Acta orthop. scand. 48, 296–300, 1977

ENDOPROSTHESIS AS TREATMENT FOR NECROSIS AND PSEUDARTHROSIS AFTER TRANSCERVICAL FEMORAL FRACTURES

A Clinical Review

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This report concerns 105 patients who developed painful necrosis or pseudarthrosis after nailed transcervical femoral fractures and were treated by Moore's arthroplasty. The mean age at the time of secondary arthroplasty was 68 years, the operation being performed on average 2 years after the fracture and nailing. The mortality within 6 weeks of operation was 3 per cent. Complications not producing late sequelae were seen in 11.4 per cent of cases, and complications producing late sequelae occurred in 5.7 per cent. At the follow-up examination 2 to 8 years after arthroplasty (mean 3.7 years), 37 per cent of the patients were completely free from pain, and the functional result was acceptable in 91 per cent. The remaining 9 per cent had other debilitating illnesses. The results are compared with other reports in the literature.

Key words: femoral neck fractures; pseudarthrosis of femoral neck; necrosis of femoral head; hip joint; joint prosthesis; arthroplasty; postoperative complications; follow-up studies

Accepted 1.iii.77

According to many reports, the reduction and nailing procedure for fracture of the femoral neck is followed by complications in up to 50 per cent of cases (Tillberg 1976). Pain is not always present despite pseudarthrosis or necrosis of the femoral head, and some authors claim that only about half of these patients suffer any discomfort (Hierton et al. 1965). Thus roughly one patient out of every four with a nailed femoral neck complains of symptoms requiring further treatment (Johansson 1964). The usual management is hemiarthroplasty using a Moore or Thompson endoprosthesis. Many reports have appeared of the late results of arthroplasty in general, but little has been published solely on the subject of secondary arthroplasty.

PATIENTS AND METHODS

During the period 1963–1968, 105 patients with pseudarthrosis or necrosis of the femoral head, after nailing of femoral neck fractures, were treated by arthroplasty at the Orthopaedic Hospital, Härnösand, Sweden (Table 1). The patients were referred from several general surgical clinics, and the true incidence of complications among the total number of femoral neck fractures could therefore not be calculated. The age distribution of the patients at the time of hemiarthroplasty is given in Figure 1.

The indications for arthroplasty were excruci-

ating pain on weight-bearing and night-pain, disturbing sleep. The incidence of slipped nail, pseudarthrosis, and necrosis of the femoral head is shown in Table 2. The group 'slipped nail' includes early complications where pseudarthrosis or necrosis of the femoral head could not be confirmed by x-ray, whereas 'pseudarthrosis' includes later complications with no signs of necrosis of the femoral head. The group 'necrosis of the femoral head' includes patients with x-ray signs of necrosis, and also some with both necrosis and pseudarthrosis. The incidence of late sequelae after nailing according to Pauwels' grouping (Pauwels 1935) is shown in Table 3.

Table 1. One hundred and five patients treated by Moore arthroplasty because of late complications of nailing.

Age (years)	mean	68
	range	44–87
Sex	women	89
	men	16
Side	right	55
	left	50
Follow-up time (years)	mean	3.7
	range	2–8

Table 2. Indications for Moore arthroplasty.

	No. of patients
Slipped nail	10
Pseudarthrosis	41
Necrosis of femoral head	54
Total	105

Table 3. Classification of the patients according to Pauwels' groups.

Group	I	II	III
Slipped nail and pseudarthrosis	0	16	35
Necrosis of femoral head	0	22	32
Total	0	38	67

Moore's self-locking prosthesis was employed in every case, using Moore's southern-approach technique (Moore 1957). The femoral neck was divided at the appropriate angle, when possible one cm above the lesser trochanter in order to avoid shortening the leg. The capsule and lateral rotaters were also sutured. To start with, the patient was kept in bed for a week after operation. As more experience was gained, weight-bearing and physiotherapy including walking exercises were started the day after operation. The patient was discharged from hospital as soon as everyday activities were possible, or on average 5 weeks after operation (range 3–12 weeks). Fifty-eight patients remained in hospital for less than 6 weeks.

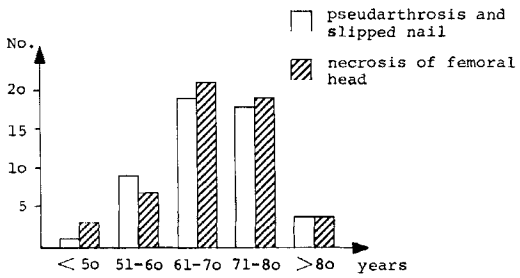

Figure 1. Age distribution.

Of the 105 patients operated upon, three died within 6 weeks of operation. Subsequently, a further 15 patients died from causes unrelated to the operation. Thus, at the time of review, 87 patients were available and all were clinically examined by the author 2 to 8 years after operation (Table 1).

RESULTS

Complications during and after operation are shown in Table 4. The figures for postoperative mortality (3 per cent) refer to all patients dying within 6 weeks of operation. Other complications are subdivided into those producing and those not producing late sequelae. The former necessitated removal of the prosthesis in two patients because of deep infection. Mechanical loosening accompanied by pain occurred in four patients, after 18 months to 2 years, and they were successfully treated with a McKee-Farrar prosthesis.

The interval between nailing and arthroplasty for the whole group was, on average, 24 months (range 4–120 months). For slipped nails the delay

averaged 5 months, for pseudarthrosis 21 months, and for the group 'necrosis of the femoral head' 29 months. During this period most of the patients had experienced a great deal of pain and discomfort, and had needed hospital care most of the time.

Table 4. Postoperative complications.

		No.	Per cent
Mortality		3	3
Cardiac	2		
Pulmonary	1		
No late disability		12	11.4
Fracture during operation	3		
Postoperative dislocation	1		
Clinical thromboembolism	3		
Haematoma	3		
Superficial infection	1		
Cardiac infarction	1		
Late disability		6	5.7
Deep infection	2		
Separation of prosthesis with pain	4		

Table 5 shows the incidence of pain at the time of review. Thirty-seven per cent of patients were free from pain. Intermittent pain on weight-bearing means slight or moderate pain after walking several hundred metres. Intermittent spontaneous pain means pain at rest not disturbing sleep, sometimes claimed to be caused by a change in the weather.

Before the hemiarthroplasty none of the patients were able to work, and many needed institutional care. The patients' occupations or activities at the time of the follow-up examination are given in Table 6. Of the 87 patients, 57 were old-age pensioners, so their only work was household duties or taking care of themselves, even though some would have been capable of more. Eight were in nursing homes; six because of senile dementia or cerebral lesions, one with rheumatoid arthritis, and one with multiple sclerosis.

The ability to climb a staircase and to put on shoes and stockings is shown in

Table 5. Pain at time of follow-up examination.

	Pseudarthrosis	Necrosis of femoral head	Total per cent
No pain	18	14	37
Intermittent on weight-bearing	11	20	36
Intermittent spontaneous	9	8	20
Severe pain	3	4	7
Total	41	46	100

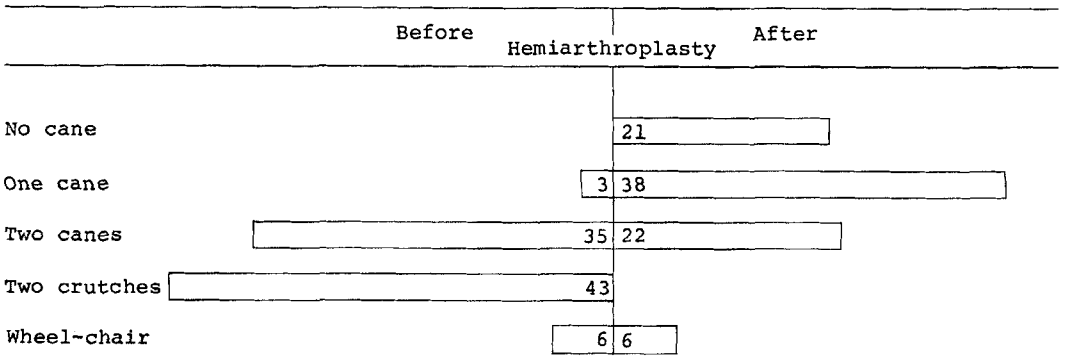

Figure 2. Mobility.

Table 7. The unaided walking capacity before operation and at follow-up is shown in Figure 2. Many of those using one stick did so because of the surgeon's recommendation. All wheel-chair patients had other incapacitating diseases.

Table 6. Occupations.

	No.
Heavy work	5
Household work	42
Daily activities	32
Institutional care	8
Total	87

Table 7. Activities of daily living.

	Yes	With some difficulty	No
Climbing stairs	49	25	13
Putting on shoes and stockings	59	19	9

DISCUSSION

The late results of hemiarthroplasty have been dealt with in many reports, but most investigations have been concerned with mixed series comprising both primary and secondary arthroplasties. The results reported here are worse than those in mixed series (cf. Beck 1968 and Furey et al. 1961 who both report good results in 82 per cent) and still worse than the results of primary arthroplasty (Hinchey & Day 1964, Riska 1971, Tillberg 1976). The results of hemiarthroplasty for necrosis of the femoral head reported here compare well with the poor results reported in cases of coxarthrosis (Apley et al. 1969, Andersson et al. 1964). Osteoarthrosis develops sooner or later after pseudarthrosis and especially after necrosis. After 2 years, or at about the time the lesion can be seen on x-ray, 30 per cent of hips with necrosis of the femoral head have developed arthrosis (Böhler & Ender 1953). It thus seems that when a long interval has passed between the primary fracture and the arthroplasty, total arthroplasty is to be preferred, especially when necrosis of the femoral head is present. The state of acetabular cartilage should be carefully inspected at operation in every case, and if some defect is discovered a total prosthesis probably should be inserted.

Under certain circumstances hemiarthroplasty should be the primary treatment of femoral neck fractures (Lunceford 1965, Riska 1971, Tillberg 1976). Of the 105 patients in this series, 45 were over 70 years of age, and, as Barnes (1970) has reported, the rate of non-union closely parallels the severity of osteoporosis. These patients, or 43 per cent of the total series, could have been spared not only the second operation but also roughly 2 years of disability often requiring hospitalization. Many debilitating illnesses also increase the rate of non-union (Johansson 1964). Of those younger than 70 years, 23 patients (22 per cent) suffered from other illnesses, and might have been spared a second operation (Tillberg 1976). In addition to the arthroplasty most of the patients had undergone at least two previous operations, i.e., nailing and subsequent removal of the nail. Sixty-seven per cent of the series could be classified into Pauwels' group III fractures (a fracture line at an angle of 70° or more to the horizontal). Such fractures show a high incidence of non-union (Scheck 1965). In Pauwels' group III fractures, and possibly also in group II fractures, primary hemiarthroplasty ought to be seriously considered.

In this series of secondary hemiarthroplasties the complications occurring during or immediately after operation, such as dislocation, fracture, thromboembolism, and infection are similar to those reported elsewhere (Moore 1957, Furey et al. 1961, Hinchey & Day 1964), and

also to those in primary arthroplasties (Riska 1971, Tillberg 1976). The postoperative mortality is a little lower than in series dealing with primary arthroplasty (Tillberg 1976), but this might be due to the more advanced age of patients treated by primary arthroplasty.

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