



Original Article

The Effect of Total Knee Arthroplasty on Body Mass Index—A Prospective Study 全膝關節置換術與身體質量指數之關係 — 一個前瞻性的研究

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ABSTRACT

Background/Purposes: Osteoarthritic patients, who need a total knee arthroplasty, usually complain of knee pain as the major reason to forbid them from exercising to lose weight. Weight gain, in turn, worsens the process of osteoarthritis as a vicious cycle. In our prospective study, we calculated the preoperative and 1-year post-operative body mass index (BMI) after total knee replacement.

Materials and Methods: We prospectively followed up 91 patients in the knee arthroplasty clinic. Height, preoperative weight, and post-operative weight at 12 months were measured, and the pre- and post-operative BMIs were calculated. All the perioperative factors of the patients were without any major change.

Results: The mean preoperative BMI was 31.08, and at 12-month follow-up, the mean BMI was 30.11. This difference was not statistically significant.

Conclusion: The results obtained in our study suggest that there is no statistically significant difference between the pre- and post-operative BMIs at 1-year follow-up.

中文摘要

背景: 退化性關節炎的病患者，當需要接受全膝關節置換術(TKA)時，通常抱怨主要因為膝痛以致不能透過運動去減輕他們體重，反而增加體重後令到退化性關節炎惡化，形成一個惡性循環。在我們的前瞻性研究中，我們計量全膝關節置換手術前和手術後一年的身體質量指數(BMI)。

材料和方法: 我們前瞻性地追蹤在膝關節置換門診裡的91位病患者。測量他們的高度，手術前和手術後一年的體重並計算他們的BMI。那些患者的手術前後因素都沒有很大的變化。

結果: 手術前的BMI平均值是31.08，12個月後的BMI平均值是30.11。這個差別在統計學是無效的。

結論: 我們的研究結果顯示手術前和手術後一年的BMI平均值在統計學是沒有分別的

Introduction

Total knee arthroplasty (TKA) is one of the commonest operative procedures performed in orthopaedics. Its popularity stems from the fact that even if range of movement cannot be improved upon, the symptoms of pain are abolished. More than 30,000 total knee replacements are performed in the United Kingdom annually.¹ It is a well-documented fact that patients who are overweight are prone to osteoarthritis (OA) of the knee joint.² It is a common practice to ask the obese patients to undergo a trial of weight loss before being offered surgery because it may reduce the symptoms of OA and also decrease the risk of post-operative complications. Obesity also increases the chances of failure of the implant because of increased loading forces on the implant^{3,4} and affects the outcome of total

knee replacements.^{1,3,5,6} There are not many studies looking at the effect of TKA on subsequent change in weight. After a TKA, patients' mobility improves, and this may increase their chances of losing weight theoretically. Body mass index (BMI) has been shown to be a reliable indicator of total-body fat.^{1,4} Patients with a BMI of 20–30 are normal, greater than 30 are obese, and greater than 40 are morbidly obese.⁴

Materials and Methods

It is a prospective study, and 91 consecutive patients who attended the arthroplasty clinic were included. All patients had their height and weight measured in metres and kilograms, respectively. These parameters were measured preoperatively and 1 year post-operatively. We then calculated the BMI by using the formula $BMI = \text{weight in kilograms} / \text{height in metres}^2$.² The BMI is

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currently accepted as the most reliable indicator of body fat and obesity^{1,4} with the consideration of height.^{1,3,6}

All patients in our study had OA of one knee only without previous knee replacement in either knee. They could walk independently without aids. All the patients in the study had the same prosthesis implanted (Nexgen LPS implant, USA). The measurements were taken by one person only—the arthroplasty nurse specialist—at the clinic, to eliminate interobserver variation. Paired *t* test was used to assess the statistically significant difference between the pre- and post-operative BMIs by the SPSS software system (SPSS Inc., Chicago, IL, USA).

Results

The mean age of the patients was 67 years (range, 35–85 years). The mean preoperative BMI was 31.08 (range, 18.58–45.91). The mean post-operative BMI was 30.11 (range, 19.88–49.95). Although the mean post-operative BMI was found to be less than the mean preoperative BMI, this was not found to be statistically significant. The paired *t* test showed the *p* value to be greater than 0.05.

Discussion

Obesity is associated with OA of the knee joint. This is probably because of greater forces acting on the joint surfaces in overweight individuals, leading to wear and tear,² especially in those with BMI greater than 25 in one study.²

Most surgeons are reluctant to offer TKA to overweight patients before a trial of weight loss because of the higher risk of peri-operative complications and mechanical loosening of the prosthesis.⁶ However, it is still controversial.^{3,6–9}

Hence, the chance of early failure and revision is inconclusive.⁵ There were no differences in clinical outcome and knee society scores at 5–10 years post-operatively,^{3,8} but there was an

improvement in the quality of life of obese patients post-operatively.¹

The insertion of the prosthesis itself does not cause a change in BMI.¹⁰ The weight of the soft tissue and bone dissected out against the weight of the prosthesis showed no significant change in body weight in both men and women.

Some studies showed no difference in activity levels between the obese and nonobese patients after TKA. Our study echoed that TKA does not affect BMI at 1 year post-operatively.

In conclusion, it seems that TKA alone will not help the patients with OA of knee to lose weight by improving mobility but just to minimise the symptoms of knee pain. Further slimming programme for the obese patients may be required to diminish their cardiovascular or other medical risks.

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