Cementless two-staged total hip arthroplasty with a short term interval period for chronic deep periprosthetic infection. Technique and long-term results

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Summary. Background: The two-staged exchange with delayed reimplantation is the most reliable method to treat a deep periprosthetic infection after a total hip arthroplasty (THR). Neither uniform recommendations for the technique of cementless reimplantation, nor long term clinical and radiological results are reported.

Materials and methods: Our protocol is performed under short term antibiotic with cementless primary porous hip implants to treat chronic deep periprosthetic infections following THR. A retrospective study was performed to evaluate the clinical and radiological long term outcome and the rate of persistent infection of 14 patients.

Results: In a five year minimum follow up persistent infection was observed twice in a two-staged revision THR. A dislocation of the hip components was observed in three cases, and could be surgically treated in twice and by wearing a hip-brace in one case. We could not find a loosening of THR components. Three patients had a good or excellent, 11 patients a fair or bad functional outcome. There was a significant correlation between functional outcome and length of interval of prostheses exand reimplantation.

Conclusion: Patients have an increased comfort resulting from a short, CRP depending time interval between ex-

Der zweizeitige Wechsel der Totalendoprothese des Hüftgelenkes nach chronischem, periprothetischem Infekt. Technik und Langzeitergebnisse


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and reimplantation. Functional outcome is the better the shorter the interval is. The reinfection rate is comparable to those of cemented revision THRs with a long term interval. We could observe advantages in a reduced amount of bone loss and better osseous integration of the uncemented implants, compared to cemented implants reviewing literature. Alterations of acetabular bone stock and soft tissue are responsible for a high rate of instability of the THR. An inaccurate gait pattern is caused by gluteal weakness in the majority of patients. Repeated surgical intervention and duration of immobilization have to be minimalized.

**Key words:** Total hip replacement, chronic infection, two-staged exchange, short term interval period.

**Introduction**

During the past three decades the rate of septic complications after total hip replacement (THR) has been reduced from 10% to 1%, largely referring to prophylactic antibiotic treatment [33, 42, 43].

The presence of a prosthesis provides a continuous nidus in cause of a deep periprosthetic infection. Successful treatment involves appropriate medical and surgical care. Options for surgical therapy are numerous and include irrigation and debridement with implant retention limited to a very small group of patients [10]. Further treatments are single-stage exchange revision THR for acute post-operative infections [16, 21, 45], a two-staged exchange with delayed prosthetic reimplantation for treatment of chronic infections [5, 11, 15, 26, 29, 33, 39, 45], and the persistent resection arthroplasty. But the patient’s satisfaction after resection arthroplasty is inferior to the results obtained by reimplantation of a THR. Many authors prefer a two-staged exchange with initial implant removal, irrigation, and debridement of infected periprosthetic soft tissue with a delayed reimplantation of a new prosthesis into a surgically eradicated site, theoretically considered free of infection. This method of treatment implicates a lower incidence of recurrence of infection [14, 26, 27, 30, 32, 36, 41, 46, 48]. Success rates of 90–95% are reported with the two-staged procedure [13, 14, 33].

This treatment method is recommended to optimize the surgical conditions by removing all dead or infected tissue, and therefore obtaining a surgical field devoid of foreign material. These circumstances provide an optimal local environment for the efficacy of systemic antibiotics [3, 7, 23, 40]. The subsequent delayed reimplantation differs from a primary hip replacement, due to the altered surgical conditions by removing all dead or infected tissue, and therefore obtaining a surgical field devoid of foreign material. These circumstances provide an optimal local environment for the efficacy of systemic antibiotics [3, 7, 23, 40]. The subsequent delayed reimplantation differs from a primary hip replacement, due to the altered anatomy and biomechanics compared to the status before excision and debridement. The technically demanding surgical conditions result in a poorer clinical outcome. The amount of published results regarding the recurrence of infection and clinical outcome of two-stage reimplantation with cementless reconstruction is diminutive. The cementless fixation for revision THR is a generally preferred procedure for aseptic failure [11, 17, 22] with the aim of increasing the durability of implant fixation. Many authors prefer a cemented reimplantation due to the presumed additional benefit of local antibiotics added to the cement. Furthermore, disagreement exists concerning the appropriate point of time for the reimplantation and the type and duration of the systemic antibiotic therapy.

This protocol recommends initial radical debridement and the application of antibiotics, followed by a delayed cementless implantation of the prosthesis. The time until to reimplantation is kept as short as possible, but variable, depending on local and general septic parameters. A standard, rather than a revision style prosthesis, is used whenever possible. Some authors demand additional use of allografts. Differences between our procedure and those described in literature include the reimplantation time and the duration of systemic antibiotic application.

We assume, that a cementless fixation for post septic revision THA with primary porous hip implants provides comparable clinical and radiological results and reinfection rates, compared to cemented revision THA. We expect better results in bone ingrowth and patient comfort [19, 45].

**Patients and methods**

We performed a retrospective review of all relevant clinical and radiological patient data being treated following chronic deep septic hip arthroplasty using our two-stage reimplantation protocol. The study was conducted between 1997 and 2008. The follow-up time was 361, 8 weeks (6, 9 years) on average after the reimplantation.

We evaluated the outcome of our two-stage reimplantation protocol with particular attention given to the cementless insertion of the prosthesis components, the short-term use of systemic antibiotics, and the CRP as a dependent variable to determine the time interval between excision of the infected prosthesis and re-implantation of the final prosthesis.

Patients treated by our two-stage reimplantation protocol after deep lingering or chronic regional infection after THR were included. Nine male and five female subjects were included. The age ranged from 44 to 79 years with an average of 68.6 years. One patient developed an infection after primary change from a hemi-prosthesis to a THR, in four patients infection occurred after a revision THR had been performed and in nine patients an infection developed after primary implantation of a total hip prosthesis. The period of time from the initial, clean implantation to the diagnosis of the infection was one to 96 months, with an average of 30.6 months.

Patients with infected THR having an ASA IV and V risk criteria were excluded from the protocol. Also acute infections within the first 14 days after surgery were excluded from the study. We favor revision of the prosthesis with a one-stage reimplantation protocol for acute infections.

When removing the infected prosthesis, a thorough debridement of the hip joint was performed. Either, the prior incision, or an anteromedial approach was used. After complete removal of the prosthesis and surgical debridement the wound was irrigated with Polyhexanide solution (Lavasept®). In 11 patients, the wound was treated with Polyhexanide solution using a suction irrigation system for at least seven days after the surgical procedure, and for as long as it took to obtain three negative swabs from the draining solution on three different days. In eleven cases, an immediate identification of the bacteria could be documented. All infections were monomicrobial. Ten of these eleven cases were Staphylococcus aureus coagulase negative, and one was Enterococcus. In this case, antibiotic treatment consisted of a second generation Cephalosporin and Sulbactam sodium for 14 days after the deb-