

Hip fracture after hemiplegia

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Summary

In a series of 57 hemiplegic patients who subsequently fractured their hips, it was found that hip fracture occurred significantly more often on the hemiplegic side. Hip fracture was equally common in right- and left-sided hemiplegia, and often occurred within one year of the stroke.

Two factors seem to be important in the genesis of hip fractures in hemiplegic patients: the tendency of stroke patients to fall to the affected side as a result of impaired locomotor function, and the development of disuse osteoporosis in the hemiplegic limb.

Introduction

Both stroke and hip fracture are common in the elderly but little has been written about the co-existence of these problems. It is recognized that hemiplegic patients fall more often than other elderly people (Peszczynski, 1956) and that such falls may result in hip fracture (Howell, 1965). Moskowitz (1969) stated that hip fracture is a late complication of hemiplegia. Moreover, there is a clinical impression that hip fracture usually (Peszczynski, 1956; Howell, 1965) or invariably (Moskowitz, 1969) occurs on the hemiplegic side. However, there has been only one survey of hip fracture in hemiplegic patients (Peszczynski, 1957) in which 28 stroke patients sustained the fracture on the hemiplegic side. Five of these patients suffered the fracture at the time of the stroke, and of the 23 who had sustained the fracture after the stroke, this occurred within one year in 14 cases.

In order to determine whether hip fracture is indeed more common on the affected side, and to ascertain the interval between stroke and fracture, 57 patients with a history of hemiplegia who subsequently fell and fractured their hips were studied.

Patients and methods

The notes of all patients with fractured neck of femur who were admitted to Nottingham General Hospital between January 1973 and December 1976

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were scrutinized. The admission history, family doctor's referral letter and, where applicable, previous notes were studied to see if a completed stroke had occurred before the fracture. The side of the hemiplegia and the fracture and the interval between the 2 episodes were noted. If the patient had suffered more than one stroke, the interval between the most recent stroke and the fracture was recorded.

Patients were excluded if the fracture occurred before or at the same time as the stroke; if the patient had sustained bilateral strokes; and if the side of the stroke was not specified in either the hospital notes or the family doctor's records.

Results

Over the 4 years, 1456 patients were admitted to Nottingham General Hospital with fractured neck of femur. Of these, documentary evidence of previous hemiplegia was found in 57. Fifteen of these patients had sustained 2 or more strokes. In 4 cases there were no residual signs of hemiplegia.

There were 39 women and 18 men. All the women were aged 65 years or older, the majority (24) being in the 75-84 age range. Of the male patients, 7 were under 65 years, the youngest being 58 years old.

Fifty patients had sustained the fracture on the hemiplegic side, 7 on the opposite side ($P < 0.001$). Patients with right- and left-sided hemiplegia were equally likely to sustain hip fractures (see Table 1).

Twenty-nine patients had sustained their fractures within one year of the stroke and in a further 7 the fracture occurred in the second year. The longest interval between stroke and fracture was 16 years. Only 5 patients fractured their hips within 3 months of the stroke.

Discussion

This study confirms the impression that hip fracture is significantly more common on the hemiplegic side. This may be because (1) hemiplegic patients may tend to fall to the affected side, and (2) the bone in the hemiplegic limb may be more likely to break as a result of disuse osteoporosis.

There are many factors which contribute to the tendency of stroke patients to fall. These include

TABLE 1. Side of hemiplegia and hip fracture

Side of hemiplegia	Side of hip fracture	No. of patients
Right	Right	25
Left	Left	25
Right	Left	4
Left	Right	3

sensory, motor, reflex and circulatory disorders (Peszczynski, 1956). Patients with left-sided hemiplegia are particularly prone to perceptual disorders. They are less able to perceive verticality than are patients with right hemiplegia: the patient may believe that he is standing upright but actually be leaning towards the weak side. This impaired perception occurs in both frontal and mid-sagittal planes (De Cencio, Leshner and Voron, 1970). If perceptual disorders were a common cause of falls in stroke patients, it would be anticipated that those with a left-sided hemiplegia would fall and break their hips more commonly than those with right-sided weakness. This study shows that right- and left-sided hemiplegic stroke patients are equally likely to sustain hip fractures, which indicates that perceptual disorders are not important in the genesis of falls after stroke.

Changes in the locomotor function of the affected leg are believed to be responsible for most falls after stroke (Peszczynski, 1956). In patients with an equinovarus deformity of the ankle, the toe of the hemiparetic foot may catch the floor causing the patient to lose balance. Hemiplegic patients may try to compensate for weakness of the gluteus medius by leaning towards the paralysed side, which may cause them to fall to that side (Friedland, 1975).

Impaired circulatory responses to changes in posture would not of themselves cause a stroke patient to fall to either side, but co-existing impairment of righting reflexes may result in more frequent falls to the affected side.

Patients with long-standing hemiplegia are known to develop disuse osteoporosis on the affected side. Hodkinson and Brain (1967) described 4 hemiplegic patients with unilateral osteoporosis who developed hip fractures on the affected side. These patients were severely handicapped, being still in hospital 6 months after the onset of hemiplegia and the fracture occurred many months after the stroke. In the present study, only 5 patients sustained fractures in the first 3 months. In the early stages of recovery from stroke, one would expect those

patients who had regained some mobility to be particularly prone to falls. The relative infrequency of hip fracture in these early months suggests that unilateral osteoporosis may be an important factor in the development of fractures in hemiplegic patients. Little is understood about osteoporosis in hemiplegic limbs. It would be interesting to know how commonly hemiplegic patients develop osteoporosis, how soon after stroke it occurs, and whether disuse osteoporosis is related to spasticity or weight-bearing.

The incidence of hip fracture after stroke is uncertain. Peszczynski (1957) found that 23 of 150 patients attending a rehabilitation centre after hip fracture had a history of previous hemiplegia or transient hemiparesis; 5 others had sustained their fractures at the time of the fall. In the present series, documentary evidence of previous hemiplegia was found in 57 patients out of 1456 presenting with hip fracture. As the study is retrospective, it probably underestimates the incidence of hip fracture after stroke.

Prospective studies are required to ascertain how commonly hip fracture occurs in hemiplegic patients, to determine the relative importance of the factors predisposing to falls and fractures in patients with stroke, and to decide whether specific rehabilitation methods are effective in reducing the tendency to fall and fracture bones on the hemiplegic side.

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