

Review article: Risk factors of infection following total knee arthroplasty

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ABSTRACT

22 PubMed articles in English were identified using the key words: 'risk factors', 'infection', and 'primary total knee arthroplasty (TKA)'. The 10 most relevant articles were reviewed. In one study, obesity and diabetes were considered risk factors for infection following TKA. In another study, postoperative infection correlated with a history of open reduction and internal fixation, male gender, remnants of previous internal fixation material, and body mass index. In yet another study, the risk factors were (in decreasing order of significance): congestive heart failure, chronic pulmonary disease, preoperative anaemia, diabetes, depression, renal disease, pulmonary circulation disorders, obesity, rheumatologic disease, psychoses, metastatic tumour, peripheral vascular disease, and valvular disease.

Key words: arthroplasty, replacement, knee; infection; risk factors

INTRODUCTION

Infection following total knee arthroplasty (TKA) is one of the most dreaded complications.¹⁻³ Its risk factors are not well known.⁴ We reviewed the literature to identify risk factors of infection following TKA.

LITERATURE REVIEW

22 PubMed articles in English were identified using the key words: 'risk factors', 'infection', and 'primary TKA'. The 10 most relevant articles were reviewed.¹⁻¹⁰

1% of patients undergoing primary TKA developed deep infections, of whom 22% were successfully treated without further surgery.⁵ Nearly 5% of primary TKA patients underwent non-revision reoperations for stiffness (58%), patellar clunk (12%), infection (12%), wound revision (6%), and haematoma (4.4%) within a median follow-up period of 4.1 (range, 1.1 to 9.1) years.³ The median time to reoperation was 74.5 days but the range varied widely.³ Younger patients were more likely to undergo a non-revision reoperation.³ Non-revision reoperation was defined

as any procedure requiring anaesthesia in which components with bony interfaces were not removed or exchanged (excluding procedures after revision TKA).³

Of 0.5% of TKA patients who developed persistent wound drainage and underwent irrigation and debridement after a mean of 12.5 days, 25% of whom were confirmed to have a positive joint culture, although all were treated successfully with antibiotics.⁶ There was no morbidity from early irrigation and debridement, and reopening of the wound did not introduce infection. This procedure was recommended, as it may prevent some chronic drainage problems from becoming established infections.⁶

The cumulative probability of infection 2 years after TKA was significantly higher in metal-backed patellar components (MBPCs) than in all-polyethylene patellar components (APPCs).⁷ Over a mean follow-up period of 5.7 (range, 2–11) years, 2.9% of patients with MBPCs and 1.6% of patients with APPCs developed infection.⁷ With the particulate metal and polyethylene debris, the attendant synovitis, effusion, and relative hyperaemia may increase the potential of bacterial seeding to these prostheses.⁷ Particulate metal debris can suppress bacterial phagocytosis and may play a role in the pathogenesis of these infections.⁷ Failure of the MBPC represents a 'prosthesis at risk' of late prosthetic infection.⁷

22 patients with surgical-site infection (6 superficial and 16 deep) within one year after primary TKA were prospectively identified using the National Nosocomial Infections Surveillance.⁸ Infection rates per year were 0.95%, 1.07%, and 1.19% in 1999, 2000, and 2001, respectively.⁸ Each patient was compared with 3 controls matched by date of surgery to determine the risk factors of infection using the stepwise logistic regression analysis.⁸ The use of closed suction drainage and increased prothrombin time were independently associated with infections, and therefore avoiding the use of surgical drains and careful monitoring of anticoagulant prophylaxis in patients undergoing a TKA should reduce the risk of infection.⁸

Patients with delayed deep infection and/or undergoing a salvage procedure (amputation or arthrodesis) were retrospectively studied.⁹ 44% of the infecting organisms were methicillin-resistant *Staphylococcus aureus* (MRSA) or methicillin-resistant *Staphylococcus epidermidis*.⁹ When the organism was methicillin-resistant, the mean number of surgical procedures per patient was significantly higher, and the proportion of patients with satisfactory outcomes was significantly lower.⁹ The number of

deep infections with MRSA or methicillin-resistant *S epidermidis* was on the increase.⁹

Among obese and non-obese TKA patients followed up for 12 months, the overall prosthetic infection rate was 1.5%.¹⁰ The rate of deep prosthetic infections was greater in patients with morbid obesity and diabetes.¹⁰ Men were more likely to develop a prosthetic infection than women.¹⁰ The prosthetic infection rate was lower in patients when a surgical drain was used.¹⁰ No prosthetic infections occurred in non-obese patients with diabetes.¹⁰ Morbid obesity and obesity with diabetes were risk factors of periprosthetic infection after TKA.¹⁰

Five (1.4%) of 350 TKA patients aged 45 to 92 (median, 72) years developed surgical-site infection within a median follow-up of 12 months.² Three of the infections were early (≤ 1 month) and 2 were polymicrobial. Antibiotic prophylaxis was implemented correctly in 99% of patients, with skin preparation scores of 8.75 in 61% and 10 in 39%. Of the patients, 87% had an American Association of Anaesthetists score of 2; 14% were diabetic, and 42% were obese. The mean duration of surgery was 70 (range, 30–164) minutes. 81.5% of the implants were cemented. 86% of the operations had a National Nosocomial Infections Surveillance score of 0. Infection risk linked to the theatre environment and teams was under control. 2.5% of the patients were MRSA-positive, none of whom developed infection. Infection prevention measures were applied in only half of the MRSA-positive cases. No MRSA-positive patients developed surgical-site infection. In conclusion, adherence to prevention measures (skin preparation, antibiotic prophylaxis, screening and prevention in case of MRSA) was found not to reduce the infection risk.²

In patients aged 26 to 91 (median, 72) years who underwent TKA using the Flexible Nichidai Knee prosthesis and were followed up for a median of 42 (range, 6–145) months, risk factors of postoperative infection were a history of open reduction and internal fixation, male gender, remnants of previous internal fixation material, and body mass index. A history of fracture and remnants of internal fixation were major risk factors of infection.¹

The relative risks of 90-day postoperative mortality and infection associated with 29 comorbid conditions were calculated based on a sample consisting of 5% of Medicare patients undergoing TKA.⁴ The independent risk factors for 90-day postoperative mortality (in decreasing order of significance) were: congestive heart failure, metastatic cancer, renal disease, peripheral vascular disease, cerebrovascular disease, lymphoma, cardiac

arrhythmia, dementia, pulmonary circulation disorders, and chronic liver disease.⁴ The independent risk factors for postoperative infection (in decreasing order of significance) were: congestive heart failure, chronic pulmonary disease, preoperative anaemia, diabetes, depression, renal disease, pulmonary

circulation disorders, obesity, rheumatologic disease, psychoses, metastatic tumour, peripheral vascular disease, and valvular disease.⁴ It is important to counsel elderly patients regarding the risks of infection after TKA and to adjust risk based on publicly reported TKA patient outcomes.⁴

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