We reviewed 80 patients (87 hips) who were older than 80 years of age at the time of cementless total hip arthroplasty. An Alloclassic SL stem had been implanted in all patients. A variety of cementless acetabular components was used. After a mean follow-up of 69.3 months (39.2 to 94.1) 48 hips in 43 patients were analysed clinically and radiologically. One patient had sustained a traumatic periprosthetic fracture of the femur with subsequent exchange of the stem 73 months after operation. Thirty-two patients (34 hips) had died and five patients (five hips) were unavailable for follow-up because of health reasons (four patients) or lack of co-operation (one patient). If the endpoint is defined as removal of the prosthesis because of aseptic loosening, the survival rate was 100% for the cup and stem after 78 months. The mean Harris hip score was 81.9 points. Radiolucent lines and osteolysis were seldom found.

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There have been many studies on total hip arthroplasty (THA) in young patients. Little is known, however, about THA in older people. Most published data on THA in the elderly focus on cost-effectiveness and economic consequences. As far as we are aware only a few reports deal with both the clinical and radiological results of THA in an elderly population. Our aim was to assess the clinical and radiological results of cementless THA in patients aged at least 80 years at the time of surgery.

Patients and Methods

We studied 80 patients (87 hips) who had received a cementless THA between 1992 and 1996. All patients had been aged over 80 years at the time of surgery. Seven had undergone a bilateral THA. In all patients an Alloclassic SL (Centerpulse, Winterthur, Switzerland) stem had been implanted. The cups were also cementless and consisted of the following designs: 48 (55.2%) Alloclassic CSF (Centerpulse), 32 (36.8%) Allofit (Centerpulse), 4 (4.6%) Aesculap (Aesculap, Tuttingein, Germany) and 3 (3.4%) Harris-Galante (Zimmer, Warsaw, Indiana). There were 25 men and 55 women with a mean age at surgery of 82.9 years (80.2 to 91.5). Forty-eight hips in 43 patients were examined clinically and radiologically at a mean follow-up of 69.3 months (39.2 to 94.1; SD 14.3). Thirty-two (34 hips) had died and could not be reviewed. For those who had died the mean time between surgery and death was 44.5 months (0 to 93.3). With the exception of one patient, who had had further surgery for excision of a fistula because of deep infection, the prostheses were in situ until the patients' death. Five patients (five hips) were not available for follow-up because of health reasons (four patients) or lack of cooperation (one patient). They were interviewed by telephone and in all the prosthesis was still in situ. For the remaining 48 patients, 47 prostheses were still in situ at the time of follow-up. In one patient the stem had to be removed because of a periprosthetic fracture of the femur. The indications for THA for these hips were: primary osteoarthritis (44 patients, 93.6%), femoral head necrosis (two patients, 4.3%) and post-traumatic arthritis (one patient, 2.1%). The clinical and radiological outcome for this group of 47 hips was also statistically assessed.

The clinical results were assessed using the Harris hip score (HHS). This was undertaken both before operation and at follow-up. For the radiological assessment, weight-bearing in the anteroposterior (AP) as well as in the axial position was performed. When assessing radiolucent lines at the implant-bone interface, osteolysis and bone remodelling on the AP view, Gruen’s classification for the stem, and DeLee and Charnley’s classification for the cup, were used. On the axial view the further classification of Zweymüller and Samek was used. Heterotopic ossification was assessed by using the classification of Brooker et al.
Indomethacin was used routinely as prophylaxis against heterotopic ossification. The Kaplan-Meier survival rate was calculated for all implanted prostheses, the two endpoints being aseptic loosening or revision for any reason. Calculations were stopped when fewer than 20 patients were at risk.

Results

Clinical results. Before operation, the mean HHS for the 47 hips was 31.5 (5 to 75; sd 14.4). At follow-up it was 81.9 (48 to 100; sd 14.8), an increase of 50.4 points. At the time of follow-up 21 patients had an HHS <= 80. For these patients the bad result could be related to poor general health. Before operation, four (8.5%) patients suffered moderate pain, 38 (80.9%) severe and five (10.6%) very severe pain. At the time of follow-up 40 patients (85.1%) were free from pain, five (10.6%) had minimal pain and two (4.3%) slight pain. In regard to satisfaction with the result, two patients (4.3%) were mainly satisfied and one with bilateral THAs (4.3%) partially satisfied. All the other patients were very satisfied. All surviving patients except two stated that the operation had improved their quality of life. One was undecided and one patient with bilateral THAs had shown no improvement.

Radiological. Heterotopic ossification was found in 20 hips (42.6%). Thirteen (27.7%) were in Brooker class I, two (4.3%) in class II, four (8.5%) in class III, and one (2.1%) in class IV. Twenty-seven hips (57.5%) showed no heterotopic ossification.
Radiolucent lines and osteolysis were found in only a few patients (Fig. 1). Bone atrophy (Fig. 2) was common in the proximal stem zones, but infrequent in the distal stem zones (1 to 14) and around the cup (1 to VI) (zone 1, 28 (59.6%); zone 2, 22 (46.8%); zone 3, 15 (31.9%); zone 4, 3 (6.4%); zone 5, 8 (17.0%); zone 6, 10 (21.3%); zone 7, 16 (34.0%); zone 8, 14 (29.8%); zone 9, 5 (10.6%); zone 10, 1 (2.1%); zone 11, 0 (0.0%); zone 12, 0 (0.0%); zone 13, 5 (10.6%); zone 14, 11 (23.4%); zone I, 2 (4.3%); zone II, 1 (2.1%); zone III, 1 (2.1%); zone IV, 2 (4.3%); zone V, 2 (4.3%); zone VI, 1 (2.1%)).

There was no correlation between the size of the stem and bone atrophy (Spearman rank correlation, p > 0.05).

Eleven stems (23.4%) showed bone apposition at the tip of the prosthesis (medial, four patients (8.5%); lateral, three patients (6.4%); medial and lateral, three patients (6.4%)). No cup or stem showed radiological signs of loosening (Fig. 3).

**Complications**

**Intraoperative.** A major haemorrhage occurred intraoperatively in two patients, in one of whom a screw damaged the external iliac vein and surgical repair was undertaken. One acetabular fracture and one femoral fracture also occurred.

**Postoperative early.** Two patients died perioperatively, one from necrotising enteritis, and one from cardiac failure. The indications for THA in these patients had been fracture of the femoral neck and traumatic loosening of a dynamic hip screw, respectively. Deep infection occurred in two patients and superficial infection in four. In one patient with a superficial infection drainage was necessary in addition to antibiotic treatment. In one patient with a deep infection excision of a fistula with additional exchange of the femoral head and liner was undertaken one month after operation. This was not registered as a failure. Two dislocations occurred after operation. Both were treated by closed reduction. One patient with osteoporosis sustained a traumatic periprosthetic fracture of the femur, which was treated by internal fixation. This patient required two further operations, however, because of loosening of the fixation devices.

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**Fig. 3**

Radiograph showing good bony integration of the cup and stem 61 months after operation.

**Fig. 4**

Survival curve showing that the survival rate is 94.3% after 78 months, if revision for any reason is taken as endpoint (95% CI: 73.9 to 99.4).
Late. One further patient sustained a periprosthetic fracture of the femur, which was treated in another hospital by exchange of the stem 73 months after operation. Recurrent dislocations followed and closed reduction was required on several occasions. No aseptic loosening of either the stem or the cup occurred. Taking revision due to aseptic loosening as the endpoint, the survival rate was 100% after 78 months. If revision for any reason is taken as the endpoint, the survival rate was reduced to 94.3% (95% confidence interval) 73.9 to 99.4; Fig. 4).

Discussion

Since patients over 80 years of age have a limited life expectancy, in most publications about THA in an elderly population either the time of follow-up or the number of surviving patients is small.16,28,29 In our study 47 hips with a cementless THA were analysed after a mean follow-up of 69.3 months.

Comparison of the mean preoperative HHS (31.5 points) with that at follow-up (81.9 points) showed an improvement of 50.4 points, demonstrating the positive effect of THA even in an elderly population whose general health may be poor. With the exception of two patients, all reported a dramatic improvement. These results compare favourably with those of cemented THA in the elderly. Ekelund et al.29 reported good or excellent results at follow-up of one year using cemented Charnley THA in 88% of their patients who were more than 80 years old. In a similar population, Newington, Bannister and Fordyce30 reported a satisfactory outcome in 75% with different types of cemented prosthesis. Using the cementless AML prosthesis (DePuy, Warsaw, Indiana) and Perfecta implant (Orthomet, Wright Medical, Memphis, Tennessee), Konstantoulakis et al.17 found a mean HHS of 95 points in patients who were aged at least 65 years. The survival rate of 100% at 78 months with aseptic loosening as the endpoint in our study confirms that cementless THA gives excellent results in elderly patients.

The high rate of complications, with two patients dying in the postoperative period, was expected. For both patients the indication for THA was previous trauma. High rates of dislocation have been reported, ranging from 2% to 15%. In our study two of 87 THAs (2.3%) had a dislocation. Lax capsule structures, weak musculature, impaired proprioception and insufficient experience of the surgeon are possible causes.16,18,28,31

In earlier studies of the Alloclassic SL stem there was a high prevalence of radiolucent lines, osteolysis and bone atrophy in the proximal Gruen zones. These changes were rarely found more distally. By contrast, bone apposition has been found particularly around the tip of the prosthesis.32-35 In our series the pattern was the same, although proximal atrophy was more common. This did not alter the clinical outcome.

While the clinical benefit of THA in an elderly population has been established by others,36 the question as to whether it is cost-effective remained unanswered.12,14-16 Since the mean life expectancy for an 80-year-old woman in Austria is 8.3 years and for an 80-year-old man 7.1 years,37 proper treatment of severe pain in the hip is appropriate. This can be achieved by THA. We therefore emphasise that cementless THA in the elderly is a reliable form of treatment of degenerative joint disease. It gives good results and should not be withheld.

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References