ANALYSIS OF COMPLICATIONS FOLLOWING UNICOMPARTMENTAL KNEE ARTHROPLASTY

Stanislav Karamitev¹, Stoyan Ivanov², Vihur Kovachev³

¹) Department of Orthopedics and Traumatology, Faculty of Medicine, Medical University Plovdiv, Bulgaria.
²) Department of Orthopedics and Traumatology, Faculty of Medicine, Medical University Varna, Bulgaria.
³) Department of Orthopedics and Traumatology, Faculty of Medicine, Medical University Pleven, Bulgaria.

ABSTRACT

Purpose: The aim of the present study is to evaluate the intra- and postoperative complications following unicompartmental knee arthroplasty and subsequent outcome.

Material and methods: For the period from 2008 to 2018, we operated on 450 patients with isolated osteoarthritis of the knee joint. In the majority of cases, patients had arthritis of the medial compartment of the joint due to antero-medial osteoarthritis or osteonecrosis and, in smaller percentage, osteoarthritis in the lateral part of the joint.

Results: Various complications were registered which we divided into intraoperative and postoperative, monitoring during the follow-up of patients. Intraoperative include fracture of the tibial plate during implantation of the component, partial resection of the intercondylar eminence during the preparation of the tibial plateau, incorrect hole placement in the femoral condyle, which led to malalignment positioning of the femoral component in varus or valgus, resection of more bone substance from the tibia leading to subsidence of the implanted component.

The postoperative complications include: aseptic loosening, polyethylene wear, impingement, progression of osteoarthritis in the opposite part of the knee joint, periprosthetic infection and arthrofibrosis.

Conclusion: Unicompartmental knee arthroplasty is a minimally invasive procedure for the treatment of isolated osteoarthritis of the knee joint and is associated with excellent and good long-term results. Complications could be reduced by using a meticulous surgical technique, selection of suitable implants and last but not least proper indications for surgery.

Keywords: osteoarthritis of the knee joint, unicompartmental knee arthroplasty, complications

INTRODUCTION

Recently, unicompartmental knee arthroplasty (UKA) has become an attractive surgical procedure for the treatment of isolated osteoarthritis in middle-aged and elderly patients [1]. This procedure was introduced in the 1970s and initially was associated with unsatisfactory end results. Over the years, the improvements made in the design of implants and surgical equipment contributed to its development in a positive aspect [2, 3]. It is currently carried out with increasing frequency and gives good to excellent results [2, 4]. For the period from 1998 to 2005, the percentage of performed UKA increased by 32.5% compared to performed total knee arthroplasty (TKA), which was 9.4% for the same period. The most frequent cause of failure was total aseptic loosening (37.4%), followed by pain without loosening (19.8%) [4, 5]. The medium and long-term survival of this type of prosthesis is highly variable. The effectiveness of the UKA still remains controversial in a long-term follow-up. Mortality and the possibility of early complications after UKA are relatively low. In the long term, however, the procedure has higher levels of revision due to complications as opposed to TKA and significant difficulties associated with possible bone loss [6-9].

OBJECTIVE

The aim was to analyze the intra and postoperative complications following unicompartmental knee arthroplasty and to evaluate the subsequent outcome.

MATERIAL AND METHODS

The present study (2008 - 2018) is retrospective and includes 450 operated patients, of which 320 women and 130 men. Age ranged from 52 to 85 years (average 68 years). Fifty six patients were operated due to osteonecrosis of the medial femoral condyle, in another 17 patients the lateral part of the knee joint was operated as a result of lateral osteoarthritis. The other 377 patients were operated because of arthritis of the medial compartment of the knee joint associated with isolated antero-medial osteoarthritis. All patients underwent a number of conservative methods of treatment before surgery: NSAIDs, physiotherapy, bracing of the knee joint, weight reduction, intra-articular administration of corticosteroids, chondroprotectors and hyaluronic acid. Most of the patients (357 of the overall number) underwent arthroscopic lavage and debridement of the affected knee joint resulting in temporary relief of symptoms. The degree of osteoarthritis of the knee joint was assessed on the basis of the Ahlbäck classification and that of Kellgren and Lawrence. Partial Partialial arthroplasty was performed in patients with stage 2 or 3, according to Ahlbäck [10]. According to
the x-ray classification of Kellgren and Lawrence, the patients were diagnosed with stage 2 osteoarthritis preoperatively. In the beginning, we strictly adhered to the UKA indications introduced by Kozzin and Scott, and in recent years we have expanded them according to the Oxford group [11]. An extended parapatellar approach was utilized in the beginning. Gradually, with increasing experience, improvement of the surgical technique and the selection of the patients, we adopted a minimally invasive approach to the affected compartment. In our series, only the all poly "fixed-bearing” model of partial knee endoprosthesis was implanted. We have not used a fixed-bearing metal-back or the mobile bearing UKA model.

RESULTS
Patients were followed for six years, both clinically and radiologically. To evaluate the functional results, we have used the American Knee Society Score (AKS). Our results were evaluated as excellent in 293 patients (65%), good in 89 pts. (20%), satisfactory – 45 pts. (10%) and poor in 23 pts. (5%). Various complications were registered and divided into intraoperative and postoperative during the patients’ follow-up. The intraoperative problems that were encountered include fracture of the tibial plateau during implantation of the component in 2 patients, which were treated with a buttress plate. In three patients, iatrogenic partial resection of the intercondylar eminence occurred during surgery. Intraoperatively fixation was obtained by using a suture wire fixation technique (Fig.1 a, b).

Fig. 1a. Intraoperative fixation of the intercondylar eminence, a-p view.

![Fig. 1a. Intraoperative fixation of the intercondylar eminence, a-p view.](image1a.png)

The most common intraoperative error that was observed (45 pts.) was the incorrect placement of femoral condyle entry point, which led to malalignment of the femoral prosthetic component in the varus or valgus position (Fig. 2).

Fig. 1b. Intraoperative fixation of the intercondylar eminence, lateral view.

![Fig. 1b. Intraoperative fixation of the intercondylar eminence, lateral view.](image1b.png)

![Fig. 2. Femoral component in valgus.](image2.png)
Twelve patients had over resection of the proximal tibial bone, which led to subsidence of the implanted component. When we analyzed the development of the so called “learning curve”, we should point out that these difficulties were common in the beginning and gradually reduce to a minimum over the years. In the follow-up period, the most common postoperative complications were: aseptic loosening of the implants, predominantly the tibial component (4 pts.); polyethylene wear (5 pts.); progression of osteoarthritis in the opposite compartment of the knee joint (10 pts.); periprosthetic infection (1 pt.) and arthrofibrosis (2 pts).

In patients with mechanical loosening of the components, we performed a precise evaluation of both bone and ligament integrity, after which conversion of UKA to TKA was performed with posteriorly stabilized primary total knee prosthesis (Fig. 3, 4).

**Fig. 3.** Aseptic loosening of the tibial component.

**Fig. 4.** Conversion to total knee arthroplasty.

After careful examination, two patients with polyethylene wear were revised, and a new thicker insert was placed. The other three patients with polyethylene wear were treated with the conversion from UKA to TKA. Five of the ten total patients with progression of the degenerative process in the lateral compartment of the knee were treated with a bicompartimental prosthesis, and the rest were converted to TKA (Fig. 5a, b).
In one patient, we registered a deep periprosthetic infection associated with loosening of the components and migration of the tibial component, compromising the skin integrity (Fig. 6).

**Fig. 6.** Deep periprosthetic infection after UKA

We underwent resection arthroplasty due to the general damaged condition of the patient and the presence of a lot of comorbidities, as well as the refusal to cooperate on his part. In both patients diagnosed with postoperative arthrofibrosis after UKA, we performed arthroscopic removal of intra-articular fibrous tissue and adhesions, followed by early aggressive rehabilitation.

**DISCUSSION**

Complications after UKA vary and depend on the design and type of implant, the follow-up period and last but not least, the surgeon’s experience. When reviewing the literature for the complications of this type of surgery, our observations completely correlate with those indicated by a number of authors [14, 18]. The lower percentage of complications in the present study correlates with significantly fewer patients, as well as the shorter follow-up period. In the study of Pandit, one thousand UKA Oxford models were performed followed up for an average of five and a half years, the incidence of complications was only 2.9%. The most common reason for the revision was the progression of osteoarthritis in the opposite compartment (0.9%), mobile inlay dislocation (0.6%) and unexplained pain (0.6%). In nineteen patients from twenty-nine, conversion of UKA to TKA was performed; six patients with UKA prostheses required open reduction due to dislocation of the mobile bearing; in 3 patients with medial UKA, a secondary lateral UKA was performed and in one case, a revision of the tibial component was required (15). In our study, due to
the all-poly design of the prostheses, no inlay's dislocation was encountered. In the research of Epinette, which included 418 complicated UKA, component loosening (45%) was the main mode of failure, followed by progression of osteoarthritis (15%) and polyethylene wear (12%) [6].

The most common complication in UKA with a mobile platform is dislocation of the mobile inlay and in UKA with a fixed inlay is mechanical loosening of the components and wear of the polyethylene. The progression of OA in the non-prosthetic compartment occurs equally in both UKA models. Peersman et al. reported results of 4330 UKA prostheses with fixed and 5133 UKA prostheses with the mobile platform. The former were followed for an average of 8.7 years, while the latter - 5.9 years. Although comparable revision levels were observed in both UNI denture models, the main complications among "fix bearing" UKA were osteoarthritis progression (0.29%) and component loosening (0.22%), while complications among "mobile bearing" UKA are loosening of the components (0.44%), luxation of the mobile bearing platform (0.29%) and progression of osteoarthritis into the intact compartment (0.23%) [15, 16].

Ko et al. found that the overall frequency of reoperations and that of complications were similar between UKA with mobile (n/1392) and UKA with a fixed platform (n/1377). The authors concluded that UKA prostheses with a mobile bearing required more frequent reoperations due to aseptic loosening, progression of OA and dislocation of the mobile inlay [17].

Conversion from a failed UKA to a TKA can be a challenging procedure. The technical difficulties depend on how the primary UKA was performed, the degree of bone resection, the presence of bone defects and the condition of the ligaments after removal of the UKA implants. It is often necessary to use metal augmentation for severe bone loss, as well as to apply stems in order to obtain security and stability after TKA [18]. There are still controversies regarding the functional results obtained and the survival period of TKA after a failed UKA. A number of studies have reported that the conversion of a failed first-generation UKA to TKA yields worse than those obtained after reoperation of a primary TKA with a revision TKA. The conversion of the second generation UKA to TKA leads to better results, as opposed to the primary total knee replacement [19].

CONCLUSION

Unicompartmental knee arthroplasty is a minimally invasive procedure for the treatment of isolated osteoarthritis of the knee joint and is associated with excellent and good long-term results. Complications could be reduced by using a meticulous surgical technique, selection of suitable implants and last but not least proper indications for surgery.

REFERENCES:
8. Ivanov S. Cannulated screw fixation for dislocated fractures of the calcaneus. Scripta Scientifica Medica. 2019; 51(2):23-29. [Crossref]


Please cite this article as: Karamitev S, Ivanov S, Kovachev V. Analysis of complications following unicompartmental knee arthroplasty. J of IMAB. 2022 Jan-Mar;28(1):4316-4321. DOI: https://doi.org/10.5272/jimab.2022281.4316

Received: 26/07/2021; Published online: 29/03/2022

Address for correspondence:
Stoyan Ivanov
Department of Orthopedics and Traumatology, Faculty Medicine, Medical University Varna, Bulgaria.
E-mail: ton_ivanov@abv.bg