

# One Stage Surgical Management of Deep Infection of Total Hip Arthroplasty

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## Abstract

Nineteen patients underwent one stage surgical management of infected hip prostheses over a five year period. Thirteen were male and six were female. The mean age was 64 years (Range 49-82). The mean time interval between primary and revision surgery was 26 months (Range 6 months - 16 years). One stage re-implantation was performed in 15 patients and excision arthroplasty in 4 patients. The mean duration of follow up was 4 years, 5 months (Range 2 - 7 years). Patients were assessed, radiologically and clinically using the Harris hip score.

*Staph. aureus*<sup>(7)</sup> and *Staph. epidermidis*<sup>(10)</sup> were the most frequent organisms isolated. Patients who underwent excision arthroplasty had discharging sinuses, extensive soft tissue and bone involvement or were poor anaesthetic candidates. Three of these patients had a poor outcome in terms of pain function and deformity. Five of the patients who underwent one stage re-implantation had an excellent clinical result, seven had a good result, one had a fair result and one a poor result. There was no recurrence of infection in either group of patients.

One stage re-implantation can result in a good clinical outcome and eradication of infection. Resection arthroplasty is a necessary option in a minority of patients, however, while successful in eradicating infection may result in a poor functional outcome.

## Introduction

Deep infection following total hip arthroplasty is an uncommon but potentially catastrophic event. The goals of treatment are, eradication of infection and restoration of function. The optimum treatment is exchange arthroplasty in one or two stages<sup>(4,11,14,16)</sup>. Traditionally a two stage revision arthroplasty was the procedure of choice and a second stage re-implantation of a prosthesis was undertaken when it was clear that infection had subsided. This optimal interval between removal of an infected prosthesis and re-implantation of a new prosthesis was ill defined however, and patients had prolonged hospital stays with significant disability and discomfort during the interval period. For a one stage re-implantation procedure to be acceptable the reinfection rates would have to be comparable to a two stage procedure. The role of antibiotic impregnated cement has been highlighted by several authors<sup>(4,15)</sup>. In certain instances, re-implantation is inappropriate and in these patients a Girdlestone resection arthroplasty is indicated<sup>(17)</sup>. In this study we report the outcome of a series of patients with deep infection of total hip arthroplasty managed by a one stage surgical procedure.

## Patients and Methods

Over a five year period, 19 patients underwent one-stage surgical management of deep infection following total hip arthroplasty. Thirteen were male and six were

female. The mean age was sixty four (Range 49-82). The time period between primary total hip replacement and revision surgery ranged from six months to sixteen years (Mean 2 years, 2 months). The presenting symptom was predominantly pain (n=16) with a discharging sinus in seven patients. Routine preoperative assessment included full blood count, serial E.S.R., plain x-rays and isotope bone scanning. Hip aspiration was performed in all patients preoperatively and the aspirate cultured in an attempt to identify the infecting organism and obtain antibiotic sensitivities. Cultures were also taken from discharging sinuses.

The surgical technique involved extensive debridement of infected tissue, removal of all prosthetic components and meticulous clearance of bone cement. Multiple biopsies and swabs for culture were taken. Primary re-implantation was performed where possible, however four patients were deemed unsuitable for a primary re-implantation and were treated by a definitive Girdlestone excision arthroplasty. The factors influencing the management decision between primary re-implantation and excision arthroplasty were identified. Post operatively, patients who had a primary re-implantation were immobilised in broomstick abduction casts for a period of three weeks. On the basis of aspirate or sinus culture, appropriate antibiotics were given intraoperatively and incorporated into the bone cement. Systemic antibiotics were continued for three weeks. The patients were then mobilised using two crutches for a period of three months.

All patients were recalled for clinical evaluation using the Harris Hip Score<sup>(9)</sup> and radiological assessment. The plain x-rays were studied for signs of loosening as evidenced by migration of components or a bone cement

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radiolucent zone of two millimetres or more. One patient was lost to follow-up. The duration of follow-up ranged from two to seven years (Mean 4 years 5 months).

### Results

Fifteen patients had a one stage revision arthroplasty. The remaining four patients who underwent Girdlestone excision arthroplasty had discharging sinuses, extensive soft tissue involvement and bone destruction and were considered high risk anaesthetic candidates (A.S.A. 3). The presence of a discharging sinus alone was not a contraindication to a one stage re-implantation however bony destruction such that bone grafting would be required was a contraindication as were patients whose medical condition was such as to make a prolonged or repeated surgical procedure inadvisable.

The infecting organism was identified in all cases using culture of the sinus discharge (7/7), preoperative aspirate (13/19) and multiple peroperative biopsies and swabs particularly from the femoral canal and acetabular floor (19/19). The most common infecting organism was *Staph. epidermidis* (Table 1).

Patients who underwent one stage re-implantation had a mean Harris Hip Score of 94.9 (Range 61-100). No patient in this group had recurrence of infection. To date there have been no mechanical failures. The patients who underwent Girdlestone excision arthroplasty had significantly lower Harris Hip Scores with a mean of 32 (Range 15-72). There has been no recurrence of infection in this group but only one of these is satisfied with the clinical outcome. This reflects partly the expected outcome following Girdlestone resection arthroplasty but also the general physical condition of these patients.

TABLE I

INFECTING ORGANISMS.	NO. OF HIPs.
<i>Staph. epidermidis</i>	10
<i>Staph. aureus</i>	5
Mixed Organisms	3
<i>Pseudomonas</i>	1

### Discussion

Systemic appropriate antimicrobial therapy combined with surgical management can effectively eradicate deep sepsis in total hip arthroplasty. The surgical options include excision arthroplasty, one stage exchange arthroplasty or a two stage exchange arthroplasty. The results following each of these procedures have been reported<sup>(1,5,6,11,13,14,16)</sup>.

Wroblewski has defined the indications for excision arthroplasty in revision hip surgery<sup>(17)</sup>. These include poor bone stock, gross sepsis with mixed or antibiotic resistant organisms and the patient's general fitness for prolonged or repeated surgery. The technique and post operative management has been well described<sup>(8)</sup>. There is a 15-20% rate of recurrence of infection following excision arthroplasty in most published series and this is related to

inadequate clearance of infected tissue and cement. Naylor et al have emphasised the importance of removing all infected material<sup>(12)</sup>. Good pain relief has been generally reported following excision arthroplasty, however the functional results are poor. Biomechanical assessment indicates that the affected lower limb acts as a semi-rigid prop<sup>(2)</sup>. The four patients in our series who underwent excision arthroplasty had clearance of sepsis, but a poor functional outcome with residual pain.

Exchange arthroplasty also requires meticulous clearance of all infected tissue and material. This is performed as a one stage procedure or a two stage exchange using the interval to treat the patient systemically with antibiotics and locally with antibiotic loaded cement pellets. The rates of infection following these procedures have been reported. Elson et al reported an 11 - 14% failure rate following a one stage exchange compared to a 2 - 5% failure rate following a two stage procedure. Many failures were attributed to poor bacteriologic information<sup>(6)</sup>.

One stage exchange arthroplasty with appropriate antibiotics has achieved a 77 - 91% success rate<sup>(4,10,16)</sup>. These results are successful in terms of function and not just eradication of sepsis. There is a significant morbidity and mortality with this procedure and in elderly patients whose general medical condition is poor it may be contraindicated. The presence of a discharging sinus is not a contraindication to one stage exchange arthroplasty<sup>(17)</sup>.

In our series, sepsis was successfully cleared in all patients. The functional outcome in those patients who underwent one stage exchange arthroplasty is excellent, however, those who required excision arthroplasty had a poor functional result. We attribute the successful clearance of sepsis in these patients to meticulous clearance of all infected tissue and accurate bacteriological information. This study confirms the role of one stage surgical treatment of infected total hip arthroplasty.

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