The Knee xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

The Knee

Mobile bearing medial unicompartmental knee arthroplasty in patients whose lifestyles involve high degrees of knee flexion: A 10–14 year follow-up study

Won Sik Choy, Kwang Won Lee, Ha Yong Kim, Kap Jung Kim, Young Sub Chun, Dae Suk Yang *

Department of Orthopedic Surgery, Eulji University Hospital, Daejeon, Republic of Korea

ARTICLE INFO

Article history:
Received 6 January 2017
Received in revised form 2 March 2017
Accepted 4 May 2017
Available online xxxx

Keywords:
Asian patients
Complications
Knee
Mobile bearing
Unicompartmental knee arthroplasty

ABSTRACT

Background: Because Asian populations have different lifestyles, such as squatting and sitting on the floor, from those of Western populations, it is possible that the clinical results and survival rate of unicompartmental knee arthroplasty (UKA) for Asian patients may be different. This study described outcomes of mobile bearing medial UKA for Korean patients.
Methods: A total of the 164 knees treated with mobile bearing UKAs in 147 patients (14 males and 133 females) were reviewed. The mean follow-up period was 12.1 years (range 10.1–14).
Results: The clinical outcomes, such as the Hospital for Special Surgery Knee score, the Oxford Knee Score and the Knee Society rating system, showed statistically significant improvement from pre-operative to final follow-up ($P < 0.05$). A total of 26 UKAs (15.8%) required revision; the most common reason was bearing dislocation. The 95% confidence interval of survival rate at 12 years was 84.1%, with revision for any reason as the end point.
Conclusions: Minimally invasive mobile bearing UKA in Asian patients who required high degrees of knee flexion showed rapid recovery and good clinical outcome. However, they also showed relatively high rates of bearing dislocation and aseptic loosening. Therefore, mobile bearing UKA should only be performed in patients whose lifestyle involves high flexions after carefully considering these risks and benefits.

1. Introduction

Oxford phase 3 mobile bearing unicompartmental knee arthroplasty (UKA) has a fully congruent mobile bearing. It offers the hope of restoring knee kinematics, decreasing bearing wear and aseptic loosening through increased implant conformity, and lowering polyethylene stresses. Moreover, the Oxford phase 3 mobile bearing UKA was designed to be a minimally invasive surgery through a short skin incision and without eversion or dislocation of the patella. For these reasons, the use of minimally invasive UKA for isolated medial compartment osteoarthritis has increased in popularity. Many studies on North American and other Western populations have reported that patients undergoing minimally invasive UKA using Oxford phase 3 have faster recovery, more normal knee kinematics, increased range of motion (ROM), and better patient-reported outcome measures [1–5]. Recently, low bearing dislocation and revision rates have been reported using Oxford phase 3 mobile bearing UKA in a large series (1000) of knees performed with a minimally invasive technique [3].

* Corresponding author.
E-mail address: yds123@hanmail.net (D.S. Yang).

http://dx.doi.org/10.1016/j.knee.2017.05.004
0968-0160/

Asian populations have different lifestyles from North American and other Western populations. They have postures requiring full flexion, such as squatting and sitting on the floor for social and religious reasons. Because of these differences in Asian populations it is possible that the clinical results and survival rates are different to those of Western patients. When the results of UKA in Asian populations were compared to those of North American and other Western populations, similar good clinical outcomes and survival rates were reported [6]. However, other studies have reported a substantially higher bearing dislocation in Asian populations [7]. Furthermore, long-term follow-up studies about Oxford phase 3 mobile bearing UKA in Asian populations is scarce [8].

The objective of this study was to determine the long-term clinical outcomes of an average 12-year follow-up following minimally invasive Oxford phase 3 mobile bearing UKA in a Korean population whose lifestyle involves high degrees of knee flexion.

2. Methods

2.1. Study design

The Institutional Review Board approved this study. Between January 2002 and December 2005, one senior surgeon performed 188 consecutive UKAs via a minimally invasive approach in 166 patients. All cases received Oxford phase 3 mobile bearing UKAs (Biomet, Warsaw, IN, USA). Of these, 24 knees (19 patients) were unable to be followed: seven knees (seven patients) were lost to follow-up and 17 knees (12 patients) were lost due to death unrelated to arthroplasty. A total of 15% of patients were lost to follow-up; this was an acceptable rate, as it was <20% and >2 year follow-up. Finally, 164 knees in 147 patients (133 females, 14 males) were studied. Pathological diagnosis of the knees included osteoarthritis (n = 146) and spontaneous osteonecrosis (n = 18), all of which involved the medial condyle of the femur. The mean age of patients at surgery was 65.6 years (range 44–75). The mean follow-up period was 12.1 years (range 10.1–14). The indications for UKA followed the recommended standards already established in the literature [9,10]. Other indications were: intact anterior cruciate ligament (ACL) confirmed by physical examination and magnetic resonance image (MRI), varus deformity <15°, flexion contracture <15°, minimal translation via varus–valgus stress view with radiographically well-preserved lateral and patellofemoral compartments [11].

2.2. Surgical technique

All operations were performed through the minimally invasive surgical techniques described in detail by Murray et al. [12]. No ligament releases were undertaken. All bearings used in this study were non-anatomic bearings (non-specific and usable on either side). The average thickness of the bearing was 3.4 mm (range 3–7). Prophylactic antibiotics were used in all patients one hour before the surgical incision was made and three more times during the postoperative 24 h. Full weight-bearing was allowed after removal of drains (24 h after surgery). All patients wore compression stockings as thromboembolic prophylaxis.

2.3. Clinical and radiologic outcome assessment

Patients completed the same method of clinical and radiologic outcome assessment at one, three and six months after surgery, and then at yearly intervals (by a surgeon who was not involved in any of the operations). Patients were asked about any complications and reoperations at each follow-up visit. Whenever patients visited the outpatient clinic after one year of follow-up, they were clinically evaluated for ROM, Hospital for Special Surgery (HSS) knee score, Oxford Knee Score (OKS) [13], the Knee Society rating system (KSS) [14], with Knee Society knee score (KSKS) and Knee Society functional score (KSFS) being subsets. Squatting and cross leg sitting postures commonly used in Korean daily life were also checked. Knee ROM was measured using a long-arm goniometer. Any complication was recorded.

In radiologic assessments, weight-bearing anteroposterior (AP) and lateral radiographs with the knee in full extension were obtained fluoroscopically. A long hip to ankle film was also taken to measure the tibiofemoral angle at each visit. The AP radiographs were aligned parallel to the undersurface and the vertical wall of the tibial component. Lateral radiographs were performed with images aligned to the posterior facet of the femoral component. All measurements were based on Digital Imaging and Communications in Medicine (DICOM) data, using the ruler and protractor functions provided by the Picture Archiving and Communication System (PACS) software (M-View™, Marotech, Seoul, Korea). X-rays were assessed to obtain AP tibiofemoral angle (TFA) (anatomic axis) and periprosthetic radiolucent lines. After a two-week interval, two knee arthroplasty fellowship-trained surgeons who did not perform any of the UKA procedures made repeated measurements in the subgroups of patients. The intraobserver and interobserver reliabilities for all radiographic measurements were considered acceptable ranges 0.88–0.99 and 0.85–0.99, respectively.

Periprosthetic radiolucent lines were evaluated on the most recent radiographs for the presence of radiolucent lines. The tibial component in the AP radiograph was divided into the following three areas: the medial zone (medial to keel), the keel (surrounding the keel), and the lateral zone (lateral to the keel) [15]. The border of the lateral vertical wall of the tibial component was not assessed, as the component was not fixed at this position and it was not filled with cement. The lateral radiograph was assessed for the presence of radiolucency running parallel to the posterior facet of the femoral component. Due to the spherical geometry of the femoral component, it was impossible to assess radiolucency along other aspects of their component. The thickness of the radiolucent lines was measured in each area and the mean thickness was calculated. Physiological radiolucency was defined as up to a maximum of two millimeter, with a defined sclerotic border running parallel to the edge of the component. Either the tibial or the femoral component was considered to be loosening when the radiolucency was ≥2 mm around the components, with a poorly defined border.

Please cite this article as: Choy WS, et al, Mobile bearing medial unicompartmental knee arthroplasty in patients whose lifestyles involve high degrees of knee flexion: A 10–14 year follow-up study, Knee (2017), http://dx.doi.org/10.1016/j.knee.2017.05.004