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Predicting Satisfaction for Unicompartmental Knee Arthroplasty Patients in an Asian Population



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ABSTRACT

Background: Despite renewed interest in unicompartmental knee arthroplasty (UKA), there is a paucity of published literature with regard to patient satisfaction after UKA within Asian populations. The purpose of this study is to identify characteristics and factors which may contribute to patient dissatisfaction after UKA in a multiracial Asian population.

Methods: Seven hundred twenty-four UKAs were performed between January 2007 and April 2013. Preoperative and postoperative variables were prospectively captured, such as standardized knee scores, knee range of motion, and patient satisfaction scores. These variables were then analyzed with a multiple logistic regression model to determine statistically significant factors contributing to patients' satisfaction.

Results: Minimum duration of follow-up was 2 years, with an overall patient satisfaction rate of 92.2%. There was improvement in mean knee range of motion and across various standardized knee scores. Preoperative variables associated with patient dissatisfaction included a poorer preoperative Mental Component Summary, better preoperative knee extension, and better preoperative Oxford Knee Scores. Significant postoperative variables included better Oxford Knee Score at 6 months and Mental Component Summary at 2 years.

Conclusion: Despite the impressive patient satisfaction rate of UKA in this Asian population, these findings suggest that there is a targeted group of patients with select preoperative factors who would benefit from preoperative counseling.

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Unicompartmental knee arthroplasty (UKA) is an accepted option for treatment of isolated arthritis within one of the 3 compartments of the knee [1]. In recent years, UKA has gained popularity as midterm and long-term results have appeared encouraging [2]. The first-decade survivorship after UKA has improved and is comparable with that after total knee arthroplasty (TKA) in patients aged >60 years [3]. UKA in general offers several advantages compared with TKA: the procedure is less invasive, patients tend to achieve a better range of motion (ROM), and they report a more “normal feeling” joint [2]. A recent systematic review

has supported the routine use of UKA for medial compartment osteoarthritis [4].

In the past, multiple studies used the need for revision surgery as an indicator of failure of a surgical procedure, neglecting the subjective component of patient satisfaction [5,6]. More recently, patient satisfaction is increasingly being used as a marker of outcome of a procedure's success. Unfortunately, patient satisfaction is a subjective measurement and hence difficult to predict even with established knee scoring systems. Literature has demonstrated a discrepancy between clinician and patient ratings of quality of life [7]. Subjective patient satisfaction is the ultimate goal of each orthopedic surgeon performing a procedure for osteoarthritis in the knee [8].

Current published literature is scarce with regard to satisfaction rates of UKA; furthermore, these studies tend to involve small patient populations. This study aims to discover the rate of satisfaction of patients from an Asian population who have undergone

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UKA. Furthermore, it aims to reveal the different factors which play a part in patient satisfaction, especially in a multiracial Asian population which purportedly requires greater flexion of the knee for day-to-day activities.

Our hypothesis is that there are preoperative and postoperative variables associated with post-UKA patient dissatisfaction.

Material and Methods

Participants

Between January 2007 and April 2013, 724 UKAs performed at a single institution were prospectively followed up for a minimum of 2 years. Of those 724 UKAs performed, 717 were medial UKAs and 7 were lateral UKAs. The study was approved by the local institutional review board. Patients who underwent bilateral UKA performed in the same setting were also included in the study. Age and body weight were not used as exclusion criteria for this study. All participants had a preoperative mechanical axis deformity of $<10^\circ$ of varus or 5° of valgus, and a flexion contracture $<15^\circ$, as per the classic selection criteria for UKA described by Kozinn and Scott in 1989 [9].

Indications

All UKAs were performed for unicompartamental noninflammatory primary osteoarthritis of the knee. UKAs were only performed in knees with an intact contralateral compartment and patellofemoral changes not greater than grade II or III (Albach classification). Trochlear wear up to grade IV was accepted if the distribution was central.

Components and Technique

All UKAs were performed by 5 qualified surgeons from the institution's Department of Orthopaedic Surgery, with the majority of cases performed by 2 senior surgeons. All implants used were of fixed-bearing design: MG UKA from Zimmer and PFC UKA from DePuy. An anteromedial wear pattern on the tibia was used as a surrogate for a competent anterior cruciate ligament. All procedures were performed through an anterior midline incision; medial UKA was performed via a medial parapatellar arthrotomy, and lateral UKA performed via a lateral parapatellar arthrotomy.

Postoperative Management

Postoperatively, the patients were put through a similarly structured physiotherapy program. This would involve bed mobilization exercises on the first day, and if the patient could tolerate these exercises, they would progress to weight bearing as tolerated with a walker.

Data Collection and Assessment

Key preoperative and postoperative variables were collected, along with patient expectations and satisfaction. Data were captured by trained personnel during each patient's follow-up in the Orthopaedic Surgery Clinic at 6 months and 2 years postoperatively; dropout rate was captured to assess for nonresponder bias. Two time points were used to measure changes and improvements in surgical outcome.

Preoperative patient-specific variables analyzed were patient's age, gender, body mass index, and knee ROM. Other preoperative variables analyzed were validated knee scores such as the Oxford

Knee Score (OKS), Functional Score (FSC), and Knee Score (KSC) from the Knee Society Clinical Rating Score.

The OKS is a 12-item questionnaire specifically designed and developed to assess function and pain after knee arthroplasty [10]. The Knee Society Clinical Rating Score is a different knee rating system subdivided into a KSC that rates only the knee joint itself and an FSC that rates the patient's ability to walk and climb stairs; the dual-rating system was developed to eliminate the problem of declining knee scores associated with patient infirmity [11].

Both preoperative and postoperative ROMs of the knee were captured via goniometry. Both flexion and extension of the knee were recorded; a flexion value of 90° would mean that the patient was capable of flexion of the knee to 90° . An extension value of 0 would refer to the patient being able to extend the knee fully, and an extension value of 10 would imply a fixed flexion deformity of 10° .

To assess the impact of the procedure on each patient's quality of life, individual components of the Short Form 36 Health Survey (SF-36) were captured, and the composite Physical Component Summary (PCS) and Mental Component Summary (MCS) were calculated. The SF-36 is a multipurpose short-form health survey which yields physical and mental health summary measures, the PCS correlating well with physical functioning and bodily pain, and the MCS correlating well with mental health and social functioning.

Owing to the multiracial nature of Singapore's Asian population, the patients' races were split into 4 main categories: Chinese, Malay, Indian, and Others.

The presence of common medical comorbidities such as diabetes mellitus (DM), hypertension (HTN), and dyslipidemia (DL) was also captured. HTN, DM, and DL were chosen as medical comorbidities as they are the 3 diseases with the highest prevalence among adults aged 18–69 years within the local context, with prevalence rates at 23.5%, 11.3%, and 17.4%, respectively, according to the Ministry of Health of Singapore. Furthermore, according to the Ministry of Health, the same 3 comorbidities also account for the majority of visits by Singaporeans to outpatient services. These 3 key medical comorbidities were analyzed as preoperative variables as well.

Postoperative variables captured included the OKS, FSC, KSC, ROM, as well as the composite PCS and MCS calculated from SF-36 scores.

Patient satisfaction scores were recorded on a Likert scale of 1–6, with 1 representing excellent satisfaction and 6 representing extreme dissatisfaction. This was adapted from Question 53 of the North American Spine Society Questionnaire. To capture a binary score, the overall satisfaction grade was categorized into 2 groups with patients who answered 1, 2, and 3 being assigned to the satisfied group and those who answered 4, 5, and 6 being assigned to the dissatisfied group.

All data, including preoperative and postoperative variables as well as reasons for dissatisfaction, were prospectively collected by hospital staff from the Orthopaedic Diagnostic Center.

Statistics

The demographic and clinical profiles of participants were summarized by using the mean and standard deviation. A 2-sample *t* test was used to assess whether demographic and clinical characteristics were associated with nonrespondent status.

Simple logistic regression was performed on both preoperative and postoperative variables with patient dissatisfaction as the dependent variable. The multiple logistic regression model was obtained through a model building process in which the stepwise algorithm with Akaike's information criterion (AIC) begins with a null model (ie, a model with no predictors). The AIC is used to select

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