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Is Overweight Or Obesity a Perioperative Risk Factor in Total Knee Arthroplasty?

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ABSTRACT

There is only little information given about perioperative morbidity and TKR in obese patients. Aim of this study was to investigate the influence of BMI on perioperative complications following total knee replacement (TKR) in a single surgeon.

Material and method: This study was based on the retrospective review of charts from 201 patients who had undergone TKR between April 2007 and December 2009 at our hospital. We reviewed all BMIs and divided the patients into 2 groups: BMI < 30 (I) and BMI > 30 (II) (Obesity). Data were then analysed for frequencies, Mann- Whitney U-Test, Wilcoxon - Test and Chi-squared test. All patients were followed up by one of us (BA) 6 weeks after operation.

Results: Local minor complications included superficial hematoma requiring no revision in 15/99 cases (I) and 17/102 cases (II) (p = 0.46).

There were 4 effusions in group I and 4 in group II requiring puncture (p = 0.623).

Dehiscence of the wound requiring no revision was found in 0/99 cases (I) and 4/102 cases (II) (p= 0.064).

Further minor complications included superficial infection requiring no revision in 3/99 cases (I) and 9/102 cases (II) (p = 0.074).

Local major complications included deep infection requiring revision in 0/99 cases (I) and 6/102 cases (II) (p = 0.016).

General major complications included deep vein thrombosis in 1/99 cases (I) and 2/102 cases (II) (p = 0.511), pneumonia in1/99 case (I) and 1/102 cases (II) (p = 0.744).

Discussion: We were able to show that obesity leads to a higher risk of infection in TKR. Despite this fact obese patients should not be excluded from TKR nowadays. Nevertheless patients should still be encouraged to reduce their weight prior to surgery and should be informed about the higher risk of infections in TKA preoperatively.

KEYWORDS: Rural Upliftment, Poverty Reduction, NRLM and World Bank

Introduction:

An increasing number of patients who undergo total hip replacement (THR) or total knee replacement (TKR) are obese. There has been much concern that obesity is associated with anaesthetic and operative complications after THR or TKR. Obese patients have a higher risk of adverse cardiovascular and respiratory events and obesity is an independent risk factor for the development of type II diabetes mellitus, a condition that carries an increased risk of post-operative morbidity. Other studies have demonstrated an increased risk of venous thromboembolic disease following joint replacement surgery in the obese (1). There is a strong association between obesity and prolonged wound drainage post-operatively which, in turn, is associated with a higher rate of wound infection and blood loss (1, 3). Namba et al. (6) concluded that obese patients have a 4.2 times higher risk of post-operative infection following THR. Recently a weak correlation between BMI and the complication rate in THR has been published by Patel A et al. (7). There are a lot of studies available on the topic of obesity and complications in THR. E.g. Patel et al. (7) stated that orthopaedic surgeons should be aware of the slightly higher risk in THR in obese patients. On the other hand several authors found no increased post-operative complication rate in obese patients undergoing THR (1). There is only little information given about perioperative morbidity and outcome and TKR in obese patients (5, 8, 10, 9). The body mass index (BMI) is currently accepted as an assessment of obesity. This is calculated by dividing the subjects' weight in kilograms by their height in metres squared. It correlates well with the amount of total body fat. Obesity is defined as a BMI > 30 kg/m2 (2). Aim of this study was to investigate the influence of BMI on complications following TKR in a single surgeon.

Material and Method:

This study was based on the retrospective review of charts and BMIs from 201 patients who had undergone TKR between April 2007 and December 2009 at our hospital. All operations were performed by a single surgeon (WH). Prior to surgery weight and height of the patients were recorded by nursing staff. BMI was calculated (2). Co-morbid conditions were also recorded. Any complications reported by the patient or the medical staff were recorded. Complications were grouped into systemic and local, each group being subdivided into minor and major according to Patel (1, 7). A complication that could be treated with medical and conservative management or that was not a risk to the artificial joint and/or the patient was listed as a minor complication (superficial infection, ooze, pain). Any complication that needed surgical/medical intervention and posed a risk to the joint or the patient was listed as a major complication (dehiscence, deep infection, post-operative stiffness requiring manipulation under anaesthesia, haematoma requiring second operation, cardiac arrest, deep vein thrombosis, cardiovascular accident, congestive cardiac failure, systemic infection, intensive care unit admission, myocardial infarction, pulmonary embolism) (1). There were 81 men and 120 women. Average height was 166.7 cm (Min: 142, Max: 189). Average weight was 73.5 Kg (Min: 53, Max: 160). Average age at time of operation was 69.1 years (Min: 46.6, Max: 100). We reviewed all BMIs and divided the patients into 2 groups: BMI < 30 and BMI > 30 (Obesity). Further patient characteristics are listed in table 1 and 2.The indications for TKR were unicompartimental osteoarthritis of the knee with a varus deformity (129), unicompartimental osteoarthritis of the knee with a valgus deformity (40), tricompartimental osteoarthritis of the knee (11), posttraumatic osteoarthritis (13), osteonecrosis (8).

Prostheses included 57 x Innex Fix UC (Zimmer, Warsaw, Indiana), 81 x Innex Ucor (Zimmer, Warsaw, Indiana), 8 x Innex Fix SC (Zimmer, Warsaw, Indiana).3 x Rotation Knee (Link, Hamburg, Germany) and 52 x PFC prostheses (DePuy, Johnson and Johnson, Warsaw, Indiana).

All procedures were performed in an ultra-clean-air theater (with antibiotic prophylaxis). During their stay at the hospital, all pa-

tients were treated with low molecular weight Heparin and compression stockings as a prophylaxis against deep vein thrombosis. For the duration of 6 weeks, partial weight bearing of 20 kg with the support of lower arm crutches was required. Data were first fed in electronic format into Excel. Data were then analysed for frequencies, Mann- Whitney U-Test, Wilcoxon - Test and Chi-squared test. All patients were followed up by one of us (BA) 6 weeks after operation.

Results:

Body mass index ranged from 18.4 to 51.6 with a mean of 30.6. Group I (BMI < 30) included 99 patients, Group II (BMI > 30) included 102 patients.

Local minor complications included superficial hematoma requiring no revision in 15/99 cases (group I) and 17/102 cases (group II) (p = 0.46).

There was one transient lesion of the tibial nerve in group I and none in group II (p = 0.493).

There were two transient lesions of the peroneal nerve in group I and two in group II (p = 0.678).

There were 4 effusions in group I and 4 in group II requiring puncture (p = 0.623).

Dehiscence of the wound requiring no revision was found in 0/99 cases (group I) and 4/102 cases (group II) (p= 0.064).

Further minor complications included superficial infection requiring no revision in 3/99 cases (group I) and 9/102 cases (group II) (p = 0.074).

Local major complications included deep infection requiring revision in 0/99 cases (group I) and 6/102 cases (group II) (p = 0.016).

1/99 cases suffered from dislocation of the knee requiring revision surgery (group I) and none in group II (p = 0.493).

General major complications included deep vein thrombosis in 1/99 case (group I) and 2/102 cases (group II) (p = 0.511), pneumonia in1/99 case (group I) and 1/102 case (group II) (p = 0.744).

Further details are shown in table 1 and 2.

Hospital length of stay was 14 ± 4.4 days (11 - 52) (group I) and 13.5 ± 4.4 days (11 - 43) (group II) (P= 0.972).

Discussion:

The obesity epidemic continues to increase. A substantial population of patients who are candidates for hip and knee arthroplasties can be classified as morbidly obese (8). Recent studies are conflicting on the rates of perioperative complications with increase in BMI. Some studies have demonstrated an increase in the rate of perioperative complications, while others, no increase in perioperative complications (10). Recently Suleiman L et al. came to the conclusion using a national database, that there is no significant increase in perioperative complication rates following total knee and hip arthroplasty across BMI categories (10). Miric et al. (4) evaluated 512 TKA patients with a BMI above 35 and showed that among obese TKA patients, there was a statistically significant increase in total complication rates, 38% compared with 25% for patients with BMI of 35 or lower (P = .002). They also found that 9.3% of patients among the obese group had multiple complications compared with 6.2% of the non-obese group (P = .03) (4). The difference to our results might be explained by a different classification system we divided two groups with a cutpoint of BMI below or over 30. In general this is a limitation of our study that results cannot be compared easily because nearly every author uses a different cutpoint.

Vincent et al. (13) in a study with 5428 TKA patients undergoing rehabilitation,demonstrated that excessive BMI, specifically a BMI > 40, did not impede progress in rehabilitation, but that the gains were less efficient and at a higher cost than those within a lower BMI category (10, 13). Wound problems have been among the most frequently cited complications of TKA in the obese population. Wilson et al. were among the first to correlate obesity and wound infections in TKA (14). Winiarsky et al. found that TKA in obese patients, while commonly successful, is associated with increased rates of infection, wound complications, and medial collateral ligament avulsions (15).

The effects of obesity on perioperative complications are of substantial concern to the orthopaedic surgeon. The patients in the series of Taylor B et al. (11) experienced low rates of systemic complications and very few wound complications associated with their procedures. Taylor et al. postulated that their results indicate that simultaneous, 2-team bilateral TKA in the obese patient can be a safe and successful procedure, with acceptably low rates of perioperative complications.

Amin et al. (2) found that morbidly obese patients undergoing TKA had significantly higher rates of complication compared with a matched non-obese group (32% and 0%, respectively; P = 0.001). Of these complications, the

most common were superficial wound infections, deep wound infections, and deep vein thrombosis (DVT). In our study we found comparable results in regard to deep infection: Deep infection requiring revision was necessary in 0/99 cases (BMI <30) and 6/102 cases (BMI > 30) (p = 0.016). But we could not find any significant difference in deep vein thrombosis (DVT).

In a study by Vazquez - Vela et al, 562 TKA cases were reviewed, and it has been

shown that obese male individuals younger than 60 years at the time they underwent TKA had the worst 10-year survival rate of 35.7%. In this study patients with osteoarthritis and a BMI of above 30 had a survival rate of 92.74% at ten years compared with those with a BMI below 30 who had a survival of 98.45% (p =0.0015). Of the patients whose TKRs failed 66% were in the obese groups with a BMI greater than 30 (12).

Our study had several limitations. First of all it was a retrospective study with a short period of follow-up. One major advantage of our study is a consecutive patient series that were operated by the same orthopaedic surgeon (WH). This is a major advantage in comparison to the well conducted study of Schwarzkopf R et al. (8). We were able to show that obesity leads to a higher risk of infection in TKR. Another limitation of our work is that our data is difficult to compare with other studies because every author divides the study groups differently due to different definitions of obesity which have been used. The aim of our study was to investigate the influence of BMI on early complications in TKR. We follow Suleiman L et al. (10) that no procedure is without risk, TKA is procedures that should not be denied to patients based solely on their higher BMI category. There are no economic or medical reasons for excluding obese patients from TKR, nevertheless patients should still be encouraged to reduce their weight prior to surgery and should be informed about the higher risk of infections in TKA. There is no conflict of interest

Table 1: Patient characteristics (n.s.: not significant)

	BMI < 30	BMI ≥ 30	p-value
number	99	102	n.s.
gender m/f	36/63	45/57	n.s.
age	71 ±9.4 (47- 91)	69 ± 8.5 (43- 84)	0.049
height (in m)	1,66 ± 0.09 (1.42 – 1.89)	1.65 ± 0.10 (1.48 – 2.00)	n.s.
weight (in kg)	73.0 ± 10.6 (46.6 -100)	93.0 ± 15.1 (70 - 143)	0.0001
BMI	26.67 ± 2.3 (18.43 – 29.86)	32.98 ± 5.0 (30.48 – 51.61)	0.0001

Table 2: Patients' pre - existing illnesses

Pre - existing illness	BMI < 30	BMI ≥ 30	P - value
Diabetes mellitus	8 (8.1 %)	32 (31.4 %)	0.000
Hypertension	68 (68.7 %)	80 (78.4 %)	0.118

Hyperuricaemia	10 (10.1 %)	16 (15.7 %)	0.239
Cardiac insufficiency	13 (13.1 %)	19 (18.6 %)	0.288
Renal insufficiency	5 (5.1 %)	7 (6.9 %)	0.589
Hepatitis B	1 (1 %)	3 (2.9 %)	0.328
Peripherial arterial disease	5 (5.1 %)	4 (3.9 %)	0.700
Coronary heart disease	21 (21.2 %)	22 (21.6 %)	0.951
Osteoporosis	14 (14.1 %)	6 (5.9 %)	0.051
Previous deep vein thrombosis	15 (15.2 %)	7 (6.9 %)	0.061
Previous pulmonary embolism	5 (5.1 %)	3 (2.9 %)	0.446
Coagulation disorder	1 (1 %)	0 (0 %)	0.310
Autoimmune disease	1 (1 %)	0 (0 %)	0.310
Tumour disease	21 (2.,2 %)	21 (20.6 %)	0.914
Corticosteroid therapy	3 (3 %)	0 (0 %)	0.077
Other diseases	78 (78.8 %)	71 (69.6 %)	0.152

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