Short Stem Total Hip Arthroplasty in Patients With Rheumatoid Arthritis

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abstract

Total hip arthroplasty (THA) has proven successful in patients with rheumatoid arthritis (RA). Patients with RA often require multiple revisions, and bone conservation is mandatory. A variety of short stems is currently available with mid-term results for osteoarthritis. This retrospective study evaluated mid-term clinical results of short stem THA in a series of patients with RA. Between 2005 and 2009, a total of 105 cementless short stems were implanted in patients with RA. Average patient age at the time of the index THA was 44.2 years, and average length of follow-up was 5 years. Clinical evaluation included physical examination and documentation of potential adverse events during the postoperative period. No radiographic failures occurred. Femoral and cup components showed some minor radiolucencies with sclerotic lines, but none involved 100% of the bone-prosthesis interface. Complications included femoral component subsidence in 2 hips after initial full weight bearing; 1 case resolved after 3 months, and the other case was revised to a standard shaft. One intraoperative dorsolateral stem tip perforation occurred with revision to a conventional length stem. Migration in 1 cup led to revision without removal of the short stem implant. No infections or joint dislocations were observed. The transfer of the short stem concept to an additional treatment option for patients with RA proved successful in the early to mid-term postoperative period. Complications and revisions were limited to early migration and early loosening of the implants in line with the results reported in the literature of cementless conventional THA in patients with RA.

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The hip joint, as any other joint of the human body, can be destroyed by rheumatoid arthritis (RA), leading to pain, stiffness, and disability. Without joint replacement surgery, the consequences of the progressive destruction of the joint surfaces include pain, inactivity, and decreased mobility. As the disease progresses, pain also occurs at rest and can interfere with sleep. Anti-inflammatory medications and steroids can alleviate the symptoms and progression of the disease to some extent. In the past decade, the treatment of RA with biological drugs has effectively slowed progression of the disease on average. Nevertheless, severe joint destruction still often requires joint replacement at a young age.

Total hip arthroplasty (THA), either cemented or uncemented, can be an effective option to eliminate restrictions in function and improve the overall quality of life in patients with RA. Arthroplasty can help restore a patient’s activity level and social life. The alternative might be a severe deterioration of the hip joint that is associated with osteoporosis and a worse prognosis for a potential THA at a later stage with a less predictable outcome.

Although conventional THA has proven successful in patients with RA, no information is available about the clinical and functional outcome in patients with RA who undergo short stem THA. There is little evidence on the clinical and functional outcomes in patients with RA, and early surgical treatment of the disease is demanding and requires new treatment pathways for these patients; one of these pathways could be shorter stems. As limitations of conventional uncemented femoral stems in this patient group persist, including proximal-distal mismatch, non-ideal load transfer, and progressive loss of bone, the use of smaller femoral implants is challenging.

Various short stem implants have been designed and are generally indicated in cases of good bone quality. Although these devices have been studied in patients with osteoarthritis, it is unclear whether they offer potential advantages over conventional stems in patients with RA who require THA. As these patients often suffer multiple revisions during their lifetime due to an early index THA surgery, the ability for revision and overall better long-term course through bone-conserving primary implants may be of particular importance for this population.

As the author’s institution is known as a center for the treatment of RA in northern Germany, a high number of THAs is performed in patients with RA. These patients are under continuous treatment as they suffer from multiple dysfunctions of the skeletal system. It was hypothesized that patients with RA would benefit from bone- and tissue-sparing short stem implants. This study outlines the mid-term clinical experience of short stem THA in patients with RA.

**MATERIALS AND METHODS**

For this retrospective study, patients with rheumatoid diseases who underwent short stem THA from 2005 to 2009 were invited to participate. Clinical evaluation included a thorough physical examination by the author, with a special focus on potential adverse events during the postoperative period. Indications included chronic polyarthritis, hemochromatosis, juvenile chronic polyarthritis and oligoarthritis, psoriatic arthritis, polymyalgia rheumatica, and ankylosing spondylitis.

The femoral implant used was a cementless short hip stem (Metha; Aesculap AG, Tuttingen, Germany) with a combined titanium plasma spray with tricalcium-phosphate coating to improve bone ingrowth. Bone quality was evaluated during surgery to determine whether a short or conventional stem implant was used. Except for the determination of bone quality, the operative technique follows the normal procedure described in the literature by Braun et al and Mihalko et al.

As cancellous bone structures are osteoporotic in patients with RA, the femoral implant must fit by means of cortical anchoring features. Therefore, the implant size must be chosen carefully for the patient’s femoral bone geometry and stem positioning. A rotationally stable filling of the femoral neck junction, alignment along the dorsolateral cortex, and direct and tight medial cortex contact is essential for primary implant stability. The last rasp must fit in a rotationally stable position.

**RESULTS**

A total of 103 patients, representing 17% of the total patient population with rheumatoid etiology, underwent 105 THAs using cementless short stem implantation (Figure 1). Average
patient age at the index operation was 44.2 years. Of the 103 patients, 48 (46.7%) were men and 55 (53.3%) were women. The specific rheumatoid diagnoses were chronic polyarthritis in 63 patients (61.2%) and ankylosing spondylitis in 14 patients (13.6%). In 10 patients (9.7%), the diagnosis was psoriatic arthritis. In the remaining 16 patients (15.5%), the diagnoses were juvenile chronic polyarthritis in 8 patients (7.8%), undifferentiated spondyloarthritis in 4 patients (3.9%), polymyalgia rheumatica in 2 patients (1.9%), juvenile oligoarthritis in 1 patient (1%), and hemochromatosis in 1 patient (1%).

Average length of follow-up was 5 years (range, 2-6 years). Most of the patients were using corticosteroids before THA and throughout the follow-up period, and many of the patients had used steroids in the past. In addition, the majority, with 4 of 5 patients, were taking some form of anti-inflammatory medications at the time of the follow-up examination.

No signs of radiographic failure were seen in most of the patients; however, occasionally femoral and acetabular components showed some minor radio-lucencies with sclerotic lines. None of these involved the entire bone-prosthesis interface.

Complications included femoral component subsidence after initial full weight bearing in 2 patients. In 1 patient, the subsidence resolved after 3 months (Figure 2), and the patient had no further complaints at later follow-up examinations. The second patient underwent revision to a cementless conventional stem at an early time point (Figure 3).

In 1 patient, an undetected intra-operative dorsolateral perforation of the distal short stem tip was revised to a cementless longer conventional stem within the first week after index surgery. In 1 patient, an acetabular component migration leading to cup loosening was revised after 3 months with an acetabular reinforcement ring, keeping the short hip stem in place. One young athletic woman working as a sports teacher complained of occasional thigh pain 1 year after the index THA. At the time of last follow-up, the total number of revisions was 3. Two patients underwent revision for the stem, and 1 patient underwent revision for the cup only. No infections and no hip joint dislocations were observed in this patient group.

**DISCUSSION**

Most of the evidence regarding clinical outcomes and complications following THA and total knee arthroplasty (TKA) is based on patients with osteoarthritis (OA). Less is known about outcomes in patients with RA, especially when new prosthetic concepts are involved.

Patients with RA have a higher risk of dislocation following THA and a higher risk of infection following TKA relative to patients with OA. Bongartz et al reached a similar conclusion; they reported that TKA and THA patients are at increased risk of prosthetic joint infection, especially in the setting of revision arthroplasty and a previous prosthetic joint infection. The risk of infection more than
6 years after the index operation leading to revision TKA and THA is higher in RA patients than in OA patients, as calculated from data of the Norwegian Arthroplasty Registry by Schrama et al.16 These findings highlight the importance of perioperative prophylactic measures and vigilance during the postoperative period.

Both of these basic and severe secondary complications in patients with RA were not seen in the current investigation at an average follow-up of 5 years. The complete lack of these kind of complications are attributed to an optimally adapted operative facility for rheumatoid surgery (infections) and the good adaptability of the studied short stem implant to the specific patient anatomy (dislocations). Dislocation was not seen in a larger, mostly primary OA cohort of 250 patients reported by Wittenberg et al17 and 151 patients reported by Thorey et al18; these 2 studies represent the longest follow-up of the short stem hip implant used in the current study.

In THA for patients with RA, increased rates of intraoperative fractures, component migration, and early aseptic loosening are to be expected.19 According to a review by Zwartelé et al20 that compared 6 studies of cemented and cementless implants in patients with RA, cementless fixation is favorable. However, compromised rheumatoid bone is a potential risk factor for mechanical complications in cementless THA.

In the current retrospective analysis of 105 THAs with a cementless short stem implant, 3 mechanical complications occurred due to early migration in 1 cup and 2 stems, leading to 2 revisions (1 cup and 1 stem). Other follow-up reports for the use of shorter hip stems in RA indications have not been found in the literature.

This retrospective study represents the first report with a low number of implant-related complications for the femoral component, which might not be expected at the time when the authors began performing this type of THA procedure. The overall results have been favorable, when considering the total number of 105 patients examined, despite the poorer bone quality and high usage rate of anti-inflammatory agents.

It is important to consider this operation in patients with RA disease who take immunosuppressive medication because it leads to a higher risk of infection. The frequently difficult osteoporotic bone in this specific patient population requires special attention during preparation of the implant site. In severe cases of compromised bone quality, weight bearing should be reduced significantly or even completely for 6 weeks postoperatively, with frequent controls and patient education during this period.

The findings of this study suggest that the selection of short stem THA for secondary arthritic destruction in younger patients be based on the intraoperative assessment of primary implant stability. Treatment must be in the context of the entire joint and soft-tissue situation of the individual rheumatoid disease under long-term consideration following revision arthroplasty. However, juvenile dysplasia conditions and pathologic hip fractures in later RA stages are unsuitable and should be excluded from a short stem implantation.

As a minority, patients with RA are a lesser focus of THA research and investigation. Further research is necessary to elucidate the complex interconnected roles of medication profile, implant choice, postoperative antibiotic protocol, and method of rehabilitation following joint replacement in patients with RA. Further follow-up of the patients in this study is planned for the future to confirm results in the long-term.

**CONCLUSION**

The use of the short stem as an additional treatment option for THA patients proved successful on a short-to mid-term time scale. The complications and revisions were limited to early migration and early loosening of the implants in line with the results reported in the literature for cementless conventional THA in patients with RA.

**REFERENCES**


