



## Which unicondylar prosthesis is better in the mid-term in obese patients : fixed or mobile?

Ersin KUYUCU, Adnan KARA, Ferhat SAY, Mehmet ERDİL, Ahmet Murat BÜLBÜL

*From the Istanbul Medipol University, Istanbul/Turkey*

As it is mentioned in the literature, rates of complications and revision are higher in the obese compared to non-obese patients, although obesity does not a contraindication for unicompartmental knee arthroplasty and successful outcomes are achieved. However, there is not any study in the literature comparing the outcomes of fixed and mobile unicompartmental prostheses which are applied in the obese patients. Objective of this study was to compare outcomes of our obese patients who we applied fixed or mobile unicompartmental arthroplasty and followed up for 8 years and over.

Of 293 patients in whom we performed unicompartmental knee prosthesis due to medial gonarthrosis between 2003 and 2014, 239 patients who were regularly followed-up at least for 18 months were included in this study. Total 248 knees with 193 (77.8%) fixed including bilateral prosthesis in 9 patients and 55 (22.2%) mobile prostheses were retrospectively assessed. The study included 57 patients having BMI >30 kg/ m<sup>2</sup> who were regularly followed-up.

In the final controls; mean flexion was found as 107° (100-128°)(p<0.05), mean extension as 3° (0-5°) and mean tibio femoral angle as 4° (1-5°) (p<0.05) valgus. Postoperative mean WOMAC value was found as 91.23 ± 3.02 (92-96) (p<0.05) and mean KSS score as 88.3 ± 3.94 (85-100) (p<0.05). In the final controls, respective knee flexions were seen to be 105° (100-125°) and 108°(105-128°) in the fixed and mobile insert subgroups (p>0.05).

Unicompartmental knee prosthesis is a good treatment option which can be applied also in obese patients

and has high survival rates. No significant difference was found between the prostheses with fixed and mobile insert in terms of function and knee scores. However, fixed unicompartmental prosthesis should primarily be preferred in obese patients because of the challenging surgical technique, difficult learning curve and insert dislocation that we encounter with mobile prostheses

**Key words :** Knee joint ; obesity.

### INTRODUCTION

Osteoarthritis which is the most common cause of pain and loss of motion in the knee is an important medical problem especially encountered in the middle aged and elderly population (3). Unicondylar

- Ersin Kuyucu<sup>1</sup>.
- Ahmet Murat Bülbül<sup>1</sup>.
- Adnan Kara<sup>1</sup>.
- Ferhat Say<sup>2</sup>.
- Mehmet Erdil<sup>1</sup>.
- Ahmet Murat Bülbül<sup>1</sup>.

<sup>1</sup>Istanbul Medipol University, Department of Orthopedics and Traumatology, Istanbul, Türkiye;

<sup>2</sup>OnDokuz Mayıs University, Department of Orthopedics and Traumatology, Samsun, Türkiye.

Correspondence : Ersin Kuyucu, Istanbul Medipol University, Bağcılar Tem Avrupa göztepe çıkışı No :1, Istanbul/Turkey.  
E-mail : ersinkuyucu@yahoo.com.tr, Phone: +90-532-4249732

© 2017 Acta Orthopaedica Belgica.

*No benefits or funds were received in support of this study.  
The authors report no conflict of interests.*

knee prosthesis is an important surgical alternative for high tibial osteotomy and total knee prosthesis (2).

According to 2008 data of the World Health Organization (WHO); 10% of men and 14% of women are obese worldwide (BMI kg /m<sup>2</sup>), although total number of obese people is more than half a billion (3). Obesity is a condition which sets ground for a lot of health problems as well as affects surgical success in the patients that will be administered surgical treatment (5). As it is mentioned in the literature, rates of complications and revision are higher in the obese compared to non-obese patients, although obesity does not poses contraindication for unicompartmental knee arthroplasty and successful outcomes are achieved (5,11). However, there is not any study in the literature comparing the outcomes of fixed and mobile unicompartmental prostheses which are applied in the obese patients.

Objective of this study was to compare outcomes of our obese patients who we applied fixed or mobile unicompartmental arthroplasty and followed up for 8 years and over.

## PATIENTS AND METHOD

Of 293 patients in whom we performed unicompartmental knee prosthesis due to medial gonarthros between 2003 and 2014, 239 patients who were regularly followed-up at least for 18 months were included in this study. Total 248 knees with 193 (77.8%) fixed (Smith & Nephew-Accuris and Zimmer-Zuk) including bilateral prosthesis in 9 patients and 55 (22.2%) mobile prostheses (BIOMET-Oxford phase -2 and Corin Tm) were retrospectively assessed. The study included 57 patients having BMI >30 kg/ m<sup>2</sup> who were regularly followed-up. As described in the literature (9); patients were selected according to the inclusion and surgical indication criteria included protected full-thickness healthy cartilage in the lateral compartment, advanced stage cartilage damage, firm anterior cruciate ligament, lack of fixed varus deformity greater than 15 degrees, firm medial collateral and lateral collateral ligaments and knee compartmental arthrosis. Obesity, age,

patellofemoral arthrosis, history of previous knee surgery and activity level were not considered as contraindication or exclusion criteria.

All patients were informed about their medical status, possible complications and risks were told and consents for surgery were preoperatively received.

All patients were postoperatively assessed according to the Ahlback classification through antero-posterior and lateral roentgenograms (1) and those with suspected ligament failure in the clinical examination were further assessed with MRI. Patients were operated in four different clinics (Okmeydanı Training and Research Hospital, Vakıf Gureba Hospital, Samsun Training and Research Hospital and Istanbul Medipol University) by two orthopedists (AMB, FS) who were instructors at the same time. Patients were prepared on standard tables as to allow perioperative flexion of 120 degrees of the knee and all the patients were operated in accompany with tourniquet following 2g iv cefazolin prophylaxis which was administered 30 minutes before the surgery. Paramedian skin incision extending from medial of the patella to medial of the tuberositas tibiae was used. The joint was accessed through medial parapatellar arthrotomy. After anterior cruciate ligament and lateral condyle were assessed and confirmed to be stable, femoral and tibial incisions were made via the guide. Following testing and assessment of the insert thickness and knee ligament balancing, the prosthesis was inserted as cemented so that the implant will be mobile or fixed according to the surgeon's choice. The aspiratory drain was removed at 24th hour. Patients were allowed to apply loading with the support of crutch on the postoperative first day. Patients were given antibiotic prophylaxis (cefazolin 3\*1 gr /IV) for 24 hours and venous thromboembolism prophylaxis (ultralow molecular weight heparin (ULMWH) 0.4 cc/subcutaneous and anti-embolism stockings) for 35 days.

Gonarthros classification of the patients was done with the Ahlback classification through roentgenograms (1). Outerbridge classification was used in the cartilage damages during the operations (15). Patients were pre- and postoperatively assessed with WOMAC and KSS scores (9). Statistical

analysis was performed using SPSS Statistics v 19 software. Independent samples t-test was used in comparison of 2 groups in the variables that showed normal distribution, while Mann Whitney U test was used in comparison of 2 groups in the variables which were non-normally distributed. In all the statistical analyses included in this study,  $p < 0.05$  values were considered statistically significant.

## RESULTS

Mean age of the patients was 62.3 ( 57-71). Of the patients, 33 were females (57.9%) and 24 males (42.1%) (F/M= 1.37). The most common comorbidities were found as hypertension and peripheral vascular disease in 25 (43.5) and diabetes mellitus in 21 (36.8%) patients. Fixed insert was used in 32 (56.1%) and mobile insert in 25 (43.9%) patients.

Mean follow-up duration was 99 months (8 years 3 months, 22-119 months). Mean body mass index (BMI) was found as 32.4 kg/m<sup>2</sup> (30.5-34,3 kg/m<sup>2</sup>). Preoperative mean flexion was found as 90.50° (85-110°), mean extension as 7° (0-8°) and mean tibiofemoral angle as 6° (3-14°) varus. None of the patients had ligament instability. Preoperative mean WOMAC value was found as 72.64 ± 5.32 (68-78) and mean KSS score as 75.8 ± 4.9 (66-89).

In the final controls; mean flexion was found as 107° (100-128°) ( $p < 0.05$ ), mean extension as 3° (0-5°) and mean tibiofemoral angle as 4 (1-5°) ( $p < 0.05$ ) valgus. Postoperative mean WOMAC value was found as 91.23 ± 3.02 (92-96) ( $p < 0.05$ ) and mean KSS score as 88.3 ± 3.94 (85-100) ( $p < 0.05$ ). In the final controls, respective knee flexions were seen to be 105° (100-125°) and 108° (105-128°) in the fixed and mobile insert subgroups ( $p > 0.05$ ).

When our obese and non-obese patients were assessed; in the final controls of unicompartmental arthroplasty that we performed in 248 knees of 239 patients mean flexion was found as 109° (100-132°), mean extension as 3° (0-5°) and mean tibiofemoral angle as 3 (0-5°) valgus. Preoperative mean WOMAC value was found as 97.23 ± 4.02 (92-100) ( $p > 0.05$ ) and mean KSS score as 92.3 ± 3.94 (85-100). No statistically significant difference

was observed compared to the postoperative values of obese patients ( $p > 0.05$ )

Forty (70.1%) patients were stage III and 17 ( 29.0%) patients were stage IV according to the Ahlback radiologic classification system (Figure-1A-B). Five (8.7%) of the patients developed superficial skin problems and 4 (80%) of these patients have DM. All of these patients recovered with superficial wound care and antibiotherapy. One patients (1.75%) who had diabetes mellitus and peripheral artery disease developed prosthesis infection in the early period and received antibiotherapy and change of polyethylene. Five (83.3%) of 6 patients who developed complication in the early period have comorbidities such as DM and peripheral vascular disease. Two (3.5%) patients developed chronic period infections, no proliferation was observed in the collected deep cultures and both the patients were treated with the change of polyethylene and washing. No any thromboembolic complication was developed such as Dvt and pulmonary embolism. Two (3.5%) patients were re-operated due to the dislocation of mobil polyethylene insert and the mobile inserts were changed with one size bigger. These patients were followed-up in the next period without problems. Roentgenograms ordered in the period after 5 years revealed asymptomatic aseptic loosening greater than 2 mm in 4 (7%) patients who were free of pain and movement restriction and currently being followed-up. The existing prosthesis were revised to total knee prosthesis in one (1.7%) patient due to development of advanced arthrosis in the lateral compartment and in 3 (5.2%) patients because of the development of symptomatic aseptic loosening. Previously, fixed insert unicompartmental prosthesis was applied in 2 and mobile insert unicompartmental prosthesis in the remaining two patients which were revised to total knee prosthesis. Total survival over 8 years was found as 93% (53 knees)(Figure 1-C).

## DISCUSSION

This study included outcomes of follow-up over 8 years and comparison of the fixed and mobile unicompartmental knee arthroplasty that we applied

in obese (BMI >30 kg/m<sup>2</sup>) patients who have medial compartmental osteoarthritis and in whom lateral compartment was not affected, anterior and lateral cruciate ligament were functionally stable as specified in the literature for the medial unicompartmental knee arthroplasty (12).

Knee osteoarthritis mainly affects the medial compartment and in this case tibial and femoral bone surfaces contacts to each other, causing permanent pain (8). In cases of the failure of conservative treatment; arthroscopic debridement, high tibial osteotomy (HTO), unicompartmental knee arthroplasty (UKA) or total knee prosthesis (TKP) is applied as a surgical option. Infact, more than one third of the currently performed total knee prostheses are applied on the patients have arthrosis at a level which would provide benefit from unicompartmental knee arthroplasty, but they have undergone more invasive surgeries (13,14).

Obesity is no longer considered as a contraindication in unicompartmental knee arthroplasty owing the advancements in prosthesis technology (16). There is no a significant difference between the patients having a BMI above and below 30 kg/m<sup>2</sup> in terms of the knee function and knee scores. Therefore, we also did not accepted obesity as a contraindication in our practice and achieved a high survival rate (93%) over 8 years with statistically significantly increased WOMAC and KSS scores of the patients. In addition, although postoperative better knee range of motion and knee scores (WOMAC-KSS) were obtained in our non-obese patients, the difference was not statistically significant. This result indicate that unicompartmental knee prosthesis can be safely chosen also in obese patients.

Another important problem in unicompartmental knee arthroplasty is the approach to the patients having anterior cruciate ligament rupture. Now there are studies in the literature suggesting use of unicompartmental knee arthroplasty also in anterior cruciate ligament rupture (6,10). Although high survival rates have been reported such as 81% with mobile unicondylar and 94% over 6 years in fixed unicondylar prostheses, there is not a clear suggestion in the literature about the association of obesity and anterior cruciate ligament rupture.

We recognize anterior cruciate ligament rupture as a contraindication in obese patients. We make decision for unicompartmental knee arthroplasty if there is not anterior cruciate ligament rupture as a finding in clinical and physical examinations, but we applied total knee prosthesis in case of the anterior cruciate ligament detected during the surgery. Up to the present, unicompartmental knee arthroplasty plan was intraoperatively changed and total knee prosthesis operation was performed in 4 patients.

There are series in the literature in which compartmental prosthesis has applied in obese patients and successful outcomes have been achieved (4,5,11). However, type of the prosthesis that will applied is yet to be clarified. In this study, no significant difference was found in comparison of the fixed and mobile prostheses that we applied in obese patients in terms of knee scores, while range of motion was found to be higher in the mobile than in the fixed prostheses. This condition which was obtained by providing a more physiological joint kinematics and compliance is rather crucial in Turkish-Japanese societies in which the knees have over flexion due to the culture of working in the fields and worship performed on the ground.

Despite advantageous joint compliances of mobile insert unicompartmental prostheses, they have specific problems such as polyethylene insert dislocation, soft tissue impingement and long learning curve (7). In our series, polyethylene insert dislocation which is not seen in fixed prostheses developed (2 patients, 3.5%). Difficulties in providing ligament balancing and surgical exploration in obese patients seem to further increase mobile prosthesis application.

The most important limitation of our study was the retrospective design and small number of patients.

In conclusion; unicompartmental knee prosthesis is a good treatment option which can be applied also in obese patients and has high survival rates. No significant difference was found between the prostheses with fixed and mobile insert in terms of function and knee scores.

## REFERENCES

1. **Ahlback, S** Osteoarthritis of the knee. A radiographic investigation. *Acta Radiol. Diagn.* 1968 ; 277 : 7-18.
2. **Argenson, J NA, Chevrol-Benkeddache, Y, Aubaniac, J. M.** Modern unicompartmental knee arthroplasty with cement. A three to ten year follow up study. *J. Bone Jt Surg.* 2002 ; 84-A : 235-238.
3. **Bergenudd H.** Porous-coated anatomic unicompartmental knee arthroplasty in osteoarthritis. A 3- to 9-year follow-up study. *J Arthroplasty.* 1995 ; 10 : S8-13
4. **Cavaignac E, Lafontan V, Reina N et al.** Obesity has no adverse effect on the outcome of unicompartmental knee replacement at a minimum follow-up of seven years. 2013 ; 95-B :1064-8.
5. **Cepni Sk, Arslan A, Polat H** Mid-term results of oxford phase 3 unicompartmental knee arthroplasty in obese patients. *Acta Orthop Traumatol Turc.* 2014 ;48 : 122-6
6. **Engh GA, Ammeen D.** Unicompartmental arthroplasty in knees with deficient anterior cruciate ligaments. *Clin Orthop Relat Res.* 2014 ; 472 : 73-77
7. **Fabricant PD, Rosenberger PH, Jokl P, Ickovics J.** Predictors of short term recovery differ from those of long term outcome after arthroscopic partial meniscectomy. *Arthroscopy* .2008 ; 24.
8. **Faour-Martín GA, Valverde-García JA, Martín-Ferrero MÁ et al.** Oxford phase 3 unicompartmental knee arthroplasty through a minimally invasive approach: long-term results. *Int orthop (Sicot)* 2013 ; 37: 833-838
9. **Goggins J, Baker K, Felson D.** What Womac Pain Score Should Make A Patient Eligible For A Trial In Knee Osteoarthritis? *J Rheumatol.* 2005 Mar ;32(3) :540-2
10. **Goodfellow J, O'Connor J.** The Anterior Cruciate Ligament In Knee Arthroplasty. A Risk-Factor With Unconstrained Meniscal Prostheses. *Clin Orthop Relat Res.* 1992 Mar ; (276) : 245-52.
11. **Kandil A, Werner BC, Gwathmey WF.** Obesity, morbid obesity and their related medical comorbidities are associated with increased complications and revision rates after unicompartmental knee arthroplasty. *J Arthroplasty.* 2015 ; 30 : 456-60.
12. **Kozinn SC, Scott R.** Unicompartmental Knee Arthroplasty. *J Bone Joint Surg Am* 1989 ; 71 :145-150.
13. **Labek G, Sekyra K, Pawelka W, Janda W, Stöckl B.** Outcome and reproducibility of data concerning the oxford unicompartmental knee arthroplasty: a structured literature review including arthroplasty registry data. *Acta Orthop.* 2011 ; 82 :131-5.
14. **Outerbridge RE.** The etiology of chondromalacia patellae. *Clin. Orthop. Relat. Res* 1661 ; 389 : 5-8, 2001.
15. **Pandit H, Jenkins C, Barker K, Dodd CA, Murray DW.** The oxford medial unicompartmental knee replacement using a minimally-invasive approach. *J Bone Joint Surg Br* 2006 ; 88 : 54-60.
16. **Plate JF, Augart MA, Seyler TM, et al.** Obesity has no effect on outcomes following unicompartmental. *Knee Arthro.* 2015 Apr 12. Epub Ahead Of Print World Health Statistics. Part-2 *Global Health Indicators.* 2008 ; 35-104.