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SEPARATION OF THE CHRISTIANSEN PROSTHETIC COMPONENTS FOLLOWING DISLOCATION OF HEMIARTHROPLASTY FOR HIP FRACTURE

BJARNE NUE MØLLER

Department of Orthopaedic Surgery, Municipal Hospital, Århus, Denmark

During the period from April 1980 to July 1982 a total of 148 patients with acute femoral neck fractures had primary hemiarthroplasties with the Christiansen trunnion-bearing endoprosthesis. Dislocations occurred in six patients (4 per cent). Five of these required reoperation due to separation of the femoral head in relation to the stem or of the plastic head and the metallic cap of the prosthetic head.

Key words: failure of endoprosthesis; femoral neck fracture; hip arthroplasty.

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In hemi-arthroplasty for displaced femoral neck fractures the Moore endoprosthesis is widely used. However, several reports have pointed out failures of this device (Riska 1971, Lindholm 1976, Meyer 1981), and new types have been introduced. The Christiansen (1969, 1974) endoprosthesis differs from the Moore in having a joint which allows flexion and extension to occur between the stem and the head. This device carries the risk of separation of the prosthetic components (Solhaug 1976).

This is a report of six cases of postoperative dislocations of the Christiansen endoprosthesis four of whom required reoperation after the prosthetic components had separated.

Table 1. Patients with dislocation following primary Christiansen hemi-arthroplasty for fresh intracapsular hip fracture

Patient No.	Age	Time between operation and dislocation	Type of dislocation	Treatment	Final result
1	92	10 days	total, then tap joint	reoperation	dead
2	86	6 weeks? (see text) ·	tap joint	reoperation	dead
3	76	2 days	tap joint	reoperation	acceptable
4	84	13 days	total	closed reduction + adductor tenotomy	dead
5	74	14 days	total ×5	closed reduction×5, total arthroplasty	acceptable
6	85	5 days	plastic head-metallic cap	reoperation	acceptable

PATIENTS AND METHODS

A total of 148 patients with acute femoral neck fractures were treated by primary prosthetic replacement in the period from April 1980 to July 1982, using the Christiansen trunnion-bearing endoprosthesis.

The prosthesis was inserted through a posterior approach and cement fixation was used. The lateral rotators were sutured but not always the capsule. Until muscle tone was completely regained after the anaesthesia, abduction was maintained by means of a special pillow between the knees. Full weight-bearing was allowed from the fifth day.

Observations (Table 1)

During the initial 3 months after the operation, dislocations were observed in six patients. The dislocations usually occurred within 2 weeks after the operation. One dislocation (patient 2), in a mentally ill patient, was discovered by routine X-ray at 6 weeks.

The dislocations were treated by attempts at closed reduction followed by traction through the tibial tuberosity for 3 weeks. However, in one case (patient 1) the attempt was followed by separation of the tap joint, requiring reoperation (Figure 1). Dislocation of the tap joint occurred in two additional patients (patients 2 & 3), and closed reduction was impossible due to separation of the plastic head and the metallic cap in patient 6 (Figure 2 A). In fact, closed reduction was successful in only two patients (patients 4 & 5). In one of these (patient 5), repeated dislocations of the prosthesis occurred (Figure 3), and a total arthroplasty was finally performed.

At 3 months, three of the dislocating, reoperated patients had died from pulmonary complications and heart failure. Two patients were using a walker, but had no complaints. Both had slightly decreased motion of the affected hip. The last patient had acceptable function after a total arthroplasty.

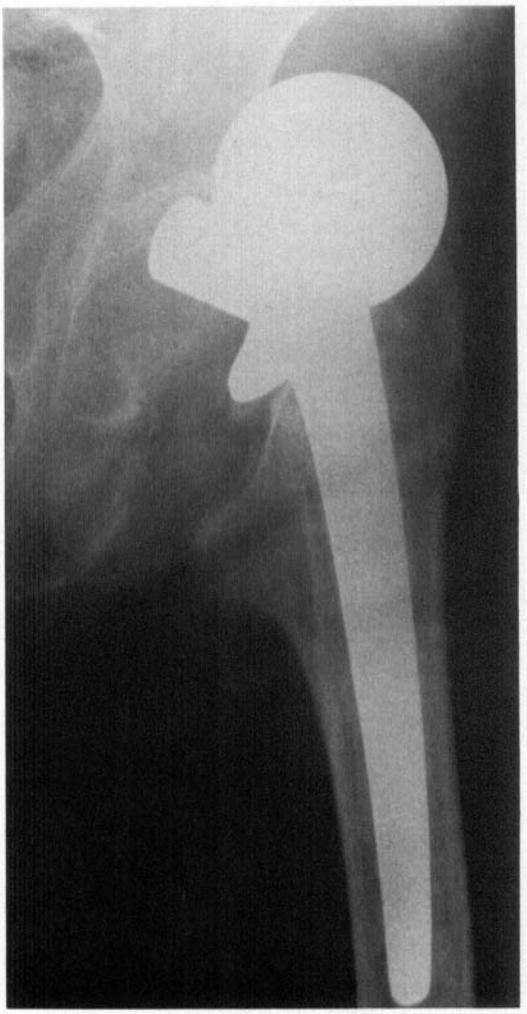

Figure 1. Separation between the head and the stem of the Christiansen endoprosthesis in patient 1.

DISCUSSION

The first femoral head prosthesis introduced by Christiansen in 1965 consisted of a shaft made of stainless steel connected through a trunnion-bearing with a plastic head piece (Christiansen 1969). Due to abrasion of the plastic head with deformation and secondary reactive synovitis, the head was equipped with a firmly attached steel cap. With these two types of prostheses Kavlie (1975) reported a frequency of dislocation of 2 per cent in 300 cases; no details of the type dislocation were given.

The risk for dislocation seems to be greatest during the first weeks after the operation. Suturing of the joint capsule was performed in only 2 patients; as stressed by Kavlie (1975) suturing the capsule and the lateral rotators is important for stability.

A disadvantageous feature of the Christiansen endoprosthesis is that interchangeable lengths of the head and neck components are not available. This means that optimal tightness of reduction can be obtained only by adjusting the length of the femoral neck, which may be difficult due to the location of the fracture. Dividing the femoral

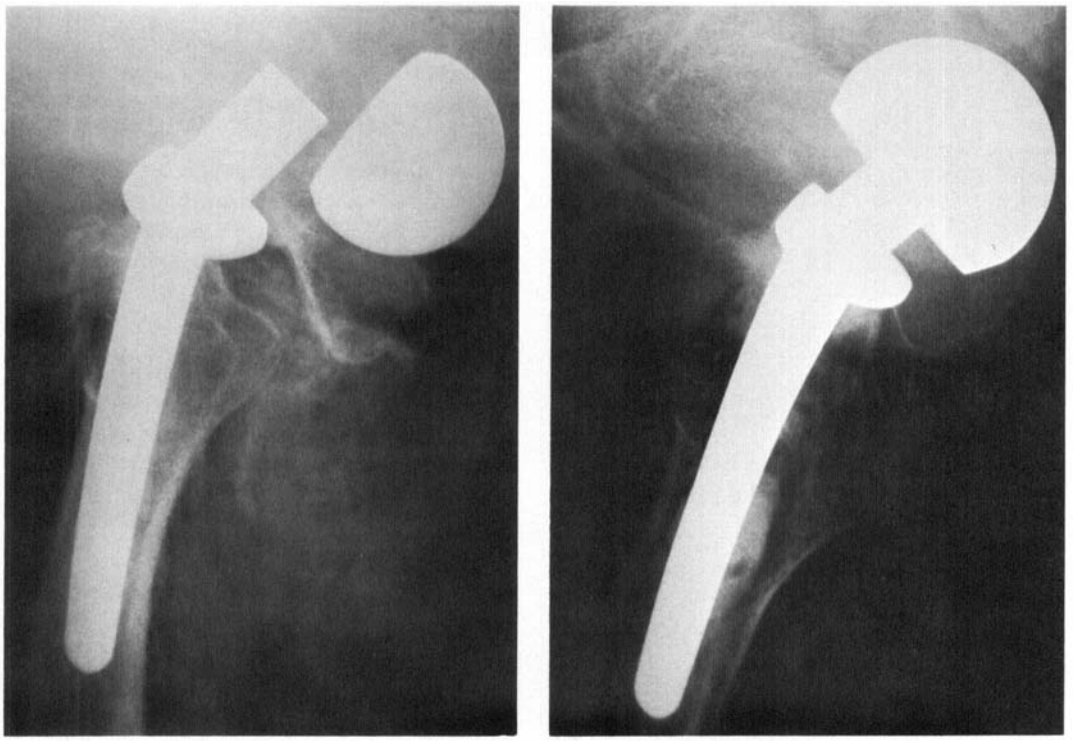

Figure 2. A, Separation between the two head pieces of the Christiansen endoprosthesis in patient 6. The metallic cap was totally separated from the plastic head, which was firmly attached to the tap. B, After open reduction of the endoprosthesis the tap joint threatens to separate.

neck close to the lesser trochanter in a patient with decreased muscle tone (Figure 2 B) may create a potential risk for dislocation, especially in cases where the metallic cap is firmly attached to the acetabulum.

Tenotomy of the hip-adductors was performed in only one patient. However, the adductors should always be checked after insertion of the prosthesis, and if the range of abduction is decreased due to contracture of the adductor muscles of the hip, tenotomy of the adductors should be performed. Our patient 5 had a long standing contracture of the hip which probably was the reason for the repeated dislocations. Total arthroplasty was finally performed as recommended by Ahlgren & Lemperg (1974) in cases with obvious contracture of the hip.

Since 1973 the Christiansen endoprosthesis has been modified; the current type has a plastic head separated from the steel cap. This modification is supposed to permit some degree of movement between the head and the cap (Christiansen 1974). However, with this modification another type of dislocation is possible, as first described by Solhaug (1976) who reported two cases in which separation of the two components of the prosthetic head occurred.

A clot of blood, occurring in the space between the plastic head and the tap was found in the patient with separation of the plastic head and the metallic cap. It is possible that this clot may produce a one-way valve mechanism through the hole in the bottom of the plastic head, thus pumping the head out of the cap. For this reason, both parts of the head should be replaced with a new piece at the reoperation. Another possibility would be a tight fit between the metallic cap and the acetabulum, resulting in a binding of the

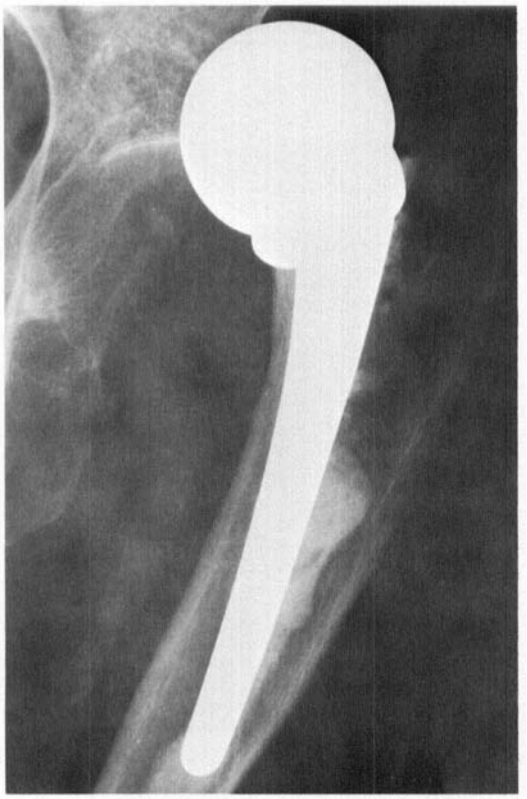

Figure 3. Total dislocation of the Christiansen endoprosthesis in patient 5 who had long standing contracture of her hip.

metallic cap, which under certain circumstances could cause a dislocation between the head piece and the cap or a separation of the tap joint.

To reduce the risk of separation, one could suggest a firm attachment between the metallic cap and the plastic head. Furthermore, a lock mechanism of the tap joint, without interfering with the function of the trunnion, probably would prevent dislocation in this connection.

The frequency of dislocations are comparable with that of the Moore prostheses (Lindholm 1976, Meyer 1981), but as special complication, separation of the femoral head in relation to the stem or of the plastic head and the metallic cap can occur. Though uncommon, this is a serious complication, as closed reduction is impossible, and a reoperation in this advanced age group carries considerable risk. These complications are, in our opinion, a clear disadvantage of this type of endoprosthesis and should be taken into account when choosing the type of prosthesis for hip replacement.

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Correspondance to: Bjarne Nue Møller, M.D., Harald Kiddesvej 44, DK-8230 Åbyhøj, Denmark.