INTRODUCTION

Total hip and knee arthroplasty are among the most clinically successful and cost-effective interventions in medicine, however infection after arthroplasty is probably caused to be the direct medical costs, economic utilization such as bed availability, and the indirect costs associated with lost productivity. Current strategies should focus on a short-term diagnosis and effective, efficient treatment algorithms that yield satisfactory long-term outcomes.

The cost of infection after arthroplasty has also been an increasingly important economic concern to the United States healthcare system. Kellam et al. reported that the cost of infection after knee arthroplasty resulted in an estimated net loss to the hospital for approximately $13,000 per patient and $300,000 per Medicare patient.

Currently, the number of joint replacements performed in the United States continues to rise exponentially. It is projected that the demand for primary knee and knee replacement combined will exceed 2 million to the year 2030. Infection is currently the most frequently reported reason for revision in TKA and makes up a significant proportion of THA revisions. It is projected that the number of revisions for total hip and total knee will grow by 137% and 681%, respectively, between 2005 and 2030.

Looking forward patient care should remain a priority. While the goal of every orthopedic surgeon is to prevent and minimize infection after joint arthroplasty, when infection does occur it is managed in a manner which addresses the patients' needs, giving them the best opportunity for eradication of infection in a prudent fashion, while offering them the best functional outcome possible.

Two-stage revision arthroplasty is currently the accepted method of treatment for infection in North America for chronic PJI. This often involves resection of the components and insertion of antibiotic spacer followed by reimplantation of prosthesis at a later date. The indications for the extended interval between two procedures is to allow delivery of antibiotics to eradicate organisms and reduce osteomyelitis. We have developed the abbreviated two-stage revision at our institution that allows for reimplantation of components at a later date. The utility involves resection of the components and insertion of antibiotic spacer followed by reimplantation of prosthesis at a later date. This minimizes the morbidity associated with the procedure and reduces the overall period of disability, and is likely to reduce the costs associated with treatment of PJI.

This study was designed to evaluate the outcomes of abbreviated two-stage arthroplasty employed at our institution compared to traditional reimplantation techniques for PJI reported in the literature.

MATERIALS AND METHODS

Between May 2005 and May 2009, 75 joints in 74 patients with PJI of the hip or knee were treated with abbreviated two-stage arthroplasty by a single surgeon at our institution. This study was approved by the institutional review board. All patients signed an informed consent prior to participating in the study. The cohort includes 41 men and 33 women with a mean age of 58 years (range, 20-82 years). The average body mass index was 34 kg/m² (range, 19-56). Of the 74 patients, 18 patients had previously undergone total joint arthroplasty, which were referred from other institutions or surgeons.

A total of two patients were excluded from the study group: One patient was septic, and died of sepsis prior to stage two. Two other patients had obvious persistence of infection at stage one, and were therefore treated in the traditional manner with antibiotic cement spacer for 24 weeks, then to follow-up prior to reaching the two year post-op mark.

RESULTS

Using revision for recurrent infection as an endpoint, there were 7 failures (4 hip, 3 knee) with a 10 month average follow-up. Of these 7 failures, two developed fungal infection. There were 6 failures who underwent further treatment for recurrent infection. Of these, 3 were medically unfit for further procedures and was placed on oral suppressive antibiotics. Another surgery included traditional two-stage exchange arthroplasty in 2 patients, repeated abbreviated two-stage revision arthroplasty in 2 patients, and the knee amputation in one patient. All of these patients are currently free of infection.

Infection often results in the need for multiple reoperations, prolonged use of intravenous and oral antibiotics, extended inpatient and outpatient rehabilitation, and frequent follow-up visits. In addition to the clinical impact, PJI also has substantial economic implications for patients, payers, physicians and hospitals in terms of the direct medical costs, economic utilization such as bed availability, and the indirect costs associated with lost productivity. Current strategies should focus on a short-term diagnosis and effective, efficient treatment algorithms that yield satisfactory long-term outcomes.

The abbreviated two-stage revision protocol has many advantages. The antibiotic level can be filtered and monitored to assure therapeutic serum concentration, also allowing for discontinuation of antibiotics in the event of profound neuropathy or ototoxicity. Intra-articular antibiotic levels through elution out from cement spacers have been reported in the range of 900 micrograms/mL. Our intermittent infusion allows approximately 1,000 times higher intra-articular concentrations and is the main rational for why a severe interval between stages of explant and reimplantation may be possible.