The Outcome of Oxford Uni-Compartmental Knee Arthroplasty (Phase III)

(in Different Patient Categories)

A Systematic Review and Meta-Analysis for Partial Fulfillment of the Master Degree IN Orthopedic Surgery

By

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The outcome of Oxford unicompartmental knee arthroplasty (Phase III) in different patient categories.

Abstract

Background: Mobile bearing UKA has gained renewed interest in the past decade limited to medial compartment of the knee. The advantages of UKA over TKA in properly selected patients are reduced blood loss, less peri-operative morbidity, short surgical time, faster recovery & rehabilitation as well as reduced post-operative pain. There is a debate about the contraindications of OUKA, whether it would be offered to obese or highly active individuals or not. This is may be because of the fear of increase risk of post-operative complication and poor survival of the prosthesis. By 2020; TKA utilization is expected to exceed one million annually therefore the cost-effectiveness of UKA as an alternative to TKA should be considered in relation to the patient age.

Aim: Primarily, to conduct a systemic review & meta-analysis of the outcomes (Knee pain, function & motion range) of OUKA in standard, obese and highly active individuals pre and post-operatively. Secondarily, to assess the survivorship of the implant and it's cost effectiveness in relation to the age.

Methods & Patients: 13 literatures were included in our analysis from 2013 to 2018. All underwent medial oxford unicompartmental knee arthroplasty (phase III) OUKA. Patients were subdivided into standard, obese and highly active subgroups. Knee pain and function were assessed by Oxford knee score OKS pre and post-operatively and a meta-analysis was conducted using the pooled data estimate from the included studies. A qualitative review was performed to assess the survivorship of the implant in each subgroup and to assess the relation between age & cost-effectiveness as regard OUKA.

Conclusion: In properly selected patients, OUKA significantly shows decrease in knee pain and function beside improvement in the motion range and survivorship of the new implant unlike the old one. Neither obesity nor high activity affect the outcomes and survivorship of OUKA and significantly not a contra-indication for using OUKA unlike what was traditionally believed. Moreover OUKA is an attractive economical cost-effective option in patients 65 years or older.

Key words: OUKA oxford unicompartmental knee arthroplasty, TKA total knee arthroplasty

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List of Abbreviations

Abb.	Full term
ACL	Anterior cruciate ligament.
BMI	Body mass index.
HTO	High tibial osteotomy.
MIS	Minimally invasive surgery.
NJR	National joint registries.
OA	Osteoarthritis.
OKS	Oxford knee score.
OUKA	Oxford uni-compartmental knee arthroplasty.
PCL	Posterior cruciate ligament.
PROM	Patient reported outcome measures.
QALYs	Quality adjusted life years
ROM	Range of motion.
SONK	Spontaneous osteonecrosis of the knee.
TKA	Total knee arthroplasty.
UKA	Uni-compartmental knee arthroplasty.
MCID	Minimal clinical importance difference.
PROs	Patient reported outcomes.

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INTRODUCTION

Osteoarthritis (OA) is the most widely recognized reason for joint disabilities in many populations especially over the age of 65 years. Essential OA is uncommon before the age of 40 years yet turns out to be progressively basic every decade from there on. A report from the third national health and nutrition examination review assessed that 37.4% of grown-ups in the United States who are 60 years old or more have radiographic proof of the Disease. Despite the fact that OA isn't a dangerous sickness, the morbidness related with this condition is extensive; 80% of patients with OA have limited mobility, and 25% experience issues performing significant exercises of everyday living. The financial weight of osteoarthritis may surpass $60 billion every year in the United States. [1, 2, 3, 4, 5]

Currently, the primarily surgical methods of treating unicompartmental knee arthritis include high tibial osteotomy (HTO), Unicompartmental knee arthroplasty (UKA) and conventional Total Knee Arthroplasty (TKA). However, with the increasing concerns regarding the finite life span and post-operative functional recovery of these aforementioned procedures, the indications of UKA in the management of medial osteoarthritis were expanded. Moreover, many studies have reported excellent clinical outcomes after UKA, Including the reduction of post-operative pain, reduced blood loss, the correction of angle deformity (varus deformity) of the knee, the return of Motion range (ROM) and the improvement of clinical and functional scores. As it conserves bone stock better than

TKA, UKA also provides patient with better kinesiology and faster recovery. Although some studies indicated that the revision rate of UKA is relatively high compared with that of TKA, the current long-term follow-ups of UKA show good clinical results in western populations. [6, 7]

In a significant proportion of patients, up to 47% by some estimates, disease is restricted to either the medial or the lateral knee compartments. These patients may be suitable for uni-compartmental knee arthroplasty (UKA). With UKA, only the parts of the knee affected by OA are replaced, and both cruciate ligaments and the remaining healthy joint surfaces are preserved. By retaining these structures, UKA restores the ligament-driven kinematics of the native knee. UKA requires a smaller incision than TKA and is accompanied with short stay in hospital and decrease infection rates, morbidity and mortality. Thus, it is more financially economic than TKA. However, in unadjusted analyses, all major National Joint Registries (NJRs) report that the revision rate for UKA is two to three times higher than that for TKA. [8]

Although HTO is better in younger age patients with better outcomes, HTO performed in patients with bone to bone contact AMOA has unexpected outcomes. UKA is a less invasive option to TKA in Obese patients or younger patients with end stage AMOA, as it will in general provide the knee with better kinematics and capacity. However, the utilization of UKA in patients with high movement levels stays disputable. Highly active individuals have traditionally been viewed as a

contraindication to UKA. Moreover in the past it was believed that it still has high revision rates. [9]

Beside there is a debate about contraindications for UKA whether it should be offered to obese patients or not. Because of a fear of an increased risk of peri-operative complications and poor survival due to early implant failure whether due to secondary implant loosening or excessive wear. [10]

UKA was traditionally indicated for patients older than 60 years of age. With improved implant design and surgical technique, UKA increasingly has been used in younger patients. Meanwhile survival rates of TKA may exceed those of UKA in younger patients; revision TKA may be more technically complex and extensive than primary TKA or revision UKA. Therefore cost effectiveness in relation to age should be considered especially by 2020; TKA utilization is expected to exceed one million annually and, unlike today, approximately half of these procedures will be performed in younger patients. [11, 12]

AIM OF THE WORK

The aim of this work is primarily to conduct a meta-analysis of the outcomes of mobile bearing Oxford (phase III) uni-compartmental knee arthroplasty in different types of patients and statistically compare between their results of pain and knee function scores pre and post-operatively. Secondarily to assess the survival rate in these patients as well as to assess the relation of age and cost-effectiveness as regard OUKA phase III.

REVIEW OF LITERATURE

Oxford Unicompartmental Knee Arthroplasty (Phase III)

Due to the appearance of the mobile bearing Oxford phase III unicompartmental knee arthroplasty OUKA; the most recent decade has restored enthusiasm for unicondylar knee replacements in individuals with arthritis influencing one compartment of the knee joint. This ought to the improvement and progress in manufacturing the prosthesis itself and the expanding great outcomes. In properly chosen patients outcomes compared or better than the consequences of total knee replacements; careful selection of candidates and precise surgical techniques are likely the passkey to better outcomes in unicondylar knee arthroplasty. [13, 14]

Uni-compartmental knee arthroplasty UKA is a form of arthroplasty that doesn't replace the entire knee (femoral condyles, tibial plateau and patella), but it includes replacing just one compartment of the joint which is diseased. It is composed of a metal component that goes on the condyles of the femur and another component that goes on the tibial side. However unlike the old days, now the component of the tibia is metal-backed with a mobile bearing polyethylene surface to permit both weight bearing and scope of movement “ROM” as well. In this way just pieces of the knee are supplanted protecting vital structures such as undamaged Anterior Cruciate ligament “ACL” which has a significant function not only in

knee proprioception, but also it saves the original kinematics derived by the knee ligaments **[Fig. 1, 2]**. [15]

Fig. (1): Prototype of Oxford mobile-bearing (phase III) UKA.

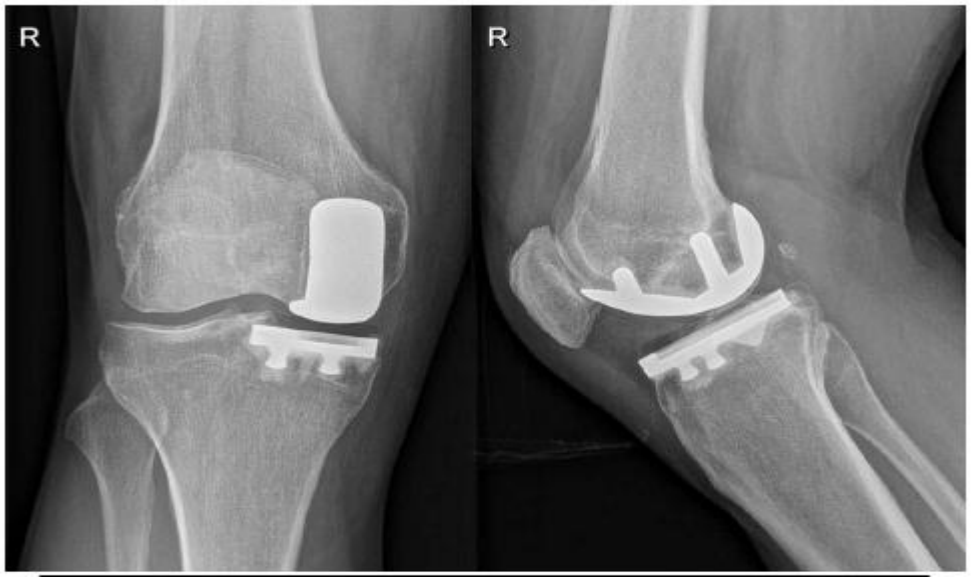

Fig. (2): X-ray (AP & Lat.) knee shows a well-fixed and stable UKA implant. [15]

Advantage & Disadvantages of UKA:

The benefits of UKA - as cleared up by as assortment of papers - incorporates decreased post-operative pain, correction of