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Primary Stanmore total hip arthroplasty with increased cup loosening in rheumatoid patients

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Abstract We studied all Stanmore total hip arthroplasties (THA, $n=325$) implanted at our center between 1980 and 1990. Seven patients (seven hips), followed for less than 12 months, were excluded. Five hips were lost at follow-up. The mean follow-up was 117 (12–252) months. A total of 18 hips were revised, with median time between operation and revision 163 months. With revision as endpoint, a survival rate analysis was calculated. The mean survival for all hips was 82% at 18 years (95% confidence interval 64–101%). For hips with rheumatoid arthritis, the survival rate was 58%, whereas in osteoarthritic hips the rate was 95% after 18 years. A high proportion of acetabular loosening was seen in rheumatoid hips.

Résumé Nous avons étudié toutes les Arthroplasties totales de la hanche de type Stanmore ($n=325$) implantées à notre centre entre 1980 et 1990. Sept malades (7 hanches), suivis moins de 12 mois, ont été exclus. Cinq hanches ont été perdues de vue. Le suivi moyen était 117 (12–252) mois. Un total de 18 hanches a été révisé avec un temps médian de 163 mois entre l'opération et la révision. Avec la révision comme point final une analyse du taux de survie a été faite. La survie moyenne pour toutes les hanches était 82% à 18 années (95% intervalle de la confiance 64–101%). Pour les hanches avec une polyarthrite rhumatoïde le taux de la survie était 58%, alors que dans les hanches arthrosiques le taux était 95% après 18 années. Une grande proportion de descellements acétabulaires a été notée dans les hanches rhumatoïdes.

Introduction

The Stanmore total hip arthroplasty (THA), which was developed in 1956, is well studied in literature and is the most cost-effective prosthesis in elderly patients over a period of 20 years [2, 4, 6, 10, 12, 13]. Overall mean survival rate of this cemented hip prosthesis is 73–85% after 20 years [6]. However, survival seems to be lower in rheumatoid patients due to a higher loosening-rate of the acetabular component [3, 15]. In our institution the Stanmore THA has been used since the second half of the 1970s. We present a survival rate analysis of the prosthesis inserted between 1980 and 1990, with special emphasis on patients with rheumatoid arthritis (RA).

Material and methods

Between 1980 and 1990 a total of 325 Stanmore THAs were implanted in 288 patients. Seven hips were excluded because of short-term follow-up (below 12 months). None of these seven patients had complaints of the hip at latest follow-up.

The included cohort consisted of 68 men and 213 women with an average age of 72 (38–86) years at surgery. In view of the regional character of our academic centre for hip prostheses, most patients lived in the surroundings of Leiden, The Netherlands. The proportion of left versus right hips was 132 versus 176. In five patients bilateral hip replacement was performed. Preoperative diagnosis was osteoarthritis in 231 hips, rheumatoid arthritis in 76 hips, femoral neck fracture in nine hips, and avascular necrosis in two hips.

The surgical technique included reaming to the acetabular subchondral bone; subsequently, three perforation holes were drilled for cement fixation of the acetabular cup. Components used were 45 mm, 50 mm, and 53 mm cups. The femoral shaft was broached with a rasp; a third-generation cementing technique was used (Biosem plug, Palacos bone cement). Two suction drains were used for at least 24 h postoperatively. Orthopaedic residents, under supervision of a consulting orthopaedic surgeon, performed half of the operations. The operation technique did not differ for the rheumatoid patients.

Retrospectively all patient charts and radiographs were reviewed for failure of the THA (i.e., revision of the prosthesis, complications postoperatively). Additionally a questionnaire for patient follow-up evaluation was sent to every general practitioner (GP) of all 281 patients. The response rate was 83% (233/281).

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Table 1 Postoperative complication rate and treatment.
THA total hip arthroplasty

Complication	Number of THAs	Treatment
Aseptic loosening femoral component	5	5 total revision
Aseptic loosening acetabular component	7	3 revision acetabulum, 4 total revision
Aseptic loosening both components	5	5 total revision
Septic loosening	1	1 girdle stone
Dislocation	5	5 closed reduction
Corpus alienum	1	1 removal drain

Five patients were lost to follow-up. Their last clinical follow-up was taken into account for this study. The clinical follow-up information of the remaining group (276 hips) is known.

In case of hip complaints, an anteroposterior (AP) pelvic radiograph and AP and lateral radiograph of the hip was made if the previous radiograph was taken more than 1 year ago. Loosening was defined as either a radiolucent line of more than one millimeter in width between bone and cement along all Gruen zones [7] of femoral or acetabular components, or migration of one of the components.

We used the Kaplan-Meier method with 95% confidence interval (CI) for survival analysis. Endpoint was defined as revision of one or two components. Stratification was done for the diagnosis osteoarthritis and rheumatoid arthritis. A log rank test was performed for comparing the differences between these curves.

Results

The mean follow-up was 117 (12–252) months. At the review (January 2002), 171 patients (188 hips, 59%) had died after a median follow-up of 98 months; 183 patients (183 THA) had been followed for more than 10 years and 65 patients (65 THA) for more than 15 years.

The postoperative complications are summarized in Table 1. Total revision rate was 5.7% (18/318) with a median period of 163 months (SE 11.9) postoperatively. Loosening of one or two components was the main cause for revision ($n=18$ of 19 revisions).

Both components were replaced in 14 patients while acetabular revision only was performed in three patients without femoral loosening. We observed one septic loosening in a rheumatoid patient who used high doses of immunosuppressive medication. After removal of her hip prosthesis, she sustained a transient ischemic attack that contraindicated reoperation. Five patients had dislocation of the hip. They were all treated by closed reduction followed by a stabilizing hip brace for 6 weeks. None of these hips redislocated. One reoperation was performed for a broken suction drain 2 days postoperative without any long-term consequences.

At latest follow-up 12 hips showed signs of loosening. Of these, four hips showed radiographic acetabular loosening. Three patients with signs of loosening also complained of pain in the hip joint. Furthermore four patients complained of hip pain, but the radiographs showed no loosening or other complications. The total loosening-rate was therefore 9.4% (30/318).

Eleven hips had acetabular loosening; seven of these were RA-affected. This high contribution could not be explained by operation or cementing technique, surgeon's experience, or patient characteristics.

Table 2 Cumulative survival rate for the total group. CI confidence interval

Duration follow-up (years)	Cumulative survival (%)	Standard error (%)	95% CI	Number of hips at risk
3	99.6	0.5	98.8–100.4	277
5	99.1	0.6	98.1–100.2	252
6	98.0	0.9	96.2–99.8	233
8	97.5	1.0	95.5–99.5	203
10	96.4	1.4	93.8–98.7	183
11	95.1	1.6	92.0–98.2	145
12	92.9	2.0	89.0–96.8	127
13	91.2	2.3	86.7–95.7	107
14	90.2	2.5	85.3–95.1	91
15	88.8	2.8	83.4–94.4	65
16	85.8	4.0	78.0–93.6	28
17	82.5	5.0	72.7–92.3	25
18	82.5	9.6	63.7–101.3	7

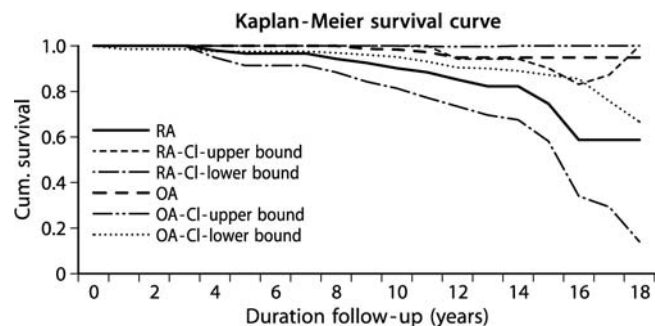


Fig. 1 Kaplan-Meier survival curve (endpoint removal of the prosthesis) for primary Stanmore total hip arthroplasty (THA). The red line represents survival of rheumatoid hips (RA), whereas the blue line represents survival of osteoarthritic hips (OA). The 95% confidence intervals for each curve are shown by the dotted lines (RA-CI and OA-CI)

The mean survival rate with 95% CI with endpoint revision of one or two of the prosthetic components was, for the total group, 95.5% at 10 years (95% CI 93.8–98.9%), 88.8% (CI 83.4–94.4%) after 15 years, and 82.5% (CI 64.7–101.3%) after 21 years (Table 2). The survival rate did differ for osteoarthritic and rheumatoid hips (94.6% and 58.3% after 18 years respectively), but this is not statistically significant (no evident overlap of both 95% CI). On the other hand, the log rank statistic for comparing the slope of these curves was 11.4 ($p=0.0007$). This means that the chance of revision was

11 times higher for rheumatoid patients compared to osteoarthritic patients during the follow-up (Fig. 1).

Discussion

The mean survival rate (endpoint: removal of prosthesis) of the Stanmore THA in rheumatoid patients was lower compared to the osteoarthritic group at long-term follow-up. The differences between groups slowly increased during follow-up, but statistical significance was not reached. This study confirms previous studies with various THAs. Furnes et al. [5] differentiated survival rates of THA for different surgical indications. They used data from the Norwegian Arthroplasty Register, resulting in mean survival rate of 86.7 and 88.8% after 10 years for rheumatoid patients and osteoarthritic patients respectively. The survival of the Stanmore THA in this series is similar to that calculated by Gerritsma-Bleeker et al. [6] and by Emery et al. [4]. Herberts and Malchau [9] studied the Swedish Total Hip Replacement Register and calculated a survival of 83% after 18 years for various types of total hip prostheses. Hartofilakidis [8] discussed a survival rate of 85% after 17 years for the Charnley THA. However, in none of the later studies were there calculations for patients with rheumatoid arthritis.

Creighton et al. [3] described an increased acetabular loosening rate in rheumatoid arthritis patients being four times higher than femoral loosening, but they used several different types of implants. Considering the small amount of rheumatoid hips (76 hips) and the acetabular loosening rate in our series, we can confirm their conclusion.

The revision rate of Stanmore THA in our series (5.7%) is lower than for other types of THA. Unger et al. [15] noted a revision rate of 16.7% after 12 years for various types of prosthesis. Sorensen et al. [14] studied the Charnley prosthesis and found a revision rate of 10.7% after 20 years.

We observed 12 radiographic loosening (continuous radiolucent lines of more than 1 mm in all femoral or acetabular zones). Nine of these patients (nine THA) had no complaints of pain but were restricted in walking due to high age (older than 85 years) and general health problems.

The reason for the early acetabular loosening in rheumatoid patient is still unclear. Surgical technique, cementing technique, surgeon's experience, and patient characteristics did not differ between rheumatoid and nonrheumatoid patients. It is probably the more advanced destruction of acetabular bone stock in combination with a general involvement of rheumatoid arthritis that reduces the survival rate. Akesson et al. [1] found a higher osteoid volume, osteoid surface, and resorptive surface in rheumatoid compared to osteoarthritic hips. Maybe this observation is of importance in early acetabular loosening. On the other hand, Onsten et al. [11] con-

firmed the lesser mineralization in rheumatoid bone, but no correlation was seen with acetabular loosening or migration. However, evidence of early acetabular failure in rheumatoid hips is still lacking in literature.

This study shows the mean survival rate of the Stanmore total hip with special attention to rheumatoid patients. The differences between patients with various diagnoses in mean survival rate are due to increased loosening rate of the cemented acetabular component in rheumatoid patients. Further research with emphasis on preoperative radiographic assessment of the acetabular bone stock might probably clarify this finding. In comparison with other prostheses, the overall long-term result of the Stanmore prosthesis is, however, still satisfactory despite the indication.

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