 10.1111/j.1469-0691.2007.01691.x

Treatment of staphylococcal prosthetic joint infections with debridement, prosthesis retention and oral rifampicin and fusidic acid

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ABSTRACT

There is growing evidence of the efficacy of treating early staphylococcal infections of prosthetic joints with surgical debridement and prosthesis retention, combined with oral antibiotic regimens that include rifampicin in combination with a fluoroquinolone. With rising rates of fluoroquinolone-resistant staphylococci, evidence concerning the efficacy of alternative combinations of antibiotics is required. Twenty patients with staphylococcal prosthetic joint infections who had been treated with surgical debridement and prosthesis retention, and a combination of rifampicin and fusidic acid were analysed. The mean duration of symptoms before initial debridement was 16 (range 2–75) days. The median time of follow-up was 32 (range 6–76) months. Treatment failure occurred in two patients. The cumulative risk of treatment failure after 1 year was 11.76% (95% CI 3.08–39.40%). Two patients had their treatment changed because of nausea. Ten of 11 patients with infections involving methicillin-resistant *Staphylococcus aureus* had successful outcomes. Debridement without prosthesis removal, in combination with rifampicin and fusidic acid treatment, was effective and should be considered for patients with early staphylococcal prosthetic joint infections, including those with infections involving fluoroquinolone-resistant organisms.

Keywords Antibiotic regimens, debridement, fusidic acid, prosthetic joint infection, rifampicin, *Staphylococcus* spp.

Original Submission: 3 September 2006; **Revised Submission:** 26 November 2006; **Accepted:** 3 December 2006

Clin Microbiol Infect 2007; **13**: 586–591

INTRODUCTION

Prosthetic joint infection is an uncommon but serious complication of prosthetic joint implantation, resulting in substantial morbidity, often with pain, immobility, prolonged hospital stay and further surgery, and thus additional costs [1,2]. The approach of two-stage exchange arthroplasty has been preferred for the treatment of prosthetic joint infections in many centres. This has resulted in successful outcomes for >80% of patients with joint replacement infections in various studies [2–4], but disadvantages include the technical difficulty of the surgery involved and the morbidity and costs of prolonged immobilisation of patients, who are often elderly [5].

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An alternative approach of debridement with prosthesis retention involves simpler surgery and potentially minimises the problems associated with prolonged immobilisation and hospitalisation. However, cure rates of infection are <40% in many studies. Where reported, such studies mostly included cases in which β-lactam-based antibiotic regimens were used, and a factor that was associated consistently with a higher risk of failure was a longer duration of symptoms before debridement [6–9].

Recent data have demonstrated the efficacy of treating patients with early (symptoms for <21 days) staphylococcal orthopaedic implant infections with retention and debridement of a stable prosthesis, combined with oral rifampicin and a fluoroquinolone [10–12]. However, fluoroquinolone resistance is now at high levels in nosocomial strains of staphylococci [13,14], thereby limiting the usefulness of rifampicin and fluoroquinolone combinations in this setting.

These organisms usually remain susceptible to fusidic acid [14], but there are few data available to support the use of fusidic acid in combination with rifampicin for prosthetic joint infections. Accordingly, the aim of the present study was to evaluate the efficacy and safety of treating staphylococcal prosthetic joint infections with debridement, prosthesis retention, and the specific antibiotic combination of rifampicin and fusidic acid.

MATERIALS AND METHODS

Study design

A retrospective cohort analysis of a prospectively compiled register of all patients with prosthetic hip and knee joint infections at St Vincent's Hospital, Melbourne, Australia, between 1998 and 2003 was performed. The clinical management of each patient was determined by the responsible clinicians. Surgical and medical therapies were not standardised for the purpose of the study, although it was common practice to treat prosthetic joint infections with a short duration of symptoms with surgical debridement, prosthesis retention and rifampicin in combination with fusidic acid. Prosthetic joint infections of longer duration (>3 months) were typically treated with removal of the prosthesis.

Study population

The study population consisted of consecutive patients who had undergone treatment with one or more surgical debridements with prosthesis retention for a staphylococcal prosthetic hip or knee joint infection, who then commenced treatment with rifampicin and fusidic acid. A period of intravenous antibiotics perioperatively with either a β-lactam or a glycopeptide was usual. Patients were excluded from the study if they had a joint replacement for a previously infected prosthesis, or if causative organisms other than staphylococci were isolated.

Definitions

A staphylococcal prosthetic joint infection was defined by the isolation of staphylococci from two or more deep culture specimens, or the isolation of staphylococci from one deep culture specimen together with either purulence surrounding the joint at the time of operation, a sinus tract communicating with the prosthesis, or acute inflammation demonstrated on histopathology of surgical specimens [9]. Treatment failure was defined as persistence or recurrence of symptoms or signs of prosthetic infection, the isolation of the same or different organisms from subsequent surgical samples, or the removal of the prosthesis while antibiotic therapy continued.

Susceptibility testing

Susceptibility testing of staphylococcal isolates was performed according to CLSI guidelines for agar and broth dilution. The MicroScan WalkAway system (Dade Behring Inc., Deerfield, IL, USA) and agar dilution methods were used for isolates from 1998 and 1999, and the Vitek-2 system (bioMérieux, Durham, NC, USA) was used for isolates from 2000 until 2003. Isolates with a fusidic acid MIC ≤1 mg/L were considered to be susceptible.

Statistical analysis

The Kaplan–Meier method was used to estimate the 1-year cumulative risk of treatment failure.

RESULTS

Study population

In total, 29 patients were diagnosed at St Vincent's Hospital as having a staphylococcal prosthetic hip or knee joint infection during the study period. Five of these patients were excluded from the study population because they underwent prosthesis removal and then either immediate (two patients) or delayed (three patients) joint re-implantation as the primary surgical treatment. Two patients were excluded because there was no initial surgical intervention. Two other patients were excluded because they received rifampicin and ciprofloxacin as oral antibiotic therapy. The medical records did not indicate reasons for the different surgical or medical treatment approaches taken for each patient.

The remaining 20 patients formed the study population and met the inclusion criteria of treatment with surgical debridement, prosthesis retention, and rifampicin and fusidic acid. Characteristics of individual patients and their outcomes are summarised in Table 1. The median age of the study population was 76 years. Thirteen patients had hip joint replacements and seven had knee joint replacements. The indication for the original joint replacement surgery was osteoarthritis (15 patients), rheumatoid arthritis (three patients), aseptic loosening of a previous prosthesis (one patient), and reversal of a previous arthrodesis (one patient). Six patients had type 2 diabetes mellitus, and four were receiving immunosuppressive medication.

The median duration from insertion of prosthesis until initial debridement (joint age) was 38 (range 12–743) days. The mean duration from onset of symptoms to initial debridement was 16 (range 2–75) days. No patient showed evidence of prosthesis loosening on X-rays or at initial debride-