

The prosthetic implant of MBA Optetrak in the treatment of knee osteoarthritis: 5 years of experience

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Abstract. In this study the authors report their experience in treating knee osteoarthritis with MBA Optetrak prosthetic implant, designed to minimize the stress of high density polyethylene. In all patients, we implanted two different Optetrak prosthesis according to the validity or not of the posterior cruciate ligament. At follow-up visit, which was performed after an average follow-up of 3.6 years, were 53 analyzed patients radiographically and clinically using the Knee Society Score (KSS). Depending on their experience, the authors consider mandatory to have a precise selection of the patients as well as to perform an accurate capsular and ligamentous balance during operation. Furthermore, the use of prosthesis models which are similar to the normal knee allows to obtain good and durable results. (www.actabiomedica.it)

Key words: knee osteoarthritis, prosthesis, capsular-ligamentous balance, arthroplasty, knee

Introduction

In the last years in the orthopaedics surgery an evolution of the prosthetic design and materials have developed thus leading to better long term results (1-4) and satisfying the higher functional expectation of the patients.

In the past, patients who underwent total knee arthroplasty (TKA) were mainly elderly with low functional needs and had the expectation to eliminate or reduce pain. Nowadays the expectations are higher because patient are younger and more active; for these reasons the clinical and functional recovery should be without pain and complete.

The results after TKA depends on the implantation technique but also on the type and design of the prosthetic model.

The different implants try to reproduce anatomically and biomechanically the normal knee and should be characterized by good congruency and stability as well as low frictions, although the high stresses produced by weight bearing (5-8).

The postero-stabilized Optetrak total knee prosthesis (Exactech®, Gainesville, FL, USA), has been utilized since 1995 and is an evolution of the “total condylar prosthesis” and of the postero-stabilized Insall-Burstein type II model.

The Optetrak design is characterized by a modification of the tibial insert and of the trochlea of the femur, thus reducing the stresses on the tibial polyethylene in order to optimize the patellar tracking and the knee range of motion (ROM) and to obtain a prosthesis more anatomical and with greater survival.

In this study the authors report the clinical and radiographic outcome of 53 patients treated with this prosthetic model.

Material and Methods

Between February 2007 and December 2011, at the Orthopaedic Clinic of the University of Parma, 61 MBA Optetrak TKAs (53 patients) have been implanted. All patients (37 patients were female and 16



Figure 1. Bilateral bicompartamental arthritis of the knee in a patient of 64 years of age. A: weight bearing x-ray of the lower limbs. B-C: Intraoperative views. D: Left knee x-ray 1 year after surgery

male) were evaluated at a mean follow up of 3 years and 6 months (range: 9 months - 5 years and 7 months).

The mean age at surgery was 68.2 years (range 53-83).

Inclusion criteria were primary or secondary bi- or tricompartmental osteoarthritis as consequence of misalignment of lower limbs, condylar necrosis, rheumatoid arthritis and traumatic events.

Patients affected by comorbidities which contraindicated surgery, severe osteoporosis and septic arthritis as well as patients with low compliance and with BMI > 35 were excluded.

Prosthetic components were always cemented.

In 45 out of 53 cases (85% of the patients) the postero-stabilized (PS) model was implanted and in 8 (15%) the posterior cruciate ligament (PCL) retaining prosthesis was used.

In the majority of the cases a denervation with a patellar plasty was performed in order to improve the femoro-patellar tracking and alignment.

Only 3 patients with severe osteoarthritis underwent patellar prosthesis.

The longitudinal antero-medial approach with medial capsulotomy was used; all the procedures were made with pneumatic tourniquet at the tight which was removed immediately after the cementation of the components.

All patients underwent antibiotics prophylaxis with 1st generation cephalosporine and antithrombotic prophylaxis with low molecular weight heparin.

Partial weight bearing was permitted from the 2nd day after surgery.

Clinical and radiographic evaluation was done in all cases 1, 3, 6 and 12 months after surgery and at final follow up.

The Knee Society Score (KSS), which analyzes parameter such as ROM, stability, pain during walk and at rest, was used.

At follow up anterior-posterior and lateral x-ray views of the knee during weight bearing were performed in order to evaluate the orientation of the prosthetic components and visualize the presence of radiolucent lines (considering 7 zones for the femoral side and 10 for the tibia) through radiographic KSS.

Results

Mean pre-operative KSS Score was 53.5 (range 41-70) and 89.5 (range 50-100) at final follow up (30 excellent, 19 good, 3 fair and 1 poor results).

The mean ROM increased from 80° before surgery to 110° at follow up (Table 1). An anterior-posterior instability with anterior drawer test lesser than 5 mm was present in 28 cases and was between 5 and 10 mm in the other 25.

A medial-lateral instability with varo-valgus stress lesser than 5° was present in 35 patients and between 5°-10° in the others 18.

X-rays evaluation showed a mean of 0.82 radiolucent zones per implant. In all cases, except one, this event has been noticed in the first 36 months from surgery with no signs of evolution in the further X-rays evaluations. In one case (poor results), in which a progressive worsening of the clinical and radiographic parameters was observed, a revision of the prosthetic components (bad initial positioning and sub-sequential aseptic mobilization) was necessary 24 months after the first implant. In all other cases the positioning of the prosthetic component was satisfactory.

Discussion

In the majority of the patients treated the postero stabilized implant was used because of the poor quality of the ligamentous apparatus. Furthermore, as seen in the literature, in some specific cases the conservation of the posterior cruciate ligament may alterate the normal knee cinematic, making more difficult the balancing of the collateral ligaments (9-10).

The anatomic congruency of the tibial and femoral components in the LCP retaining model is lesser than the congruence of the PS model; this feature al-

Table 1. Number of implants and results

Data	Results
N° of implants	53
Preoperative KSS	53.5 (41-70)
KSS at follow-up	89.5 (50-100)
Mean preoperative ROM	80°
Mean postoperative ROM	110°

lows a wider range of motion but, on the other hand, it increases the stress and the sliding of the bone-prosthesis interface, which can cause instability and wear of the prosthetic components (11).

Another choice concerns the use of the fixed bearing which is extensively debated in the literature. Since many years, prosthetic components with rotating platform, which have been developed with the goal of reduce the wear of the polyethylene insert, improve the range of motion and the function of the implants, are available, thus making less necessary the lateral release during its positioning.

Nevertheless, some studies (12, 13) have shown that there are no significant differences between fixed bearing and rotating platform in terms of osteolysis, survival rate and functional outcomes; on the other hand, other studies have reported a higher wear of the tibial-insert interface in the mobile platform implant (14).

The authors personal experience was always with the fixed bearing, having always the possibility to implant the mobile platform.

Furthermore, for this type of prosthesis, new insert made of Ultra High Molecular Weight Polyethylene (UHMWP), which are high resistance structure, highly cross linked with minimal production of free radicals and maximum resistance to oxidation and lower wear, may be utilized.

Another debating option in TKA is the use or not of cement. Author's choice was always to use cemented prosthetic components especially in elderly patients with poor bone quality.

Some authors reported with this type of implant an high rate of anterior patellar knee pain during flexion and extension due to the new congruency profile of the replaced femoro-patellar joint.

In this series of cases the patella has almost never been replaced and only two cases of chronic had persistent anterior knee pain. The authors believe that these positive results about this parameter were due to the increased depth of the patellar "sulcus" in the design of the femoral component and to the particular attention during surgery reserved to improve patellar tracking. Some studies (16, 17) report that, if a good femoral-patellar tracking is obtained and if the joint surface of the patella is not particularly damaged, the patellar plasty with circumferential denervation may

represent a good choice of treatment. This assumption is confirmed in this study in which this surgical passage was positively performed in 50 patients and only in three patients, characterized by a poor femoral patellar tracking with excessive stresses on the femoral-patellar interface, poor bone quality and severe femoral-patellar arthritis, the patellar bone was replaced. These patients had similar functional results as the group of the patients without patellar replacement.

Conclusion

The peculiarities of the MBA Optetrak prosthesis are characterized by the high congruency of the prosthetic surfaces, similar to that of the normal knee, the deep and anatomical troclear "sulcus" of the femoral component and the versatility of the implant (different options depending on the possibility to save or not the posterior cruciate ligament).

Even if more modern prosthetic models, such as Hi-Flex (18) which, is characterized by a more physiological rollback with a combination of posterior rotation and translation during flexion and extension and the gender specific implants, the authors believe that the MBA Optetrak is still a valid and up-to-date prosthetic model, as demonstrated by satisfactory results reported in this study and in the literature.

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