with osteoarthritis, debrided arthroscopically to assess the outcome of this procedure. Based on statistical analysis, he concluded that arthroscopic debridement is a successful palliative, temporizing treatment for the osteoarthritic knee [5]. In the present study, arthroscopic debridement was carried out in 24 patients who were under 60 years of age with diffuse joint pain, localizing signs suggestive of torn menisci, loose bodies and in whom there was appreciable joint space on standing AP radiographs.

This procedure was later extended to patients over the age of 65 years who were unwilling for replacement or were inoperable due to associated medical conditions. 70% patients had good relief of pain and marginal improvement in range of motion but long-term beneficial results are not available at present. One patient subsequently underwent unicondylar medial compartment replacement as arthroscopy had revealed a large chondral defect on the medial femoral condyle and the tibial plateau. This procedure is palliative in nature but useful in low demand knees where risk/benefit ratio is favourable.

High tibial osteotomy

High tibial osteotomy has had a long innings in surgical treatment of osteoarthritis of the knee. Many reports for and against this operation are available in literature [6,7,8]. We do not carry out this procedure at this centre, mainly because we believe that subsequent replacement would be hampered following high tibial osteotomy.

However, this procedure finds place in many centres where it is offered to patients below 60 years of age with single compartment disease. It has a definite role in those patients whose socioeconomic status does not favour replacement procedures.

Unicondylar knee replacement

Unicondylar knee replacement (UKR) has been around for over 30 years and developed at the same time as total knee replacement. However, early reports by Intall suggested a high failure rate and he recommended its use in lateral compartment disease only [9]. Marmor and others however showed favourable early and long term results [10,11]. Bert performed 100 metal backed, unicompartmental arthroplasties [12]. He concluded that despite improved function in comparison with tricompartmental arthroplasty (TCA), unicondylar knee arthroplasty (UKA) is beneficial only in highly selective cases. The 10 year survival rate for unicompartmental arthroplasty is not significantly different from the best rate of total knee replacement (TKR). Murray carried out medial unicompartmental arthroplasty in 143 knees for medial compartment osteoarthritis where prosthetic survival rate at the end of 10 years was 98% [13]. Newman performed a prospective randomized trial of 102 osteoarthritic knees with unicompartmental arthroplasty [14]. He found that UKR gives better results than TKR and this superiority is maintained for at least 5 years. Range of knee flexion was significantly higher in UKR group. Laurencin compared unicompartmental knee arthroplasty with total knee

arthroplasty in a group of 23 patients in each of whom UKA in one and TKA on the opposite knee was done [15]. The average age group was 67 years. He reported better improvement in the range of motion by 15°-20° and overall result in UKA in comparison to TKA in the same patient. We carried out UKA with Genesis unicondylar knee system in 7 patients and found excellent / good results in 90% cases. In our limited experience with the Genesis unicondylar knee system we felt that this procedure provides good pain relief and near complete range of motion as the cruciate and collateral ligaments are left untouched. After initial use of unicondylar knee replacement in patients below 60 years of age we have offered it to patients above 75 years who tolerate this minimal intervention better than total knee replacement. However, patient selection is of paramount importance, as also the implant and surgical technique. Obesity is a relative contraindication.

Total Knee Replacement

The answer to a severely arthritic knee remains total replacement irrespective of age or underlying disorder. Insall reviewed in detail two series of total condylar arthroplasties [16]. The first consisted of 100 cases and second consisted of 303 cases of posteriorly stabilized knees. He found excellent to good results in 94% cases using 100 point score system at follow up ranging from 2 to 9 years. Buechel reported 95% to 98% good to excellent results in a 10 year follow up with the LCS knees [17]. They showed a range of motion of 124° in primary arthroplasty but had a 1.2% dislocation rate of the rotating platform mainly in revision cases. Buechel and Pappas have done long-term survivorship analysis of knee prostheses using meniscal bearings [18]. The ten year overall survival rate of the cemented, rotating platform type was 97.5% and the six year overall survival rate of the cementless rotating platform type was 98.1%. They also concluded that uncemented knees had reduced range of motion probably due to increased bleeding leading to adhesions. However, Freeman found no significant difference between cemented and cementless fixation in clinical practice [19]. The choice of prosthesis depends much on the surgeons training and experience but the type of bearing and fixation is often decided on the basis of bone quality and anticipated usage of the joint. We use cruciate sacrificing option in F/S (fixed bearing) and LCS (rotating platform) knees, as we believe that in most cases, which present late, these ligaments are nonfunctional. F/S (modular or integral) have been used in 61 knees. We found good stability and 0°-90° range of motion. One patient had to un-

dergo manipulation under anaesthesia after six months due to stiffness but subsequently recovered 90° of flexion. The LCS (rotating platform) was used in 13 knees with a view to provide better range of motion and reduced stress on the tibial base plate. Range of motion improved by 15°-20° over F/S and no instability was seen.

Our complication rate in the series was 4.1%. 3 patients had superficial wound infection, which was managed with systemic antibiotic and wound dressings. One patient with vascular injury was managed with repair of popliteal artery. One patient had supracondylar fracture of femur, one year after TKR due to road traffic accident. This was managed with POP cast immobilization.

The Joint Replacement Centre at Army Hospital, (R&R) follows a protocol for the surgical management of the arthritic knee. Arthroscopic debridement is offered to young or elderly patients as a palliative procedure providing a good risk/benefit ratio. UKR is done in single compartment disease both in young and elderly patients, where it provides the benefit of minimum intervention and good range of motion. TKR is reserved for severely arthritic knees where a choice of bearings is available depending on the patient's age and anticipated usage. The short-term results are promising but a long-term follow up is required before our results can be compared with published work from other centers.

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