Cumulative revision rate with the Scan Hip® Classic I total hip prosthesis

1,660 cases followed for 2–12 years

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We analyzed the cumulative revision rate in 1,474 patients (1,660 hips) operated on with a cemented Scan Hip® Classic I prosthesis from November 1983 to January 1994 at Lund University Hospital.

The revision rate was analyzed for 3 diagnoses—arthrosis, rheumatoid arthritis and complication after a hip fracture—and for 2 head diameters—22 and 32 mm.

Until January 1996, 36 hips were revised: 31 because of aseptic loosening, 3 because of dislocation and 2 because of infection. The overall revision rate was 5.6% after 10 years and was similar in arthrosis, rheumatoid arthritis and fracture cases.

Due to revisions because of dislocation in the 22 mm group, the total revision rate was lower in the 32 mm group (p = 0.03).

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Submitted 97-05-20. Accepted 97-12-29

There is little information concerning most joint implants in current use. According to Murray et al. (1995), the clinical results are sufficiently documented in only 30% of the implants used in the U.K. In the Scandinavian countries, the situation might seem better because of the national hip and knee registers in which information, hopefully about all revisions of hip and knee implants, are collected. On the basis of these registers revision rate analysis has been performed to assess the implant and the importance of patient-related, implant-related and surgical parameters (Paavolainen et al. 1991, Havelin et al. 1993, Malchau et al. 1993).

Data on reported revisions after 8–10 years among 4,585 Scan Hip® Classic I arthroplasties performed in Sweden are available in the Swedish National Hip Register (Malchau and Herberts 1996).

We analyzed the cumulative revision rate of Scan Hip® Classic I arthroplasties performed at Lund University Hospital, with a 22 or a 32 mm head, in patients with arthrosis, rheumatoid arthritis and patients operated on because of a complication after a hip fracture.

Patients and methods

From November 1983 to January 1994, 1,753 Scan Hip® Classic I prostheses were implanted in 1,558 patients at our department. To obtain large and comparable groups, we included patients with the three commonest diagnoses: arthrosis (905 patients, 1,021 hips), rheumatoid arthritis (206 patients, 259 hips) and those operated on because of nonunion or avascular necrosis after a hip fracture (372 patients, 380 hips). Thus, 1,660 THAs in 1,474 patients were analyzed (Table 1). The remaining 93 THAs in 84 patients with other diagnoses (tumors, skeletal metastasis, pathological hip fractures, morbus Bechterew, congenital hip dislocation, primary osteonecrosis) were excluded. No other selection was performed. At the endpoint of the study—the turn of the year 1995–1996—436 patients (475 hips) had died.

The arthroplasties were performed by 58 surgeons, with the number of operations per surgeon varying from 1 to 313. 16 were experienced hip surgeons who performed 67% of the arthroplasties.

The Scan Hip® Classic I (MITAB, Sweden) femoral component has no modularity, is made of CoCrMo alloy and is available with a 22 or 32 mm head, with or without a collar. The cup is made of machined, ultra-high molecular weight polyethylene. The design was introduced in 1983.

Most patients were operated on with a posterolateral skin incision and a posterior arthrotomy, without trochanteric osteotomy. The same skin incision, but with an anterior arthrotomy, was used in an unknown number of the rheumatoid patients. The same cementing technique was used: cleaning with pulsating lavage, plugging of the femoral canal, retrograde filling

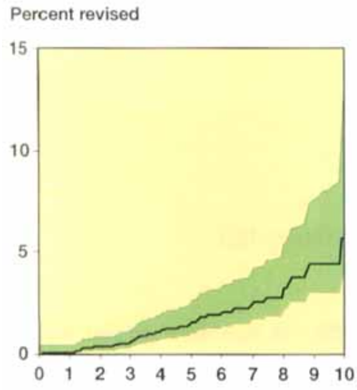

Figure 1. Total cumulative revision rate (thick line). Green area indicates the 95% confidence interval.

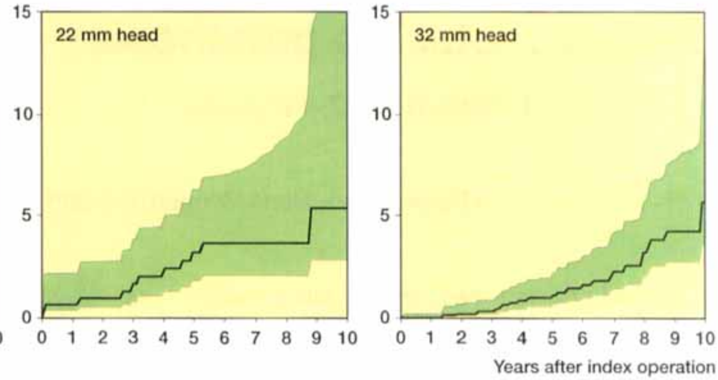

Figure 2. Difference in cumulative revision rate with the 22 and 32 mm heads. (All patients, all revisions, p = 0.025)

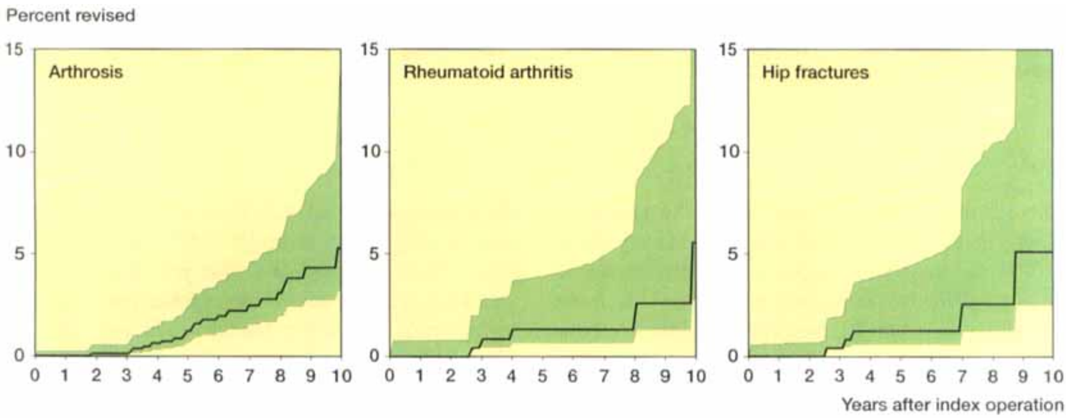

Figure 3. Cumulative revision rate because of aseptic loosening in patients with three diagnoses.

and pressurization of Palacos® bone cement with gentamicin. As additional prophylaxis against infection, systemic antibiotic administration was started at the beginning of the operation and continued for 3–7 days. The size of the head was chosen according to the surgeon's own preference. In patients with arthrosis, 156 hips were replaced with a 22 mm head and 865 with a 32 mm head; in rheumatoid arthritis patients, it was 115 and 144 hips, respectively, and in patients with a complication after a cervical hip fracture, it was 40 and 340 hips, respectively.

Data on primary arthroplasties and revisions were obtained from our register of operations. According to the Swedish National Hip Register, no patient who had a primary operation in our department was revised in another hospital (Malchau 1996).

The cumulative revision rate was calculated with the Kaplan-Meier technique. The confidence interval was calculated as the Wilson quadratic 95% confidence interval (Dorey et al. 1993). Failure was defined as revision of one or both components. The indication for revision was aseptic loosening, dislocation or infection.

Results (Tables 1 and 2)

All revisions

The overall cumulative revision rate was 5.6% after 10 years with 153 hips at risk and 95% confidence interval of 3.3–8.0% (Figure 1). The revision rate with the 32 mm head was lower than with the 22 mm head, p = 0.03 (Figure 2). There were no significant differences in revision rates between the three diagnoses.

Aseptic loosening

The differences in cumulative revision rates because of aseptic loosening in arthrosis, rheumatoid arthritis and fracture cases were not significant (Figure 3). Nor

Table 1. Data on patients and revisions

	Arthrosis	Rheumatoid arthritis	Hip fractures[a]	22 mm head	32 mm head
Patients	905	206	372	273	1224
Hips	1021	259	380	311	1349
Age [b] (year)	69 (25–91)	58 (15–88)	77 (22–97)	59 (15–97)	72 (25–96)
Men [c]	481 (426)	78 (60)	81 (80)	58 (49)	582 (519)
Women [c]	540 (479)	181 (146)	299 (292)	253 (224)	767 (705)
Reason for revision:					
Aseptic loosening	21	5	5	8	23
Dislocation	2	1	–	3	–
Infection	1	–	1	–	2
Component revised:					
Acetabular component	2	1	–	3	–
Femoral component	12	2	5	4	15
Both	10	3	1	4	10

[a] Nonunion or avascular necrosis after hip fracture
[b] Values are given as mean (range)
[c] Number of hips (number of patients)

Table 2. Cumulative revision rates with the Scan Hip® Classic I prosthesis. Values are presented as number of arthroplasties at risk/revision rate and 95% confidence interval in parentheses

Years postop	All patients				Arthrosis		Rheumatoid arthritis		Hip fractures	
	Aseptic loosening		All revisions		Aseptic loosening	All revisions	Aseptic loosening	All revisions	Aseptic loosening	All revisions
	22 mm	32 mm	22 mm	32 mm						
1	308/0.0 (0.0–0.0)	1276/0.0 (0.0–0.0)	306/0.6 (0.0–1.5)	1276/0.0 (0.0–0.0)	1000/0.0 (0.0–0.0)	999/0.1 (0.0–0.3)	258/0.0 (0.0–0.0)	257/0.4 (0.0–1.2)	327/0.0 (0.0–0.0)	327/0.0 (0.0–0.0)
2	298/0.0 (0.0–0.0)	1211/0.1 (0.0–0.2)	295/1.0 (0.0–2.0)	1209/0.2 (0.0–0.5)	970/0.1 (0.0–0.3)	967/0.4 (0.0–0.8)	250/0.0 (0.0–0.0)	249/0.4 (0.0–1.2)	289/0.0 (0.0–0.0)	288/0.3 (0.0–1.0)
3	283/0.7 (0.0–1.6)	1065/0.2 (0.0–0.4)	280/1.7 (0.2–3.1)	1063/0.3 (0.0–0.6)	868/0.1 (0.0–0.3)	865/0.4 (0.0–0.8)	240/0.8 (0.0–2.0)	239/1.2 (0.0–2.6)	239/0.4 (0.0–1.1)	238/0.7 (0.0–1.7)
4	259/1.4 (0.1–2.8)	855/0.7 (0.2–1.2)	256/2.4 (0.7–4.2)	854/0.8 (0.3–1.4)	719/0.6 (0.1–1.1)	716/0.9 (0.3–1.5)	212/1.3 (0.0–2.8)	211/1.7 (0.0–3.3)	183/1.3 (0.0–2.7)	183/1.6 (0.0–3.1)
5	236/2.3 (0.5–4.0)	673/1.0 (0.3–1.6)	234/3.2 (1.2–5.3)	672/1.1 (0.4–1.8)	585/1.2 (0.4–2.0)	583/1.5 (0.7–2.4)	181/1.3 (0.0–2.8)	180/1.7 (0.0–3.3)	143/1.3 (0.0–2.7)	143/1.6 (0.0–3.1)
6	203/2.7 (0.7–4.7)	529/1.5 (0.6–2.3)	202/3.7 (1.4–5.9)	528/1.6 (0.7–2.5)	476/2.0 (0.9–3.0)	474/2.3 (1.2–3.4)	147/1.3 (0.0–2.8)	147/1.7 (0.0–3.3)	109/1.3 (0.0–2.7)	109/1.6 (0.0–3.1)
7	154/2.7 (0.7–4.7)	403/2.1 (1.0–3.3)	153/3.7 (1.4–5.9)	402/2.3 (1.1–3.5)	373/2.5 (1.2–3.7)	371/2.8 (1.5–4.1)	112/1.3 (0.0–2.8)	112/1.7 (0.0–3.3)	72/2.6 (0.0–5.5)	72/2.9 (0.0–5.9)
8	103/2.7 (0.7–4.7)	312/3.0 (1.5–4.6)	102/3.7 (1.4–5.9)	311/3.2 (1.7–4.7)	293/3.1 (1.6–4.6)	291/3.4 (1.8–5.0)	75/2.6 (0.0–5.6)	75/3.0 (0.0–6.0)	47/2.6 (0.0–5.5)	47/2.9 (0.0–5.9)
9	48/4.4 (0.5–8.4)	211/4.12 (2.2–6.0)	48/5.4 (1.4–9.4)	210/4.3 (2.3–6.2)	179/4.3 (2.3–6.4)	178/4.6 (2.5–6.7)	48/2.6 (0.0–5.6)	48/3.0 (0.0–6.0)	33/5.1 (0.0–10.9)	33/5.5 (0.0–11.2)
10	16/4.4 (0.5–8.4)	138/5.5 (2.8–8.2)	16/5.4 (1.4–9.4)	138/5.7 (3.0–8.4)	101/5.3 (2.5–8.0)	101/5.6 (2.8–8.3)	33/5.6 (0.0–11.9)	33/5.9 (0.0–12.3)	20/5.1 (0.0–10.9)	20/5.5 (0.0–11.2)

was there any significant difference between different head sizes.

There was no revision because of aseptic loosening of the acetabular component alone. In one case there was a fracture of the femoral component after 5 years.

Dislocations

There were 3 revisions because of dislocation, all with the 22 mm head. In 2 cases, the dislocations were anterior because of too much anteversion of the cup. 2 revisions were performed after 4 and 25 days, and in one case the revision was done after 15 months.

Infections

2 hips were revised because of infection. The indication for the arthroplasty was pain after infected osteosynthesis of a cervical hip fracture in one case and arthrosis in the other. In both cases the septic complication was diagnosed shortly after the arthroplasty.

27/1,117 (2%) arthroplasties performed by experienced surgeons and 9/543 (2%) arthroplasties operated on by inexperienced colleagues were revised.

Discussion

The total revision rate was lower in the group with the 32 mm head, due to the revisions because of dislocation in the 22 mm group, but there was no statistically significant difference between the two head sizes, as regards revisions because of aseptic loosening. This observation is of interest in relation to wear and the role of polyethylene particles in the process of aseptic loosening (Howie 1990, Schmalzried et al. 1992, Maloney and Jasty 1993). If the polyethylene debris were the main cause for osteolysis and loosening, a significantly greater incidence of loosening should be expected with the 32 mm head, since the volume of the polyethylene debris with a 32 mm head is 2–3 times greater than with a 22 mm head (Livermore et al.1990, Kabo et al.1993, Kesteris et al.1996). Our observation is confirmed by Marston et al. (1996); in a randomized prospective study by Charnley and Stanmore, prostheses with different head sizes (22, 25 and 29 mm, respectively), they found no difference in revision rates after 10 years.

The Swedish multicenter study (Malchau and Herberts 1996) has reported a 2.8% revision rate, because of aseptic loosening after 10 years in 3,775 patients with arthrosis operated on with the Scan Hip® Classic I prosthesis, with a collar, and a 6.1% revision rate of the collarless Scan Hip® Classic I prosthesis after 8 years in 810 patients with arthrosis. There were 4 collarless femoral components among our revisions. We could not, however, compare the revision rate with or without a collar, because of missing data about the number of primary arthroplasties with a collarless femoral component. To collect data retrospectively from radiographs was not possible, since films of patients deceased before January 1991 (152 patients), as well as films of patients who had not undergone any radiographic examination during the last 5-year period (unknown number of patients), had been destroyed. The revision rate in patients with arthrosis in our study was double that recorded for Scan Hip® Classic I, with collar, in the Swedish National Register. The most probable explanation of this difference is that not all revisions are reported to the Register. A detailed comparison would have been interesting as a validation of the data published from the Register.

The surgeon's experience had no beneficial effect on the revision rates. This is only to be expected, as the number of revisions was so low. Several studies focusing on the surgeon's experience have been published. Skeie et al. (1991) found no significant difference in revision rates after 10–15 years in four groups of surgeons who had performed < 24, 25–49, 50–99 or > 100 operations. However, Marston et al. (1996) reported 11 times greater relative risk for revision by trainees, as compared to more experienced orthopedic surgeons. This difference can probably be explained by different specialist education systems in the U.K. and Scandinavian countries, e.g., how soon the younger doctors are allowed to perform hip arthroplasties, unsupervised. Most arthroplasties in the study by Marston et al. (1996) were performed by trainees, whereas in our study only one third were operated on by trainees or surgeons with little experience of hip arthroplasties.

Analysis of revision rate is only one of the methods for evaluating the outcome of arthroplasty. Such data are useful, especially if an implant tends to fail early. It is tempting to use the results for speculations about the long-term prognosis. However, it is important to remember that reliable conclusions can be drawn only for the length of time the results are calculated for. A low revision rate after the first 5–6 or even 10 years does not guarantee a continued low revision rate during the next few years (Malchau et al. 1993, Malchau and Herberts 1996).

Survival curves are currently used in the marketing of prostheses, but survival is only a rough measure of the results, and it reflects neither the clinical performance nor varying indications for revision. The survival curve gives no information about the radiographic and clinical outcomes and, in advertisements, it is usually presented without information about the number of patients and diagnosis.

Acknowledgements

This study was supported by grants from Science and Technology Procordia AB, Lunds sjukvårdsdistrikt, Stiftelsen för bistånd åt vanföra i Skåne, Swedish Medical Research Council project 09509 and Medical Faculty, Lund University.

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