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Total hip replacement with second generation cementing technique and the monobloc ScanHip: a 10-year follow-up

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Abstract In 230 consecutive patients 244 hips were operated with a 32-mm cemented prosthesis. The mean age at surgery was 77 (46–96) years. At the 10-year follow-up 89 patients (95 hips) were dead and 33 patients (35 hips) did not attend because of old age or medical problems. Thirteen hips had been revised for aseptic loosening, two for infection, one for recurrent dislocations, and one for fracture. Four hips were found to be loose and seven had suspected radiographic loosening zones but only minor clinical symptoms. No or little limp was experienced by 52% of patients and 62% reported no or little pain. Eighty-seven percent were satisfied with the early postoperative result and 77% were still content at the time of follow-up. On the 10-year radiographs wear of the cups was, on average, 2.2 mm in loose hips and 1.5 mm in intact hips ($P=0.02$). There was no correlation between dissatisfaction and loosening visible by X-ray at follow-up.

Résumé 244 hanches chez 230 malades consécutifs ont été opérées avec une prothèse cimentée à tête de 32 mm. L'âge moyen à la chirurgie était 77 (46–96) années. Au délai de 10 ans 89 malades (95 hanches) étaient morts et 33 malades (35 hanches) non revus à cause de l'âge ou de problèmes médicaux. 13 hanches avaient été révisées pour descellement aseptique, deux pour infection, une pour luxations itératives, et une pour fracture. 4 prothèses ont été notées descellées et 7 avaient des aspects radiographiques en faveur d'un descellement mais avec seulement des symptômes cliniques mineurs. 52% des malades n'avaient aucune ou une discrète boiterie et 62% aucune ou une discrète douleur. 87% des malades ont été satisfaits du résultat précoce et 77% l'étaient en-

core au délai de suivi. Sur les radiographies à 10 ans l'usure des cupules était en moyenne de 2.2 mm dans les hanches descellées et de 1.5 mm dans les hanches intactes ($p=0.02$). Il n'y avait aucune corrélation entre l'insatisfaction et le descellement radiographique au délai d'étude.

Introduction

The Swedish national registry of total hip replacements [3] has been an effective outcome follow-up instrument focusing on revision rates since 1978. Similar Finnish and Norwegian national registries of joint replacements have reported the use of artificial joints on a nation-wide basis since the 1980s. Both registries report a 10-year survival of about 94% for patients with cemented implants. According to the latest publication from the Swedish national registry, the 10-year survival of the ScanHip is average, with Lubinus SP2 1% better and Charnley 1% worse [3].

We studied a consecutive series of ScanHip replacements to revalidate the statistics from the national registry concerning reoperations, as well as to re-examine all cases clinically and radiographically at 10 years to determine the number of dissatisfied patients and undetected loose prostheses in need of revision.

Patients and methods

The Department of Orthopaedic Surgery has used the ScanHip prosthesis (Scandimed, Sjöbo, Sweden) since 1984. It has a monobloc, cobalt-chromium femoral component with a 32-mm head and an all polyethylene concentric acetabular socket without "snapfit." It has a 15-cm stem and a collar similar to the Harris "design 2" with a matted finish and a rounded rectangular cross-section. At this time it was used without a stem centraliser. The acetabulum was prepared stepwise by reamers up to a good circumferential fit in the periphery. Remaining cartilage was removed with the aim to preserve the subchondral bone. An additional four to eight holes for fixation were created at either 6 or 10 mm in diameter. The position of the acetabular component was

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aimed at about 40° of inclination in the lateral direction and 10° anteversion. The femoral canal was prepared using curette, rasps, and power reamers to measure for the plug. The polyethylene plugs (Scandimed) were selected 1 mm wider than the diameter of the powered reamer and positioned 1–2 cm distal to the stem tip. Before injection of cement the canal was brushed with high-pressure saline pulsative flow, and the canal was usually packed with gauze until the cement was injected. We used Palacos with Gentamicin, prepared in a “vacuum” mixer syringe (Scandimed), and injected in a retrograde fashion. No compression handle was used during cementation of the acetabulum and for the femur the cement was usually compressed using the thumb before introducing the prosthesis about 3 min after the mixing of the cement. The femoral stem was introduced in 10° of anteversion as measured against the plane of knee flexion and placed in a neutral, slightly valgus orientation with a good contact between the collar and the calcar to make the leg length the same as at the trial reduction before cementation. For all operations a posterolateral approach was used, and patients received Ekvacillin 1–2 g i.v. preoperatively and postoperatively every 6 h for 24 h. Most patients received prophylactic Macroderex 1000 ml i.v. on the day of surgery and the following 2 days. Patients were discharged after 1–2 weeks, depending on living conditions and available help. The mean time in hospital was 14.5 (3–49) days, and the mean time of surgery was 105 (40–243) min.

From November 1984 to February 1988 we performed 244 arthroplasties in 230 consecutive patients; 139 were women and 91 men. The mean age was 77 (46–96) years. By the 10-year follow-up 89 patients (95 arthroplasties) had died and 33 patients (35 arthroplasties) declined to attend, mostly because of other medical problems and old age. The mean age of those who did not attend was 85 years, and many of them were unable to answer the questionnaire. Ten surviving patients (13 arthroplasties), already revised, were also excluded. This left us with 98 patients (101 arthroplasties) for the detailed study. Of these patients 30 had bilateral arthroplasties at the time of follow-up. Bilateral operations were performed in six patients within the period November 1984 to February 1988. Three had one of their hips revised, and those hips were excluded.

At 10 years the patients were summoned for follow-up. All responding patients answered a questionnaire and were examined according to Johnston et al. [4] by a physiotherapist (IW) prior to X-ray examination.

X-ray examinations were evaluated by an experienced radiologist and classified as loose if there was a continuous zone of osteolysis of more than 2 mm in width, migration of more than 5 mm, fractures visible in the implanted material, or a zone visible between cement and metal. If there were no such signs of loosening but focal osteolysis was observed in any area other than the calcar, they were clinically re-examined and evaluated for revision.

Results

Out of 230 patients (244 hips) 98 patients (101 hips) were alive and available for re-examination. The primary diagnosis was osteoarthritis in 166, rheumatoid arthritis in 19, hip fracture sequelae in 56, and idiopathic osteonecrosis in one. In the case of two dead patients medical records were not found. Ten dislocations and four wound infections were encountered postoperatively. We did not register any fractures of the bone nor of the implant. Deep vein thrombosis was documented in four patients.

Seventeen of the 244 operations required revision (Table 1). The two cases with early revision (cases 1 and 2) were infected. One patient (case 4) had a femoral fracture after 5 years just beneath the prosthesis, which made replacement necessary. In case 17 the cup was revised

Table 1 Hips revised within 10 years after ScanHip arthroplasty. *CL* cup loosening, *SL* stem loosening, *BL* both components loose, *RD* recurrent dislocations, *FX* fracture, *OA* osteoarthritis, *RA* rheumatoid arthritis

Case	Age	Sex	Diag.	Yrs to revision	Cause of revision	Parts replaced
1	78	F	FX	1	BL	C+S
2	75	F	OA	4	CL	C
3	56	M	OA	8	CL	C
4	68	F	OA	4	FX	C+S
5	69	F	OA	9	CL	C
6	52	M	OA	9	BL	C+S
7	54	F	OA	6	BL	C+S
8	59	M	OA	9	BL	C+S
9	57	F	RA	4	CL	C
10	64	F	OA	7	CL	C
11	68	F	OA	2	SL	S
12	62	M	OA	8	CL	C
13	66	M	OA	9	BL	C+S
14	51	F	OA	6	BL	C+S
15	40	F	OA	7	CL	C
16	74	F	OA	9	CL	C
17	67	M	FX	4	RD	C

because of recurrent dislocations. These four patients were excluded in the “implant survival” count. Thus, the “implant survival” according to Dobbs [2] was 95% at 10 years.

Clinical evaluation

At the 10-year follow up the mean body weight of the patients was 72.6 (44–107) kg and 21% had a severe limp that obviously affected the gait. One patient was amputated on the operated side and had pain in the stump. All these patients had a Trendelenburg lurch, but only four had a positive Trendelenburg sign. Nine patients could not be tested for Trendelenburg sign in the operated leg. Among the patients with a positive Trendelenburg sign, two had a primary diagnosis of congenital dislocation and had a preoperative limp.

In all, 52% had no or little limp. The degree of limp correlated to the degree of pain ($P=0.005$); 60% (12) of those who had a severe limp took analgesics as compared to 20% of the others. Pain was reported to be severe in 6%, moderate in 31%, slight in 31%, and none in 32%. Twelve percent had continuous pain, 18% always when walking, 20% just after long walks, and 18% only during the first steps after sitting.

Focused analysis was done concerning location of pain into back, hip, or leg. Among those who had the most pain 26% reported that they felt the pain down the thigh, 24% in the back of the thigh, 11% in both the front and back of the thigh, and 13% in the groin. There were no differences with regards to pain between hips with or without radiographic signs of loosening.

Leg length was measured in the supine position from spina iliaca anterior superior to the tip of the medial malleolus. Thirty-three of 65 patients who were operated

unilaterally had a leg-length discrepancy. The mean length discrepancy was 11 mm for shorter legs and 14 mm for longer legs. Only one patient, with a 30 mm difference, considered this to be a problem.

The mobility of the nonoperated hip was compared to the operated hip. Extension deficit (fixed flexion) and maximum flexion, abduction, adduction, and outward and inward rotation were measured. In maximum flexion the mean difference was 7° ($P=0.0001$). The mean differences in mobility concerning extension deficit (fixed flexion), abduction, adduction, inward rotation, and outward rotation were all less than 3°.

Twenty-seven percent of patients reported no difficulties in activities of daily living, 56% some difficulties, and 17% major problems. The mean value for maximal flexion of the hip in patients with major problems was 74° (45–90) against 89° (60–120) among the remaining group. One-third managed to walk normally on stairs, one-third always used a handrail, and 4% could not climb stairs at all. Twenty-three percent used a walking aid outdoors and 20% used one always. The reported mean walking distance per day was 1,300 m (0–8,000). Sixty-three percent of patients said that they had increased mobility after surgery, 90% had less pain than before operation, and 84% used less analgesic. Asked if they were satisfied early after surgery 86% said “yes” and at follow-up 77% were satisfied. At the 10-year follow-up 92% were living on their own and 8% with institutional service.

Radiological evaluation

The X-ray examination at 10 years included AP and lateral hip films and an AP pelvic film. The routine classification showed four additional hips with loosening, and these were revised within 1 year after this study. Another seven had suspected radiographic loosening but declined revision surgery due to paucity of symptoms. On the 10-year X-ray films the wear of the cups was measured by a radiologist to be in average 2.2 mm (SD 0.8) in loose hips and 1.5 mm (SD 0.7) in hips without signs of loosening ($P=0.02$).

Discussion

The cumulative survival rate at 10 years for the ScanHip monobloc prosthesis in our series was 95%, with 13 of 244 hips revised of which only six had stem loosening. This is in accordance with the ScanHip survival rate reported by Kesteris et al. [5] and is comparable to other 10-year results, like the 94% survival rate for the Charnley prosthesis [6] with second-generation technique including cement gun and centraliser. With the cemented Stanmore prosthesis, Deutman et al. [1] similarly reported 95% survival rate whereas Xenos et al. [7] reported only 89% survival rate with the uncemented PCA prosthesis.

Among the revisions we had one fracture in a patient without loosening, one with five current dislocations, and two with infections. These were excluded as unrelated to the type of implant in our survival analysis for revision because of aseptic loosening.

Function is difficult to evaluate, especially in elderly patients with poor general health. There is a special problem with senile patients since they are unable to answer a questionnaire in a reliable way. Most patients that did not show up were senile, according to their relatives. It was not possible to use the Harris Hip Score to describe function, as it had not been used in pre- or early postoperative records.

Discrimination of pain areas was used in an attempt to see if patients with loosening felt pain in a special way. With regard to pain areas, limp, daily walking, and patient satisfaction, we found no specific pattern in patients with loosening as compared to those without. The patients with loosening (mean age 76 years) reported 2000 m mean walking distance as compared to 1200 m in the others (mean age 77 years).

In accordance with our results the latest report from the Swedish national registry [3] finds a 10-year implant survival of 94% with the ScanHip, 93% with the Charnley prosthesis, 94% with the Stanmore prosthesis, and 97% with the Lubinus SP prosthesis. We confirmed that all of our revised cases had been reported to the Swedish national registry.

There was no correlation between dissatisfaction and loosening visible on X-ray at follow-up. Thus, we recommend scheduled X-rays to detect osteolysis and, in case of radiological signs of loosening, a clinical examination at 10 years.

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