

WEAR OF THE POLYETHYLENE HEAD OF THE OSCOBAL PROSTHESIS

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Ten hemiarthroplasties were performed with the Oscobal (Daubenspeck) hip prosthesis, which consists of a metal stem and a non-rotating polyethylene head. Five patients died 1-150 days after the operation. Signs of massive wear of the polyethylene head were demonstrated in four out of the five patients still alive 16-28 months after the operation. We can therefore not recommend the Oscobal system for hemiarthroplasty of the hip.

Key words: femoral neck fractures; surgery; Oscobal prosthesis; wear of polyethylene head

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The most suitable primary treatment for displaced femoral neck fractures and the complications involved is still the subject of a lively debate. Kavlie et al. (1975) found the Christiansen endoprosthesis to be a very good alternative to nailing, and Johnson & Crothers (1975) noted fewer failures after replacement with the Moore prosthesis than after nailing. Salvati et al. (1974), however, concluded that the best long-term results were still attained by the method that promoted healing of the fracture while preserving the patient's own viable femoral head.

For many years in this hospital we have used the Thompson or the Moore prosthesis but only on the basis of relatively limited indications. However, we wanted a system that could be used equally well for partial and total hip replacement, and in 1973 we decided, somewhat arbitrarily, to try the Oscobal (Daubenspeck) prosthesis.

MATERIALS AND METHOD

The Oscobal total hip prosthesis consists of three parts (Figure 1):

1. The standard stem is made of a cobalt-chromium-molybdenum alloy. A conical plug holds the interchangeable head piece and four retaining slots prevent the head rotating.
2. The head is manufactured from high molecular weight polyethylene in various sizes (38-54 mm) with various lengths and angulations of the collum.
3. The acetabular cup is made of the same alloy as the stem.

The approach for insertion of the prosthesis is determined by the preference of the surgeon. Acrylic cement is used for fixation of the stem after reaming of the medullary canal, and also for fixation of the acetabular cup.

The femoral head removed from the acetabulum is measured, a provisional head is selected accordingly and the size is checked directly in the acetabulum. In order to keep the load per unit surface to a minimum the largest head able to enter the acetabulum is used.

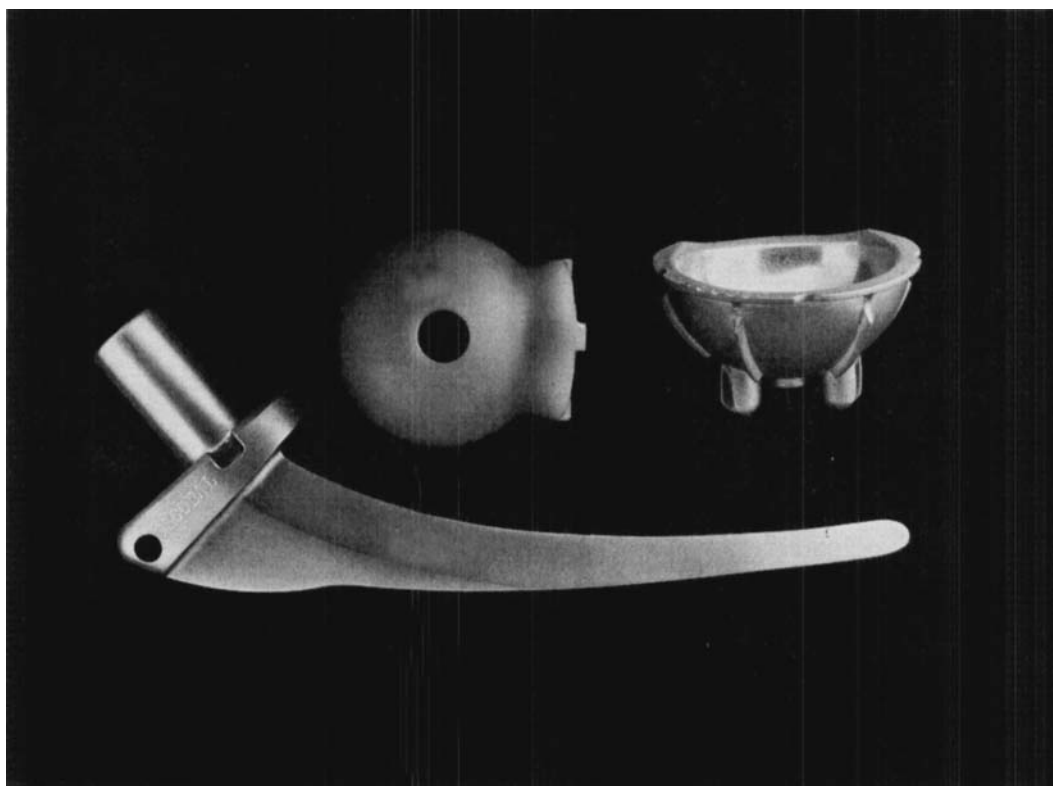


Figure 1. The Oscobal (Daubenspeck) total hip prosthesis: Provisional head with standard stem and cup.

RESULTS

Over a 16-month period ten hemiarthroplasties with the Oscobal prosthesis were performed; all were female patients and the indications are outlined in Table 1. The mean age at operation was 83 years (range 73–94). After only 19 months we had to replace the first head piece due to abrasion, and as we had received reports of the same complication from the manufacturer, we decided to discontinue the use of this prosthesis for the time being and to review the previous cases.

In five patients an antero-lateral and in five patients a postero-lateral approach had been chosen. No remodelling of the acetabulum had been necessary. All operations except one were uneventful. Postoperative X-rays were satisfac-

Table 1. Indications for operation.

Elderly and weak patients	
with severely displaced fractures	6
Primary nailing with later dislocation	3
Aseptic necrosis of the femoral head	
after nailing	1
Total	10

tory in all patients, showing the prostheses to be in their proper place and no fractures of the femoral shaft to have occurred. Hence, unrestricted weight-bearing was permitted within a few days. From the time of admission all patients received low dose heparin thromboprophylaxis (5000 IU subcutaneously every 12 hours).

Following the operation five patients

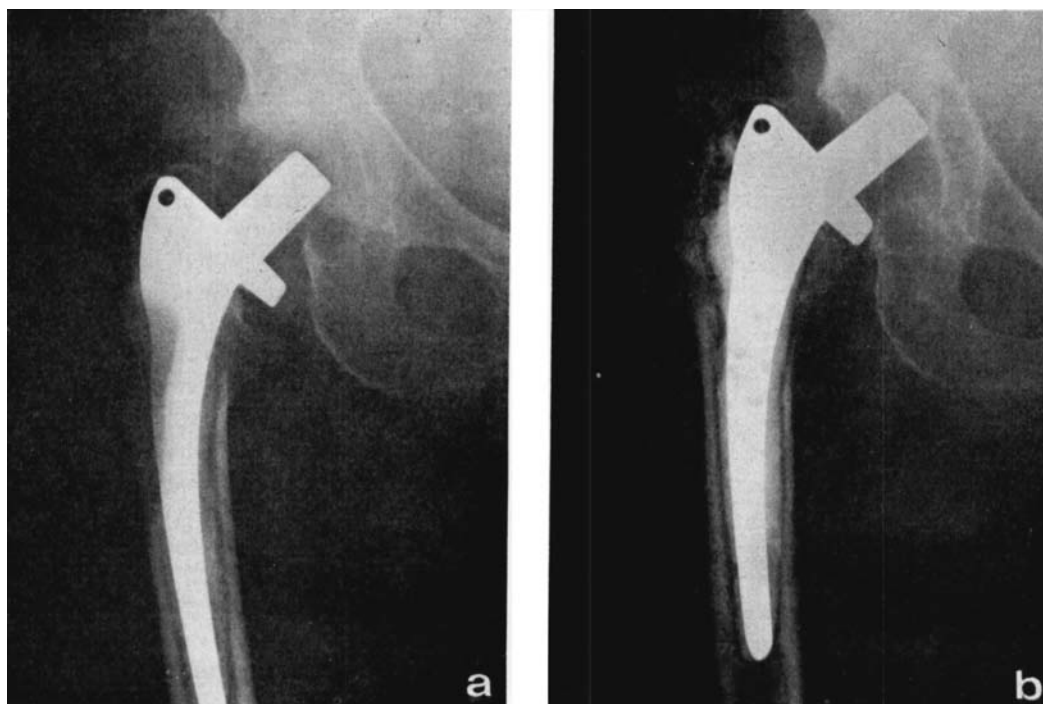


Figure 2. X-rays of the same hip taken 19 months apart. Note reduced distance between the prosthetic neck and the acetabular floor.

died, two of them in this hospital. One patient died 24 hours after the operation. She had a marked drop in blood pressure (from 180 to 100 mmHg systolic) during and after operation, and ECG showed ischaemic changes. The other patient fell out of bed 2 months after the operation and sustained a supracondylar fracture of the operated femur. She remained in traction until she died 150 days after the arthroplasty. Autopsy was not done in either of the cases.

The other three patients died 45, 47 and 60 days after the operation. At that time they had left the hospital, and the causes of death are not known.

The remaining five patients were re-examined 16–28 months after the arthroplasty. At that time all of them needed various forms of walking support, experiencing some discomfort in the hip.

In all the patients there were roentgenological signs of osteolysis around the cement, and in four patients the distance between the neck of the prosthesis and the acetabular floor was reduced, indicating wear of the prosthetic head (Figure 2). In one patient this was noted as early as 16 months after the operation. The only patient in whom roentgenological signs of wear were still absent had an almost immobile hip joint, because of voluminous periarticular calcification 1.5 years after arthroplasty.

So far two patients have been reoperated, and a marked abrasion of the polyethylene head has been found (Figure 3). Macroscopically the acetabular cartilage seemed intact, but the capsule was thickened, and the joint contained an excess of serous fluid. Necrotic-appearing tissue was found around the proximal part of the stem, and in one case the stem was

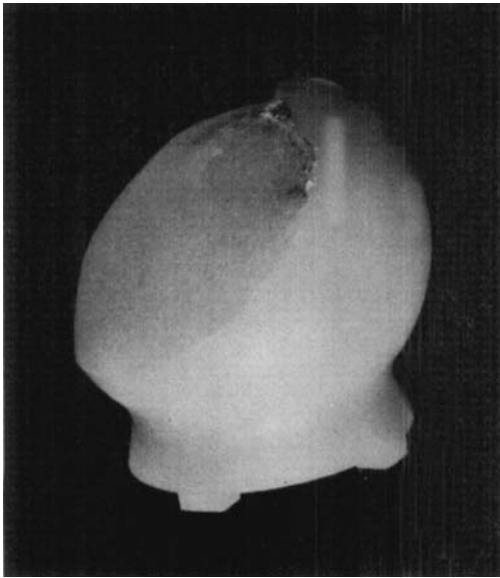


Figure 3. Polyethylene head removed 19 months after hemiarthroplasty.

loose. Cultures were negative, and histological examinations showed bone, cartilage and fibrous tissue with a massive foreign body reaction.

DISCUSSION

The advantage of the Oscobal prosthesis is that the head piece is easily interchanged. By subsequently adding a standard cup an existing replacement femoral head can be expanded to a complete total hip joint replacement, without having to remove the standard stem from its position. In order to ensure the desired sliding motion between the inner cup surface and the head surface, the femoral head is prevented from rotating by cams in the stem.

According to the manufacturer, the special Oscobal femoral head mounting results in less wear than the rotating mounting of a head on a small diameter plug. In total prostheses Scales (1973) also found it preferable to have a simple ball and socket type of joint, since there is a risk that undue wear of the com-

ponents can occur when the ball is designed to rotate on an axle. In Weber's rotation-endoprosthesis for total hip replacement, however, the rate of wear in the cylindrical hole of the rotation ball has been greatly reduced thanks to an optimized surface treatment of the AP polyester. After more than 2 years use minimal wear was noted only in the cylindrical hole as a widening of the boring near the apex of the trunnion, while the original geometry of the joint was maintained (Weber & Semlitsch 1973).

Willert (1973) stated that products of wear can be found consistently, but in varying quantities, in the periarticular tissues of arthroplasties using plastic components. Kavlie et al. (1975) found, in some cases, considerable abrasion of the plastic head of Christiansen rotation hemiprosthesis. This problem has apparently been eliminated following the coating of the head with a thin steel cap (introduced in 1968).

Abrasion of the surface of the head usually occurs when the head is too small or the acetabulum has not been properly remodelled. In all the patients in the present material the head initially fitted very well into an intact acetabulum. We have found strong correlation between abrasion of the head and roentgenological signs of osteolysis of the stem. Reasons for osteolysis might be micromovements of the stem from friction due to abrasion of the head piece and a foreign body synovitis (Kavlie et al. 1975, Christiansen 1974). Other authors have discussed thermal necrosis and subsequent bone resorption (e.g. Feith 1975) and metal toxicity (e.g. Jones et al. 1975) as causes of symptoms after arthroplasties.

The high mortality rate in this age group is not unexpected (Mikkelsen & Langholm 1964). In the present material a definite selection has been made of frail and elderly persons.

The patient material is small, and the observation period short, but still the rather uniform results illustrate clearly that the Oscobal system should not be used for hemiarthroplasty of the hip, because of the risk of considerable abrasion of the polyethylene head.

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