THE PROGNOSIS OF ABDUCTION FRACTURE OF
THE NECK OF THE FEMUR

A. L. FLATMARK and T. LONE, TONSBERG, NORWAY

From the Surgical and Radiological Departments, Vestfold County Hospital, Tonsberg

The prognosis after fracture of the neck of the femur in abduction is supposed to be good. The fracture is usually stable and will heal without nailing.

Necrosis of the femoral head may develop as the result of an abduction fracture. It is widely believed, however, that this complication is far less frequent after abduction fractures than after adduction fractures. The main cause of the frequent necrosis after adduction fracture is thought to be the primary displacement, with injury to the vessels supplying the femoral head. Reduction may aggravate the condition further, as may the introduction of a three-flanged nail (Linton 1944).

The accepted view on the prognosis after abduction fractures is not founded on extensive data. Surprisingly few papers on this particular type of fracture have been published, and the period of observation has mostly been rather short. It is the aim of this investigation to contribute to the elucidation of the prognosis in abduction fractures, with particular reference to the occurrence of avascular necrosis.

MATERIAL

The material comprises studies and follow-up examination of patients with abduction fractures, discharged from the Surgical Department, Vestfold County Hospital, between 1950 and 1959. During this period a total of 459 patients with fractures of the femoral neck were treated: of these, sixty-eight (15 per cent) had abduction fractures.

The diagnostic criteria for an abduction fracture were a subcapital fracture with a varying degree of coxa valga between the femoral neck and the head fragment, a greater or lesser degree of impaction in the upper layers of the femoral neck, no upward displacement of the shaft, and no angulation at the fracture site in the lateral films. These criteria correspond to Types I and II as defined by Linton (1944).

Of the sixty-eight patients, fifty-eight were women and ten men. In thirty-six patients the fracture involved the right hip and in thirty-two patients the left hip. The age distribution is shown in Figure 1.

Follow-up examination—Forty-seven patients were followed up for fifteen months to ten years after the injury. Fourteen patients died while still under observation, two patients refused to come for examination, and another two were referred to other hospitals. Of the latter we know that they were clinically free from symptoms after one year of observation.

The follow-up examination thus included more than 90 per cent of the living patients and about 70 per cent of the total material.

PRIMARY TREATMENT

Two different methods of treatment were used. Seventeen patients were treated with nail fixation even though there was no disimpaction of the fracture. None of the nailing operations presented technical difficulties, nor did they produce displacement in any of the fractures. Fifty-one patients received conservative treatment. They were confined to bed for four to six weeks and encouraged in cautious exercises, avoiding abduction and outward rotation. Thereafter they were allowed up on crutches without weight bearing on the fractured leg for five to six months after the injury.
Four of these fractures slipped; that is, the fractures were unstable in 7-5 per cent of the cases. In two instances we know the exact time of slipping, after two and fourteen days. Check radiographs of the third patient were not taken until the fifth week, when displacement had occurred. Nail fixation was used for these three patients. The fourth slipping was discovered three months after the fracture had occurred, in a patient too old and frail for operation. This last patient was the only one known to have developed a pseudarthrosis. In all other cases union was obtained, though in some instances the follow-up period was only three months.

We have tried to find a connection between the displacement and the steepness of the fracture line. Pauwels’ (1935) gradation with Linton’s modification was used in the assessment. In Group I (0–30 degrees) there were three fractures without slipping; in Group II (30–50 degrees) two slippings in thirty-two fractures; in Group III (over 50 degrees) two slippings in twenty-eight fractures.

Twenty-six patients had taken weight on the leg after the accident for up to one to two weeks; in none of these patients did the fracture slip. The four patients in whom instability of the fracture occurred had not taken weight on the leg, and the slipping occurred while the patients were confined to bed. Three of the sixty-eight patients died in hospital.

RESULTS

Radiographic examination of the forty-seven patients showed union of the fractures in all cases. Avascular necrosis of the femoral head occurred in eleven patients (23 per cent). In the thirteen patients in whom nail fixation was used there was no loosening of the nail. Avascular necrosis of the femoral head developed in only one of the patients treated by nailing, whereas it occurred in ten of the patients treated conservatively. Thus, nail fixation does not seem to add to the risk of necrosis.

The lines mapped out by Linton (1944) have been used as the radiographic criterion for necrosis of the femoral head. One of the examples of necrosis in our series belonged to Linton’s Type I; the others are evenly distributed over Types II–VIII.
It is of interest to correlate the occurrence of avascular necrosis with the duration of the observation period. As is shown in Figure 2, necrosis is fully demonstrated only in patients four years or more after fracture.

It was impossible to say with certainty when the necrosis of the femoral head first occurred because the patients had not been examined in the interval. Also it seemed strange that necrosis was not radiographically demonstrable in any patient after only one or two years' observation. This supports the need for a long follow-up after this fracture.

A separate study of the twenty-five patients with at least four years' observation revealed that eleven (44 per cent) developed necrosis of the femoral head. Even if we exclude the patient with the type of necrosis corresponding to Linton's Type 1, the frequency was still as high as two in five. These twenty-five patients represented 70 per cent of all patients with more than four years' observation.

It seems probable that some of the patients with only one to two years' observation at present will develop necrosis of the femoral head later on. It therefore seems safe to assume that the actual frequency will lie somewhere between 25 and 45 per cent.

Clinical examination showed that two of the patients with necrosis of the femoral head were free from symptoms. More than half had disabling pain, and some had gross arthritis of the hip. We also found that over a third of the patients who did not show radiographically demonstrable necrosis complained of pain or disability in the affected leg. In these patients varying degrees of reduced mobility of the hip joint were present. All these patients complained that they were unable to tie the shoe lace on the affected side.

**DISCUSSION AND CONCLUSIONS**

Our investigation suggests that the frequency of necrosis of the femoral head after abduction fracture is far higher than is commonly believed.

In the few papers published the frequency ranges from 6 per cent to 10 per cent. Linton (1944) found the frequency to be 8.5 per cent, Cleveland and Fielding (1954) found 10.3 per cent and Crawford (1960) 6.4 per cent. Hulth (1956), on the other hand, found necrosis in four of twelve patients, but he believed that in two cases the necrosis was probably caused by injection of contrast medium into the femoral head. The explanation of these contradictory findings must be that in most studies the period of observation has been too short.

The investigation confirmed that stability is good in this fracture. Slipping and secondary displacement occurred in 7.5 per cent of the cases; Crawford found 10 per cent. Slipping
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usually occurs during the first two weeks. When stable, the fracture will unite without nailing, and nailing does not seem to add to the risk of necrosis.

We believe that exact information about the long-term prognosis of this type of fracture is of great interest. It appears certain that the results obtainable through treatment of this fracture put a limit to the results that can be expected from nailing of an adduction fracture. It looks very much as if the frequency of necrosis is about the same in abduction and in adduction fractures. This seems to indicate that the viability of the femoral head is determined at the time of injury.

REFERENCES