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Long term Patient Outcomes following Navigated Knee Replacement: A Retrospective analysis

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Abstract

Total knee replacements (TKR) are often deemed successful when patients recover and maintain their functionality both in the short and long term. The other main indicator for success is the revision rate following TKR. This study analyses the long term results of navigated TKR based on patient related outcomes in terms of patient satisfaction, Oxford Knee Score (OKS) and also knee revision rates.

The retrospective data of all patients who underwent navigated Columbus TKR from the author's institution from 2005 to 2011 was analysed and compared to the national database. The overall cohort size was 1679 with a mean age of 68.81yrs (sd 8.46). The OKS, satisfaction scores, complication and revision rates were compiled and evaluated up to ten years post-operatively. Patient reported outcomes were recorded six weeks, one, two, five and ten years post-operatively.

The results from the OKS and satisfaction scores demonstrated marked improvement throughout recovery to the ten year time point. The OKS had a mean improvement of 16.6 from the pre-operative score at the 10 year time point and the satisfaction scores improved at each follow-up and remained high at the 10 year time point. A total of 61 complications and 36 revisions recorded, with infection being the major cause for revisions.

This survey has identified and established that the majority of patients undergoing knee arthoplasty using the Columbus total knee system and computer navigation function reasonably well in the long term and the revision and complication rates in this hospital are compare well with national levels..

1 Introduction

A successful outcome of total knee replacement (TKR) surgery, which is considered the gold standard (Pozzi et al., 2014) for the treatment of osteoarthritis (OA) is often characterised by revision rates and functional recovery of patients (Patil et al., 2015). Recovery of patients is often established

by evaluating subjective, objective and functional outcomes, both at the short term and long term follow-up. It has been well established that the objective outcomes do not always correlate with the subjective outcomes in terms of recovery. Patient reported subjective outcomes need to be given additional importance when evaluating long term success of TKR (Bullens et al., 2001, Choi & Ra, 2016). This study analyses the long term recovery of navigated TKR based on patient related outcomes in terms of patient satisfaction, Oxford Knee Scores (OKS) and knee revision rates.

2 Methods

All relevant clinical information was extracted from our local clinical database and national database for patients who underwent navigated TKR using the Columbus knee system (Aesculap AG, Tuttlingen, Germany) and the OrthoPilot navigation system (Aesculap AG, Tuttlingen, Germany) between 2005 and 2011. The cohort size was 1679 patients (735 Males and 944 females, mean age 68.81yrs (Table 1)) including 32 bilateral cases (19 males and 13 females). The essential demographics are detailed in Table 1. The OKS and satisfaction scores (Table 2) were recorded at the six weeks, one, two, five and ten years post-operatively. The OKS was scored using the 12-60 (best to worst respectively) scoring system. Satisfaction levels were measured using a 5-point Likert scale ranging from “very satisfied” to “very dissatisfied”. Complications and revisions were identified using both the internal and external databases (Table 2).

3 Results

The pre-operative OKS had a mean of 41.8 and showed marked improvements at all time points up to ten years post-operatively. The mean difference at 10 years OKS was at 16.6 from the pre-operative score. Satisfaction levels increased at each follow-up compared to that at six weeks post-operatively and remained high. One patient died within 90 days of surgery. There were a total of 65 complications and 36 revisions (2.1%) recorded, with infection (1.5%) being the major cause for revisions. All infected cases lead to the implant being revised, with the exception of one where the patient died of unrelated causes prior to any planned revision. Eighty-four percent (n=21) of infections occurred within 90 days of surgery.

Demographics		***Age(years)***	***BMI(kg/m2)***	***ASA Score***		
Mean(SD)		68.8 (8.64)	32.5 (5.81)	2.2 (0.55)		
Oxford Knee Score (12-60)	***pre-OKS***	***6Wk OKS***	***1Yr OKS***	**2Yr OKS**	***5Yr OKS***	**10 Yr OKS**
Mean(SD)	41.8 (7.7)	27.7 (7.5)	22.3 (7.9)	22.3 (8.2)	21.8 (8.9)	25.2 (10.6)
Satisfaction		***6Wk Satisfaction***	***1Yr Satisfaction***	***2Yr Satisfaction***	***5Yr Satisfaction***	***10Yr Satisfaction***
Very Satisfied		67.8%	81.5%	81.0%	84.7%	84.4%
Satisfied		17.3%	12.6%	13.3%	9.8%	7.5%
Unsure		5.0%	3.9%	4.0%	3.6%	2.7%
Dissatisfied		0.8%	1.9%	1.7%	1.9%	5.4%
Very Dissatisfied		0%	0%	0%	0%	0%
Completed follow-ups		93%	85%	28%	32%	11%
Total Patients: 1679						

Table 1: Patient demographics and Oxford Knee Scores and satisfaction rates up to five years post-operatively.

Revisons		**Complications**	
Infections*	24	**Infections***	21(4)
Fracture	2	**DVT/PE**	15
Arthrofibrosis	2	**Mortality**	1
Aseptic Loosening	2	**Stroke**	4
Pain	4	**AMI**	4
PCL rupture trauma	1	**GI Bleed**	2
Surgical Mistakes	1	**Acute Renal Failure**	10
Total	**36**	**Total**	**65**

*Revision infections are a subset of complication infections.

Table 2: Revision and complication details. Complication infections are within 90 days (over 90 days).

4 Discussion

This retrospective review of data provides an insight in to the recovery of patients post surgery for a period of ten years. The scores achieved in both OKS and satisfaction levels suggest that most of the recovery and improvements in quality of life is obtained within the first year of surgery with continued improvements in the long term. A systematic review published by Kallenberg et al. (2018) concluded that the majority of studies report satisfaction rates above 80%, with post-operative function and pain relief being primary indicators of satisfaction which are in line with the findings of this study. The routine follow-ups in the hospital were initially planned to span over a period of ten

years but were later reduced to six weeks and one year, hence the return of patients at two years (28%), five years (32%) and ten years (11%) post-operatively shows a reduction, however it was clear from the national database that revisions and complications for this cohort were minimal and well below national averages and it is safe to assume that patients are doing reasonably well based on the national averages. The five year revision rates as per the Scottish Arthoplasty Project was 2.8% for knees in 2010 (SAP, 2010) which is higher than this hospital's revision rates (2.1%) and is still lower than the current national five year rates (2.5%) (SAP, 2018). When excluding revision for infection, the revision rate related to surgical technique is 0.7%. The incidence of infection during the years between 2005-2010 was 1.4% nationally (SAP, 2012) which is similar to the rate for this hospital (1.5%). This survey has identified and established that for the majority of patients undergoing knee arthoplasty using the Columbus total knee system and computer navigation are functioning reasonably well in the long term and the revision and complication rates in this hospital are within the national levels.

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