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No influence of body mass index on early outcome following total hip arthroplasty

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Abstract We reviewed patients who had undergone total hip arthroplasties between January 2000 and October 2002 in order to determine whether a high body mass index (BMI) results in an increase in complications or re-operations. We compared 179 hip arthroplasties in 162 patients with an average BMI of 22.5 (18.6–24.9) with 164 hip arthroplasties in 151 age-matched patients with an average BMI of 33.3 (30–39.6). There was no difference in satisfaction between obese and non-obese patients following arthroplasty using a self-administered validated questionnaire (obese = 91%, non-obese = 93%, $p=0.84$). At a minimum of one year follow up, there was no statistically significant difference in the rates of complication (obese = 8.7%, non-obese = 7.6%, $p=0.76$) or revision surgery (obese = 3.6%, non-obese = 3.2%, $p=0.85$). In the short term a BMI >30 plays no role in an increase in complications or re-operation.

Résumé Nous avons revus des malades qui avaient subi une arthroplastie totale de la hanche entre janvier 2000 et octobre 2002 pour déterminer si un index de masse corporelle (BMI) élevé s'accompagnait d'une augmentation des complications ou des réinterventions. Nous avons comparé 179 arthroplasties de la hanche chez 162 malades avec un BMI moyen de 22,5 (18,6–24,9) avec 164 arthroplasties de la hanche chez 151 patients d'âge équivalent avec un BMI moyen de 33,3 (30–39,6). Il n'y avait aucune différence dans la satisfaction après l'arthroplastie entre obèses et non obèses en utilisant un questionnaire validé auto-administré (obèse = 91%, non obèse = 93%, $p=0.84$). À un minimum d'une année de suivi, il n'y avait aucune dif-

férence dans les taux de complication (obèse = 8,7%, non obèse = 7,6%, $p=0,76$) ou de chirurgie de révision (obèse = 3,6%, non obèse = 3,2%, $p=0,85$). Dans le court terme un BMI >30 n'a pas d'importance dans la fréquence des complications ou des réinterventions.

Introduction

Obesity is considered a risk factor for surgery and a number of postoperative complications such as wound infection and deep venous thrombosis [12]. Obesity has also been shown to increase the risk of symptomatic osteoarthritis [14] and is over-represented amongst patients requiring elective orthopaedic surgical procedures [2]. The implications of obesity on the outcome of total hip arthroplasty (THA) remain varied.

There are several definitions of obesity. Body mass index (BMI) is regarded as one of the most useful measures and has been shown to have a direct relationship with morbidity and mortality [4].

The purpose of this study was to investigate the influence of BMI on patient outcome following THA and whether a high BMI results in an increase in complications or re-operation.

Patients and methods

This study was based on the retrospective review of BMIs from patients who had undergone total hip arthroplasties between January 2000 and October 2002 at our hospital. Patients were seen in a pre-assessment clinic two weeks prior to surgery with their weight and height recorded by nursing staff. BMI was calculated as the body weight in kilograms divided by the height in metres squared. All patients were asked to participate in an ongoing audit of primary and revision hip surgery. Informed consent was obtained and the details of their primary or subsequent revision surgery were recorded. A self-administered val-

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idated questionnaire was sent to patients one year after their primary surgery to assess patient satisfaction and any complications. All data received were then entered onto our Arthroplasty Audit Group database.

We reviewed all BMIs and divided the patients into two groups. Patients with a BMI between 18.5 and 24.9 were considered normal, and values between 30 and 40 were considered obese. All obese patients (group 1) were compared with a similar group of patients with a normal BMI (group 2). The two groups of patients were then cross-referenced against the data in our Arthroplasty Audit Group database. Details reviewed included patient satisfaction, the continuing presence of pain following surgery, use of prophylactic antibiotic and anti-thrombotic agents, diagnosis, length of hospital stay, American Society of Anesthesiologists (ASA) grade, intra- and postoperative complications, and whether any re-operation was carried out. The hospital records of all patients who had a complication or re-operation were reviewed to determine their outcome.

Statistical analysis

A power assessment was undertaken prior to the study. One hundred patients per group were required to observe a significant difference between the groups ($p < 0.05$). Analysis involved using the chi-squared test and the calculation of appropriate confidence intervals of both groups.

Results

In the period under review 459 total hip replacements were performed and 151 patients (164 THA) fulfilled the obese inclusion criteria (group 1). Thirteen patients had staged bilateral THA. The average BMI in this group was 33.3 (range 30.0–39.6). The patients were compared with a similar group of 162 patients (179 THA) with a normal BMI (group 2). Seventeen patients with a normal BMI had staged bilateral THA. The average BMI in this group was 22.5 (range 18.6–24.9). All patients from groups 1 and 2 were identified on the primary hip arthroplasty database. They were matched and their details are listed in Table 1.

The response rates for the one-year questionnaire were 85% and 88% for groups 1 and 2 respectively. In group 1, 126 out of 138 (91%) patients were pleased with their total hip arthroplasty compared with 146 out of 157 (93%) patients in group 2. The difference in proportion in patient satisfaction between the groups was not significant. Six out of 138 (4.3%) and five out of 157 (3.2%) patients recorded bad pain following their total hip replacement in groups 1 and 2 respectively. The difference in proportion was not significant.

Antibiotic prophylaxis was routinely given at induction of anaesthesia and anti-thrombotic agents administered post-operatively until the date of discharge. In groups 1 and 2, all patients were recorded as having antibiotic and anti-thrombotic prophylaxis. Cefuroxime was used in all cases in both

Table 1 Details of the two patient groups

	Obese	Non-obese
Age*(years)	66.4 (33–86)	69.6 (34–89)
Men	58	48
Women	93	114
Diagnosis		
Osteoarthritis	157	165
Rheumatoid arthritis	3	8
Trauma	1	5
Other	3	1
Surgeon		
Consultant	113	123
Registrar	42	42
Other	9	14
American Society of Anesthesiologists grade		
1	24	35
2	84	87
3	29	22
Not recorded	14	18

* Mean; (range)

groups except for two patients in group 2 who received erythromycin. Low molecular weight heparin and aspirin were used in all cases in both groups except for two patients in group 2 who received warfarin.

Eighty-two out of 164 admissions in group 1 (median hospital stay seven days, range 4–36 days) were discharged within one week compared with 87 out of 179 admissions in group 2 (median hospital stay 8 days, range 3–42 days). The difference in proportion was not significant.

There was no difference in the ASA grades between the two groups ($p = 0.24$).

Four (2.4%) intraoperative complications in group 1 were identified on the primary surgery questionnaire compared with seven (3.9%) in group 2. Intraoperative complications are listed in Table 2. The difference in proportion of intraoperative complications was not significant.

In group 1, 12 (8.7%) complications were recorded in the one-year follow-up questionnaire compared with 12 (7.6%) in group 2 and are listed in Table 3. The difference in proportion of complications was 1.1% and was not significant.

Over the study period, five revisions took place in both group 1 (3.6%) and group 2 (3.2%) (Table 4). The dif-

Table 2 Frequency of intraoperative complications

	Obese (n=164)	Non-obese (n=179)
Greater trochanter fracture	3	3
Revised femoral component	1	1
Revised acetabulum component	0	2
Anaesthesia	0	1
Total	4	7

Table 3 Frequency of reported postoperative complications

	Obese (n=138)	Non obese (n=158)
Leaky wounds	4	3
Sciatic nerve damage	1	1
Trochanteric pain	0	2
Leg length discrepancy	0	3
Dislocation	2	1
Deep venous thrombosis	1	0
Stitch abscess/superficial cellulitis	4	0
Other	0	2
Total	12	12

Table 4 Reason for revision surgery in both groups

	Obese (n=138)	Non-obese (n=157)
Infection	1	4
Recurrent dislocations	2	0
Aseptic loosening	2	1
Total	5	5

ference in proportion in the revision rate was 0.4% and was not significant.

Discussion

Obese patients are often considered poor candidates for total joint arthroplasty. These patients tend to have longer hospital stays and higher total charges compared with non-obese patients [7]. In our study, we found no difference in the length of hospital stay between obese and non-obese patients. This compares favourably with other studies [8].

The effect of a high BMI on the outcome of any joint arthroplasty and potential postoperative complications is of vital concern to the orthopaedic surgeon. Orthopaedic surgeons prefer to operate on slim rather than obese patients. In a large cohort study, a high BMI was shown to be a risk factor for THA due to osteoarthritis [9]. With the steady rise in obesity across the western world, orthopaedic surgeons will need to be aware of the short- and long-term effects of obesity on total joint arthroplasty.

Within the current literature, the effect of obesity on THA remains varied. Some reports have found no difference in the rate of perioperative complications between obese and non-obese patients. Anderson et al. [1] and Soballe et al. [11] found no relationship between obesity and postoperative complications. Lehman et al. [10] showed no difference in the prevalence of perioperative complications in obese patients with similar gains in pain relief and functional abilities as non-obese patients. Chan and Villar [5] showed no difference in the quality of life in the short term following THA between obese and non-obese patients. However, other studies have reported a positive correlation between obesity and perioperative complications. Bowditch and Villar [3] reported increased blood loss in obese patients following THA. Surin and Sundholm [13] found a

correlation between obesity and aseptic loosening in their 11-year follow up study. Chao and Coventry [6] also noted an association between increased weight and the fracture of THA components.

Our study has demonstrated no difference in the rate of intra- and postoperative complications between obese and non-obese patients. We were also able to demonstrate similar rates of satisfaction between obese and non-obese patients following THA with both groups having similar benefits of pain relief postoperatively. We reviewed the ASA grades of all patients to ensure that the two groups were not grossly different preoperatively with regards to medical co-morbidities.

A limitation of this study is the short period of follow-up. This limitation is of particular importance to the rate of revision surgery. In our study, we were not able to demonstrate a difference in the revision rate between obese and non-obese patients. However, the reason for revision surgery due to infection was higher in the non-obese group and this was unexpected. To assess implant longevity and the effects of obesity, long-term studies are still required.

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