Total hip arthroplasty does not aid weight loss

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ABSTRACT

INTRODUCTION Increased body mass index (BMI) is associated with the development of osteoarthritis of the hip. Many overweight patients with an arthritic hip cite restricted mobility and pain as impeding factors in their attempts to lose weight. There is an assumption that weight loss will occur after their surgery due to increased mobility.

PATIENTS AND METHODS The records of 180 patients who had undergone total hip arthroplasty (THA) were reviewed to identify BMI prior to, and 2 years after, surgery.

RESULTS BMI significantly increased postoperatively, both in patients with a pre-operative BMI in the recommended range ($P < 0.001$) and in those whose pre-operative BMI was indicative of obesity ($P = 0.01$).

CONCLUSIONS Irrespective of pre-operative BMI, reduction in body mass index did not occur following hip replacement surgery.

KEYWORDS

Total hip arthroplasty – weight loss

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Overweight patients awaiting total hip arthroplasty are often encouraged to lose weight pre-operatively in order to reduce the risk of peri-operative complications.¹ High body mass index (BMI) has been shown to be a risk factor associated with development of osteoarthritis of the hip.² Many of these patients cite restricted mobility and pain as impeding factors in their attempts to lose weight. There is often an assumption by the patient that weight loss will occur after their surgery once their mobility has returned.

This study investigates the effect of total hip arthroplasty (THA) on patient BMI. We hypothesise that neither weight loss, nor reduction in BMI can be assumed following hip arthroplasty surgery.

Patients and Methods

The records of patients who had undergone elective THA surgery in a district general hospital located in the south east of England between 2002 and 2004 were retrospectively analysed. The weight and height of each patient prior to surgery and 2 years after surgery, whilst attending follow-up clinic, was recorded. The BMI of each patient pre-operatively and 2 years postoperatively was calculated by dividing body weight (kg) by the square of the

patient's height (m). For analysis, patients were stratified by pre-operative BMI into those with a BMI of 20–24.9 kg/m² (acceptable weight), 25–29.9 kg/m² (overweight) and of those 30 kg/m² and greater (obese).⁶

Statistical analysis

Each patient's BMI recorded pre-operatively was compared with that recorded 2 years postoperatively using the paired Student's *t*-test. Analysis of the data was conducted stratifying by patient sex and pre-operative BMI.

Results

The records of 180 patients (72 male and 108 female) were identified and analysed. Mean age at time of surgery was 65 years (range, 26–86 years).

Analysis showed that when patients were stratified by their pre-operative BMI, there was a statistically significant increase in BMI measured 2 years postoperatively compared to BMI measured prior to surgery, irrespective of pre-operative body mass index (Fig. 1). Mean BMI increased from 29.05 kg/m² by 1.05 kg/m² ($P < 0.001$) over the 2-year period, equating to an average increase in weight of 2.5 kg or an increase in BMI of 3.6%.

Figure 1 Histogram illustrating BMI changes stratified by pre-operative BMI.

When analysed by patient sex (Table 1), the mean BMI of male patients was found to have increased by a mean of 1.05 kg/m² ($P < 0.001$) during the first 2 years postoperatively, whilst the BMI of female patients increased by a mean 1.00

kg/m² ($P < 0.001$). This equates to an increase in BMI in males of 3.6% and in females of 3.5% over the study period.

BMI significantly increased postoperatively both in patients with a pre-operative BMI in the recommended

Table 1 BMI pre-operatively and postoperatively stratified by pre-operative BMI and sex.

BMI group	<i>n</i>	Mean BMI Pre-operative	Mean BMI Postoperative	Mean BMI increase	95% CI of BMI increase		<i>P</i> value
					lower	upper	
All Patients	180	29.05	30.10	1.05	0.70	1.40	<0.001
20–24.9	31	22.74	24.40	1.65	0.86	2.46	<0.001
25–29.9	84	27.48	28.62	1.13	0.55	1.72	<0.001
>30	65	34.08	34.72	0.64	0.15	1.13	0.011
All males	72	29.26	30.31	1.05	0.47	1.63	<0.001
20–24.9	10	22.15	24.99	2.83	0.92	4.74	0.008
25–29.9	32	27.37	28.57	1.20	0.42	1.98	0.004
>30	30	33.64	33.93	0.29	–0.63	1.21	0.524
All Females	108	28.96	29.96	1.00	0.51	1.48	<0.001
20–24.9	21	23.02	24.14	1.10	0.33	1.88	0.008
25–29.9	52	27.56	28.65	1.09	0.26	1.93	0.011
>30	35	34.77	35.56	0.79	0.03	1.54	0.042

range ($P < 0.001$) and in those whose pre-operative BMI was classified as obese ($P = 0.01$).

Discussion

Body mass index is a frequently used tool employed in the assessment of nutritional status;⁵ it remains the preferred measure of obesity for epidemiological studies.⁴ The divisions into normal, overweight, obese and morbidly obese were initially based on levels devised from insurance company statistics of the lowest mortality for a given height and thus are not universally used.⁵ The World Health Organization advises that the optimal range of BMI for good health is 20–25 kg/m² for adults.⁶ Body mass indices outside this range have been associated with excess mortality through increased rates of heart disease, cancer, and hypertension.⁷

Osteoarthritis of the hip is associated with obesity^{8–11} and many patients presenting to elective orthopaedic clinics with arthritis are, therefore, also found to be overweight. Those with symptomatic arthritis of the hip which has been refractory to conservative treatments including simple analgesics, physiotherapy and weight reduction, are often offered total hip arthroplasty. Obese surgical patients are known to differ both physiologically and metabolically. Therefore, the anaesthetic implications of surgery need to be carefully considered on an individual basis. They have a higher risk from anaesthesia^{1,12} and are at greater risk of developing problems,¹³ such as bleeding at time of surgery¹⁴ and higher rates of deep vein thrombosis.¹⁵

Chan and Villar¹⁶ studied three groups of patients who had undergone total hip arthroplasty – those who were not obese, those who were mildly obese and those who were moderately obese. In their study no patients with a BMI greater than 40 kg/m² were included. Improvements in quality-of-life scores were noted for all groups, but the authors commented that there was no difference in quality of life after surgery among the three groups at 1 and 3 years. However, this does not suggest that obesity does not have an effect on outcome after THA. Obese patients have a lower functional level than normal weight patients. As BMI increases, the risk of having difficulty ascending and descending stairs 1 year after surgery increases, whilst the postoperative WOMAC global score and SF-36 physical component summary scores decrease.^{17,18} Obese patients have lower activity levels, find it more difficult to climb stairs but are not less satisfied with their THA, perhaps due to limitations in their expectations of procedure outcome¹⁷ or their lower day-to-day functional demands.¹⁹

Due to possible increased operative risk and poorer post-operative function in obese patients, weight loss is often advised pre-operatively. However, overweight patients will often cite their hip pain as being the cause of their obesity,

suggesting that pain prevents them from exercising and thus losing weight. There is often the assumption, made by the patient, that once the painful hip has been operatively treated that they will be able to lose weight through increased activity. Podiometric studies have, however, shown that, following total joint replacement, patients with an increased BMI have decreased ambulatory activity compared to normal patients.¹⁹ It is possible that other co-morbid conditions play a role in their reduced activity levels.

Previous studies have investigated weight change following hip replacement surgery, but some have been limited in statistical power through small patient numbers and non-paired data analysis.^{20–22} Jain *et al.*²⁵ retrospectively reviewed 78 patients who self-reported height and weight following THA and found that there was an increase in BMI following surgery. Our study supports these findings; in addition, we were able to measure patients' height and weight in follow-up clinic thus avoiding the data validity issues inherent with the use of self reporting. Aderinto *et al.*²⁴ studied obese and non-obese patients, and compared their postoperative weight gain. It was shown that obese patients had a greater weight gain but, importantly, pre- and postoperative BMIs were not compared.

This study has shown that patients should not expect weight loss to follow their hip replacement surgery. Body mass index, in fact, significantly increased during the first 2 years after THA. BMI increased in both men and women, and in patients with BMIs in the normal range and in patients who were overweight pre-operatively. This is accordance with previous studies.^{22–24}

Body mass index has been demonstrated to fluctuate in the general UK population with age. Up to 60 years of age, there is a tendency for BMI to increase; beyond that age, BMI is seen to decrease.²⁵ As the mean age of the patients in this study was 65 years at the time of surgery, one would expect there to be either no change or a slight decrease in BMI. The change in BMI found is, therefore, unlikely to be due to the increasing age of the patients.

Neither weight loss nor BMI reduction can be assumed following THA. Importantly, they have similar quality-of-life benefits following hip arthroplasty despite poorer function with lower activity levels. BMI seems to have no bearing on the short-term outcome of THA.

Conclusions

Irrespective of pre-operative BMI, reduction in BMI did not follow hip replacement surgery. This finding compliments previous work which has shown that the activity levels of obese patients do not increase after total hip arthroplasty. This information may be valuable to a surgeon whose patient needs encouragement to lose weight prior to surgery.

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