

Unicompartmental Knee Replacement for Localized Osteoarthritis of the Medial or Lateral Compartment

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Osteoarthritis commonly affects the knee joint, resulting in joint space narrowing and development of osteophytes and sclerosis of the underlying subchondral bone. Total knee arthroplasty is now considered the surgical treatment of choice for osteoarthritis of the knee. It is indicated in patients over age 65 with degenerative arthritis in two or three compartments of the knee [Figure 1]. However, osteoarthritis may involve only one compartment of the knee joint. Unicompartmental osteoar-

thritis of the knee occurs in the medial compartment in about one-third of patients and in the lateral compartment in about 3% of patients [1].

The optimal treatment for osteoarthritis of the medial compartment or lateral compartment of the knee joint is still controversial. In patients with involvement of the medial or lateral compartment of the knee there are various surgical options, including arthroscopy and joint debridement, high tibial osteotomy, unicompartmental knee arthroplasty or total knee arthroplasty [2-6]. Unicompartmental knee arthroplasty is indicated in patients under age 65 with involvement of either the medial or lateral compartment [Figure 2]. However, symptomatic patellofemoral disease, cruciate and collateral ligament instability, overweight, and decreased

range of motion (loss of extension of more than 10° or flexion lower than 90° and varus or valgus deformity of more than 10°) are considered as contraindications for unicompartmental knee arthroplasty [5-9].

The first reports of unicompartmental knee replacement were disappointing. In the early 1970s, Gunston and Marmor independently introduced the first cemented fixed-bearing unicompartmental knee arthroplasty. In 1978, Laskin [10] published a 2 year follow-up study of his experience with the Marmor modular knee replacement, reporting 35% fair or poor results and a high incidence of loosening. The revision rate was 22% [10]. In 1980, Insall and Aglietti [11] published a revision incidence of 28% to total knee arthroplasty. Marmor [12] published his 10-13 year follow-up in 1988, documenting 97 cases with 21% failure due to progression of arthritis in the other compartments of the knee or to loosening of the tibial component.

In 1978, Goodfellow and O'Connor [13] introduced the first generation of mobile-bearing unicompartment knee arthroplasty and their rationale was clearly stated: "Meniscal bearing provides the unique combination of complete congruency of its articular surfaces to minimize wear and creep, with complete freedom of movement to accommodate the preferred motion pattern of the retained natural compartment." This type of prosthesis consists of a spherical femoral component, a flat tibial component and unconstrained polyethylene mobile bearing between them. It provides complete congruency of the articular surfaces and complete freedom of move-

Figure 1. Total knee replacement (TKR) of the right knee



Anteroposterior and lateral views [A and B] of a 72 year old woman with osteoarthritis of both compartments of the knee with joint narrowing, subchondral sclerosis and osteophyte formation (arrows), treated by total knee arthroplasty [arrows C and D].

Figure 2. Unicompartmental knee replacement of the left knee



Anteroposterior and lateral views [A and B] of a 63 year old man with localized osteoarthritis of the medial compartment of the knee with joint narrowing, cysts and osteophyte formation and subchondral sclerosis (arrow), treated by unicompartmental knee arthroplasty [arrows C and D].

ment. Later, in 1988, the same authors reported excellent long-term results with this technique. Only 9 of the 103 patients treated with this meniscal-bearing mobile UKR required reoperation, i.e., 91% had excellent and good results. Excellent results were also described later by both Goodfellow et al. [14] and Murray et al. [15]. Since that time more and more authors have described a high incidence (up to 98%) of 10 year survival in both fixed-bearing and mobile-bearing UKR, particularly since the introduction of the minimally invasive parapatellar technique [8,14-16].

Unicompartmental knee arthroplasty can be performed through a smaller parapatellar incision and involves lesser degrees of soft tissue dissection and bone resection, with less blood loss and a lower incidence of medical complication. This form of the procedure can reduce morbidity, complications, and length of hospital stay, allowing faster recovery and rehabilitation. Price and co-workers [16] published their results with the Oxford meniscal-bearing UKR in patients younger and older than 60 years of age. The 10 year survivorship of the younger group was 91% compared to 96% in the older age group. The results show that the Oxford unicompartmental arthroplasty can achieve 10 year results that are comparable to total knee arthroplasty in patients under 60 years old. The authors concluded that for patients over 50, age should not be considered a contraindication for this procedure [16].

Other authors have described even longer follow-up studies of 15–25 years after unicompartmental knee replacement. Steele et al. [17] reported in 2006 that fixed-bearing medial UKR can function well for many years. Clinically, there was a slight deterioration during the second decade following UKR. Survival was 85.9% at 20 years and 80% at 25 years. The authors concluded that satisfactory survival of a fixed-bearing unicompartmental knee replacement

can be achieved into the second decade and beyond [17].

In 2009, Newman et al. [18] published their 15 year follow-up experience comparing UKR and TKR. The early results demonstrated that the UKR group had fewer complications and more rapid rehabilitation than the TKR group. At 5 years there was an equal number of failures in the two groups, but the UKR group had better results and a greater range of movement. The better early results with UKR are maintained at 15 years with no greater failure rate. The median Bristol knee score of the UKR group was 91.1 at 5 years and 92 at 15 years, suggesting little functional deterioration in either the prosthesis or the remainder of the joint. According to the authors these results justify the increased use of UKR [18]. Other authors have reported that unicompartmental knee arthroplasty is preferable to high tibial osteotomy in relatively young patients with medial compartment arthritis due to quick relief of pain and faster recovery. Barrett and colleagues [19] found that revision of a failed unicompartmental arthroplasty to a total knee joint replacement is relatively easier than revision from a high tibial osteotomy to a total knee joint replacement.

In this issue of *IMAJ* Heller and co-authors [20] describe their experience in a 2 to 5 year follow-up of 59 patients with unicompartmental knee arthrosis or avascular necrosis of the medial femoral condyle after Oxford meniscal-bearing unicompartmental knee replacement. Although this is a relatively short-term study it supports the good results described in the literature. Seven knees out of 59 (11%) were converted to total knee replacement, all of them within the first 2 years. The authors concluded that this bone-preserving procedure should be strongly considered in end-stage isolated unicompartmental osteoarthritis or avascular necrosis.

Based on the literature it seems that unicompartmental knee arthroplasty is

a favorable procedure in patients with localized osteoarthritis or avascular necrosis of the medial or the lateral compartment. It allows replacement of only the affected joint compartment with less bone loss. Recovery and rehabilitation are quick and ambulation is early. The ideal patient for UKA is a relatively young person with a stable knee and intact cruciate ligaments, a flexion contracture less than 15 degrees and a change of mechanical axis of less than 5–10 degrees from neutral. There is a high success rate following these operations. Survivorship is about 90% for 10 years and about 85% for 20 years. The prerequisites for improved outcome of unicompartmental knee arthroplasty are, therefore, the proper selection of patients and the prosthetic design, and use of the minimally invasive technique.

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UKR = unicompartmental knee replacement

TKR = total knee arthroplasty

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