One-Stage Revision for Infected Total Hip Arthroplasty

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KEYWORDS

• Prosthetic joint infection (PJI) • One-stage septic exchange • Complication of total hip arthroplasty • Cemented revision • Posterior approach

KEY POINTS

- The preoperative protocol of diagnostics includes joint aspiration and blood tests.
- The causative organisms and known susceptibility must be identified.
- All foreign material requires radical debridement and removal.
- Targeted antibiotic therapy is required both locally and systemically.
- Strict treatment protocol includes early mobilization with full weightbearing.

INTRODUCTION: NATURE OF THE PROBLEM

Prosthetic joint infection (PJI) is a most challenging complication following total hip arthroplasty (THA).[1] Despite all efforts to prevent this complication, infections occur in about 0.5% to 1.9% of primary hip arthroplasty; and in 8% to 10% after revisions.[2,3] Although the definitive diagnosis of PJI remains the key for success, a designated concept of preoperative planning and treatment is mandatory.[1,4,5] Treatment options can include irrigation and debridement[6] with retention of implants for acute infections and exchange arthroplasty either as a 1-stage or 2-stage procedure for deep, late infections.[7–11] In patients who fail all reconstructive options, consideration is given to salvage operations, including a Girdlestone-like resection arthroplasty or disarticulation.[7,12] Currently, the 2-stage exchange arthroplasty is the preferred method of treating chronic PJI of THA,[13,14] whereas a protocol-based, 1-stage exchange arthroplasty is advocated by a few specialized centers and has comparable outcomes.[15–18]

The therapeutic goal in 1-stage exchange arthroplasty is control of the infection in combination with the maintenance of joint function with a single surgery.[16] This technique is a viable option and, depending on the status of the patient,[19] the surgeon's expertise, and the hospital set-up should be used. The main objective is to reduce the bioburden by performing extensive and radical soft tissue debridement and removal of the biofilm-covered prosthesis.

Evaluating the current available literature and guidelines for the treatment of PJI,[20] there is no clear evidence that a 2-stage exchange arthroplasty has a higher success rate than a 1-stage approach.[9] Although the 2-stage technique is described in many articles as the gold standard for management of chronic PJI,[21] there are several unknowns regarding this procedure. Most important is the optimal timing of the reimplantation.[22]

The 1-stage exchange offers some advantages, including the need for only 1 operative procedure, reduced time on antibiotics, reduced hospitalization time, and reduced relative overall costs.[11] The reported outcome of this procedure is

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comparable to the 2-stage exchange arthroplasty.[18,23–25] Therefore, the 1-stage exchange at PJI of THA is getting more and more popular worldwide. There is, however, a need for randomized, prospective studies that can compare the outcome of these procedures.

This article provides a detailed description of current practice regarding the management of PJI of the hip, including diagnostics, preoperative planning, surgical treatment algorithm, possible complications, and postoperative care.

ONE-STAGE EXCHANGE ARTHROPLASTY

For obvious reasons, 1-stage exchange arthroplasty carries many advantages compared with the 2-stage exchange.[16] The 1-stage exchange arthroplasty, though commonly performed in specialized centers in Europe, has also been gaining popularity in North America.[26] One-stage exchange arthroplasty is a viable option for most patients with PJI.[27] At the Endo Klinik, approximately 85% of patients with PJI are treated with 1-stage exchange arthroplasty.[5] A main requirement for 1-stage exchange arthroplasty is that the infecting organism and its sensitivity must be determined before surgery.[28–30] This allows for delivery of local antibiotics, which are added to the cement.[31,32]

INDICATIONS FOR ONE-STAGE SEPTIC EXCHANGE OF THE HIP

One-stage septic exchange is in indicated by the following:

- PJI after THA in which infection is proven based on the International Consensus Group on Periprosthetic Infection of PJI (1 major or 3 minor criteria)[9]
- Late or chronic infection more than 30 days postoperatively or hematogenous infection more than 30 days after onset of the symptoms[33,34]
- Known germ with known susceptibility based on microbiological diagnostics
- Proper bone stock for cemented or, in some cases, uncemented reconstruction
- Possibility of primary wound closure.

CONTRAINDICATIONS OF ONE-STAGE PROCEDURE

One-stage procedure is contraindicated by the following:

- Culture-negative PJI
- Lack of appropriate antibiotics
- Systemic sepsis of the patient
- Failure of 2 or more previous 1-stage procedures[16]
- Infection involving the neurovascular bundles (femoral or sciatic nerve, iliac vessels)
- Extensive soft tissue involvement that would prevent closure of the wound
- Infection with a highly virulent organism, especially cases for which appropriate antibiotic impregnated cement is not available.

SURGICAL TECHNIQUE

The outcome of 1-stage exchange arthroplasty is technique-dependent. This procedure largely depends on the efficiency by which debridement and bioburden reduction is performed. The technique of 1-stage exchange arthroplasty is briefly outlined.

Preoperative Planning

In every case, preoperative plain radiographs (anteroposterior and lateral views) are performed (**Fig. 1**A). In some difficult cases with massive bone loss, computed tomography may be indicated. Preoperative templating using personal computer–based software (MediCAD, Hectec,

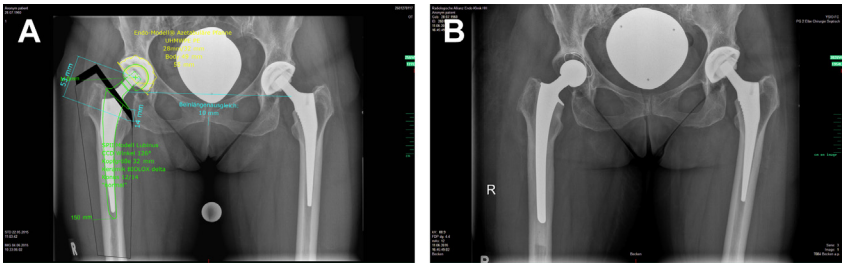

Fig. 1. (*A*) Preoperative anteroposterior (AP) pelvis radiograph and software-based templating of a 55-year-old female patient with PJI of right THA. Preoperative aspiration revealed *Staphylococcus capitis*. (*B*) Postoperative AP pelvis radiograph after 1-stage septic exchange of the right hip; both components were implanted with antibiotic-loaded bone cement.

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