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SHORT REPORT

Does obesity affects early infection after total knee arthroplasty. A comparison of obese vs non obese patients

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Abstract

Surgical site infection (SSI) is a disastrous complication after total knee arthroplasty (TKA) which can cause prosthesis loosening and may end up in septicemia. The incidence of infection reported to be in the range of 0.3-12.4% for primary TKA. Significantly higher infection rate is found in the morbidly obese patients. The current study compared the immediate rate of post-total knee replacement wound infection in the obese versus non-obese population. The cross-sectional study was conducted at Aga Khan University Hospital (AKUH) and comprised patients undergoing TKA for primary knee osteoarthritis. Surgical outcome was measured by the Southampton wound infection score at 1-month follow-up. Out of 142 enrolled patients with a mean age of 67.8±56 years, infection was confirmed in 3(2.11%) patients who needed surgical management. All the patients who developed SSIs were females.

Keywords: Total knee replacement, SSI, Obesity.

Introduction

Surgical site infection (SSI) is a disastrous complication after total knee arthroplasty (TKA) which is problematic for patients as well as for surgeons.¹ The deep SSI can destroy the peri-articular bone, cause prosthesis loosening and may end up in septicemia. The incidence of infection has been reported to be in the range of 0.3-12.4% for primary total knee replacement (TKR).² Literature reveals that Infection can be classified into immediate, early and delayed types. Immediate infections presents within 1 month of surgery. Early infections between 1 month and 2 years and delayed after 2 years. The common predisposing factors of SSIs include host factors and intra-operative factors. Host factors are immuno-compromised state, diabetes, rheumatoid arthritis, steroid intake, urinary tract infection, skin ulceration and obesity. Intra-operative factors are operation theatre environment, human traffic in theatre and prolonged operating time.³

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Additional obesity-related factors are relatively low blood supply of adipose tissues, relatively long operative time and a higher likelihood of staphylococcus aureus carriage.⁴ The state of obesity has been objectively determined by using a cut-off value of body mass index (BMI) >30.⁵ Literature review has shown significantly higher infection rate in the morbidly obese 32% versus non-obese 0% with (P=0.001).⁴

A study reported a statistically higher intra-operative difficulty and postoperative complications after knee arthroplasty in obese patients.⁴ Another case series encountered more wound infection in the obese than patients.⁶ On the contrary, some authors showed statistically insignificant difference in wound infection rates after TKA in obese individuals.⁷ Furthermore, a study suggested that immediate postoperative problems (like wound infection) after TKA in obese patients were relatively small in number.³ Hence, there is no consensus about the SSI rates in obese TKA patients. Moreover, there is no local data available to highlight this fact.

The current study was planned to compare the immediate post-TKR wound infection in the obese versus non-obese patients.

Methods and Results

The cross-sectional study was conducted at Aga Khan University Hospital, Karachi, and comprised patients undergoing TKA between January 1 and June 31, 2013. Patients of either gender aged 40-80 years suffering from primary osteoarthritis of knee joint refractory to medical treatment were included. Patients with secondary osteoarthritis as a result of previous infection, trauma, and patients taking steroids as well as patients for revision surgery were excluded.

The reported prevalence of wound infection rate is from 0.3% to 12 %, taking average of 2 <6.3%> as proportion of wound infection with margin of error 4%, confidence level of 95%, a sample size of 142 patients was worked out.²

Obesity was defined as a state of being obese when the BMI was >30kg/m².⁸ All the patients were operated after preoperative assessment and optimisation by single

Table-1: Showing analysis of SSI according to obesity.

		SSI		Total	p-value
		No	Yes		
obesity	No	60	0	60	0.19
	Yes	79	3	82	
Total		139	3	142	

P-value by chi-square test.

orthopaedic consultant and no drain was placed at the end of surgery. All patients received three doses of first-generation cephalosporin as prophylaxis; 1st dose at the time of induction, 2nd dose after 8hrs and third dose at 16hrs postoperatively. Patients were subsequently followed up at 1st, 2nd and 4th weeks. Data regarding demographics, age, gender, BMI and SSI outcome was collected as per the Southampton wound infection criteria.⁹ Wound infection was confirmed by an infection control nurse who was not part of the surgical team. Grades 0 to 4 were used: Grade 0 - Normal healing; Grade 1 - Normal healing with mild bruising; Grade 2 - Erythema plus other signs of inflammation i.e. heat and tenderness; Grade 3 - Clear or hemoserous discharge; and Grade 4 - Purulent discharge. Grade 2 and above was taken as wound infection.

SPSS 19 was used for statistical analyses. Mean and standard deviations were computed for numerical variables like age and operating time, whereas frequency and percentages were employed to assess the categorical variable like gender, obesity, comorbid, site of knee joint replacement, Southampton wound grading system, and final outcome. Effect of confounding variables i.e. age, gender and operating time was determined by stratified analysis. Chi square test was applied and $p < 0.05$ was taken as statistically significant.

Of the 142 patients enrolled with a mean age of 67 ± 6.8 years, 107 (75.4%) were females. Mean BMI was 29.5 ± 2.2 , and 82 (57.7%) patients had $BMI > 30$. Total 27 (19%) patients had co-morbid, including hypertension and diabetes. Cefazolin was given to all the patients for prophylaxis. Mean operating time was 96 ± 8.8 minutes.

On follow-up, 3 (2.1%) patients had SSIs. All the patients were managed with wound debridement and liner change. These patients were obese ($BMI > 30$), but the difference was statistically non-significant ($p = 0.19$) (Table-1).

On further stratified analysis, none of the confounders and effect-modifiers like age, gender, operating time, were significant ($p > 0.05$ each).

This prospective case series reports SSI of 2.1% in patients undergoing TKA at a tertiary care hospital in a low-income country. We did not find any association of SSI with age, gender and operating time.

Although joint replacement is a cost-effective and safe procedure, but prosthetic infection is a major complication.^{10,11} Its incidence in England has been reported between 0.54% and 0.63%.⁸ Substantial morbidity and economic cost is associated with revision of infected implants. SSI is multifactorial, including patient, surgical and environmental factors. The effect of obesity on SSI has been demonstrated in a few studies.¹¹ The odds ratio reported in a prospective study of over 2800 knee and hip replacements was between 4.2 and 6.7 times the odds for infection in obese total knee and hip patients, respectively, compared with non-obese patients.¹¹

A high bodyweight increases the stress transferred through a TKR to the surrounding bone. It has also been suggested that female gender and absolute bodyweight influence the outcome in obese patients undergoing TKA. In one study, SSI was found to be 2.8% vs. 4.6% in non-obese and obese, respectively.^{2,12} Other outcome variables i.e. Knee Society score, deep venous thrombosis (DVT), mortality was insignificant. This suggests that TKR may be associated with a poor outcome and a higher failure rate in obese patients, owing to the higher peak stresses and cyclical loading across the knee joint.¹³

Our study does not prove this proposition owing to fact a smaller sample size, which is a limitation of the study. Besides, this is a case series of TKA patients from a single centre and all the patients were operated upon by a single surgeon following uniform surgical technique. Apart from SSIs, there are other outcome measures that need to be explored, which can be affected by obesity.

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