Obesity and Total Knee Arthroplasty: Is it more time consuming and do they stay longer?

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Citation

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Abstract

Background & Purpose: With increasing numbers of obese individuals presenting for consideration for Total Knee Arthroplasty (TKA), this observational study assessed the influence of obesity on operating time and duration of hospital admission following TKA.
Materials and Methods: 263 patients who underwent 276 TKAs between 1st January and December 31st 2005 at the Glenfield General Hospital were identified from the Trent (and Wales) Arthoplasty Audit Group. Patients were grouped into three weight categories based upon BMI. We examined hospital records for 265 of the 276 procedures and compared operating time and length of hospital admission between the three BMI groups. Patient perceived outcomes including patient satisfaction, post-operative pain and frequency of walking were compared at 1-year post TKA.
Results: There was no difference in operating time or duration of hospital stay between the BMI groups. Similarly, there were no significant differences in patient satisfaction or pain levels at 1-year post-op. As has been demonstrated previously, increasing BMI negatively influenced post-operative walking frequency (p=0.02).
Interpretation: BMI did not influence operating time, length of stay, post-operative pain and patient satisfaction post Total Knee Arthroplasty, but was associated with decreased post-operative mobility.

INTRODUCTION

The prevalence of obesity is increasing globally. An estimated 1 billion adults worldwide are overweight, of whom at least 300 million are obese [1]. In the UK in 2002, studies revealed 23% of adult males and 25% of women were obese [2] and in 2003, 70% of individuals aged 65-74 were classified as overweight or obese [1].

Over 30,000 Total Knee Arthroplasties (TKA) are performed each year in Great Britain [3] and obese individuals comprise a disproportionately large subset of patients undergoing joint replacement procedures [4]. Despite considerable attention, the literature is divided over the ramifications of obesity on TKA. Several studies have cited obesity as a negative predictor of outcome following TKA [4,5,6], while others report comparable outcomes at both short and long-term follow up [3,7,8]. As a result of this division, obese patients are frequently encouraged to loose weight before surgery and some patients are advised against or denied the operation because of their BMI [3].

While attention has been directed towards the examination of physical outcomes following TKA in obese patients, there is a gap in the literature examining the health economics of Total Knee Arthroplasty and obesity. There seems to be a perception that TKA in obese patients is technically more demanding and is associated with a longer operating time compared to non-obese patients. It has also been shown that obesity impedes mobility following TKA [9] and this may lead to an increased hospital stay. Studies have revealed that hospital expenses following TKA were higher in obese patients when compared to the non-obese [10] while those examining the influence of obesity on total hip arthroplasty have reported a link between obesity and increased operating time for revision total hip arthroplasty [11]. To our knowledge there is no published literature comparing TKA operating time in obese patients to non-obese patients.

The purpose of this study was to: (1) examine whether a high BMI correlated with longer operating times and greater duration of hospital admission, and (2) investigate the influence of obesity on patient perceived outcomes at 1-year post TKA.

PATIENTS AND METHODS

The accepted method of assessing obesity is the body mass index (BMI). Calculated by dividing the weight of an individual in kilograms (kg) by their height in metres squared, BMI correlates well with total body fat [5,7]. Obesity is defined as a BMI ≥30 kg/m^2.

The Trent (and Wales) Arthroplasty Audit Group [12] identified 263 patients who underwent 276 TKAs (13 patients had bilateral surgery during this period) at the Glenfield Hospital in Leicester, between 1st January and 31st December 2005. We studied hospital records for 265 of the 276 procedures (96% data capture). Of the 265 TKAs studied, 108 were performed on male and 157 on female patients respectively. The mean age of patients was 72 years (range 63 – 79). There were no exclusion criteria.

Data on patient height, weight and BMI, operating time and length of hospital stay were obtained from these records. Tourniquet times were not available for three patients. Data on patient satisfaction, pain levels and walking frequency at 1-year post surgery was obtained from the Trent (and Wales) Arthroplasty Audit Group [12].

Patients were divided into three groups based on BMI; Group 1 consisted of 31 patients with a BMI ≤ 25.0 who underwent 31 TKAs. Group 2 included 118 patients (124 TKAs) with BMI between 25.1 and 30.0. Group 3 consisted of 104 patients who had undergone 110 TKAs and had a BMI of >30.0.

The length of hospital stay was positively skewed and analysed using a Kruskal-Wallis test. Operation times were compared between the three BMI groups using analysis of variance. Responses to questions on patient satisfaction, post operative pain and frequency of walking were compared between the three BMI groups using chi-squared tests.

Statistical analysis was performed using the statistical software package SPSS (SPSS Inc., Chicago, Illinois) version 14. Significance was assumed at $p<0.05$.

RESULTS

The mean operating time was 82 min (95 % CI 76 to 88) in Group 1, 84 min (95% CI 81 to 87) in Group 2 and 88 min (95% CI 84 to 91) in Group 3 (p=0.2).

The mean length of stay for each BMI group ranged from 7.7 days (95% CI 5.7 to 9.6) in Group 1, 7.2 days (95% CI 6.2 to 8.1) in Group 2, to 6.7 days (95% CI 5.6 to 7.7) in Group 3 (p=0.8).

One-hundred and eighty-four of the 276 patients surveyed completed the section on post-operative satisfaction (67% data collection). 88% in Group 1 reported that they were pleased with the outcome of their TKA along with 88% in Group 2 and 85% in Group 3 (p=0.1) (Table 1).

Figure 1

Table 1: Patient satisfaction reported by 184 of 276 patients who underwent Total Knee Arthroplasty in the calendar year 2005.

BMI Group	Patient Satisfaction (percent)		
	Pleased	Unsure	Unhappy
1 (n=17)	88	12	0
2 (n=93)	88	1	11
3 (n=74)	85	3	12
p= 0.1			

59% of the patients in Group 1 recorded never or rarely experiencing pain compared to 57% in Group 2 and 51% in Group 3 (p=0.7). 193 patients completed this section of the survey (70% data capture) (Table 2).

Figure 2

Table 2: Frequency of pain reported by 193 of 276 patients who underwent Total Knee Arthroplasty in the calendar year 2005.

BMI group	Pain Frequency (percent)			
	Never	Rarely	Sometimes	Bad
1 (n=17)	35	24	41	0
2 (n=98)	25	32	39	4
3 (n=78)	22	29	41	8
p=0.7				

One-hundred and eighty-nine patients completed the survey on walking frequency (68% data capture). Eighty-eight percent in Group 1 walked “often” as compared to 82% in Group 2 and 66% in Group 3 (p=0.02) (Table 3).

Figure 3

Table 3: Frequency of walking reported by 189 of 276 patients who underwent Total Knee Arthroplasty in the calendar year 2005.

BMI group	Walking Frequency (percent)			
	Often	Sometimes	Rarely	Never
1 (n=17)	88	12	0	0
2 (n=98)	82	13	1	4
3 (n=74)	66	28	5	0
p=0.02				

DISCUSSION

Hailed as one of orthopedic surgery's success stories [3], TKA is widely regarded as one of the most predictable and successful reconstructive procedures performed on adults [6]. Despite considerable attention, the influence of obesity on outcomes following TKA is uncertain [7] and there exists a perception among many medical practitioners, including some orthopaedic surgeons, that TKA in obese patients is associated with a longer operating time and longer recovery compared to non-obese individuals.

The results of this study reveal that operating time and length of stay are independent of BMI. While a trend of increasing duration of operation time was noted with increasing BMI, this was not statistically significant. Conversely, the trend was reversed with examination of length of stay (LOS); decreasing length of hospital stay was observed with an increase in BMI. These trends were not statistically significant and it is possible that they would become so were the study size increased. However, our data is a reflection of TKAs performed in a busy orthopaedic unit over an entire calendar year. The data examined in this study is an accurate representation of the population of patients on whom TKAs are most commonly performed; the mean age of the patients in our study was 72 years (range 63 – 79) and 222 of the 254 patients were overweight or obese, a figure in keeping with data from a 2003 National Health Survey which reported that 70% of individuals aged 65 –74 were overweight or obese [1].

There was no significant difference in patient satisfaction or pain levels between the three BMI groups at 1-year post-TKA. This data is in keeping with other studies which concluded that BMI was not associated with deleterious TKA outcomes at short [3,9] or long-term follow up [7,8]. This study did demonstrate a negative association between obesity and post-operative walking frequency. While obesity appears to impede mobility following TKA, all patients were subjected to the same physiotherapy regime post-operatively and this did not increase length of stay.

Increasing numbers of obese patients are presenting for consideration of TKA. This study provides evidence that there is no difference of clinical or statistical significance with respect to operating time or length of hospital stay comparing differing grades of obesity. There would seem to be no reason for withholding arthroplasty surgery from these patients.

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