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HUMERAL SHAFT FRACTURES

Treatment with a Simple Hand Sling

IVAR SPAK

Department of Surgery, Simrishamns Sjukhus, Simrishamn, Sweden.

Complications of operative treatment of closed fractures of the shaft of the humerus occur in about 12 per cent of cases. Fixation of the arm in some form of cast gives better results but the complication rate is still 5.5 per cent and there is a risk of shoulder–hand–finger syndrome.
In order to minimize these complications the author treated patients with humeral shaft fractures by supporting the hand only, in a simple sling. The method is described and its advantages discussed. All the fractures, including transverse ones, united in 3 to 6 weeks without any serious complications.

Key words: humerus; humeral fractures; therapy

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Surgical treatment of fractures of the shaft of the humerus may frequently be complicated by injury to the nerves, delayed union or infection (Fenyö 1971 and Wiedmer 1974). According to Holm (1970), non-union is more common (12 per cent) after surgical than after conservative (5.5 per cent) treatment. Non-operative treatment includes fixation with different kinds of plaster of Paris or bandaging the arm in the adducted position (Koch 1971). Fixation of the shoulder, however, can lead to stiffness of this joint and to the shoulder – hand – finger syndrome (Moberg 1960). Some fractures have been treated by traction (Boettcher et al. 1970); the use of a hanging cast is common although it involves the risk of delayed union unless the cast is made as light as possible (Dintimille et al. 1975). According to Watson-Jones (1955) it is sufficient to apply a simple plaster splint.

In 1962 Gelin demonstrated a case in which the patient was successfully treated with an ordinary collar and hand sling. In 1964 the author reported a preliminary series treated in the same way (Spak 1964). That series has since been extended, the results have been analysed and are reported below.

CLINICAL MATERIAL

Fifty-nine cases of uncomplicated fractures of the shaft of the humerus were treated over a 14-year period. The age and sex distribution are given in Figure 1 and the fractures are grouped according to approximate level and type in Figure 2. The series does not include fractures of the surgical neck or supracondylar fractures. Table 1 gives the distribution of the fractures according to the sex of the patients and side affected. Two of the fractures were pathological, one being a transverse fracture in a 60-year-old woman with metastases from cancer of the breast and the other a spiral fracture in a 10-year-old boy with a simple bone cyst. Both these fractures healed without complications.

METHOD

The fractures were treated by means of a narrow collar and hand sling giving no support to the elbow or forearm. With the elbow flexed at a right

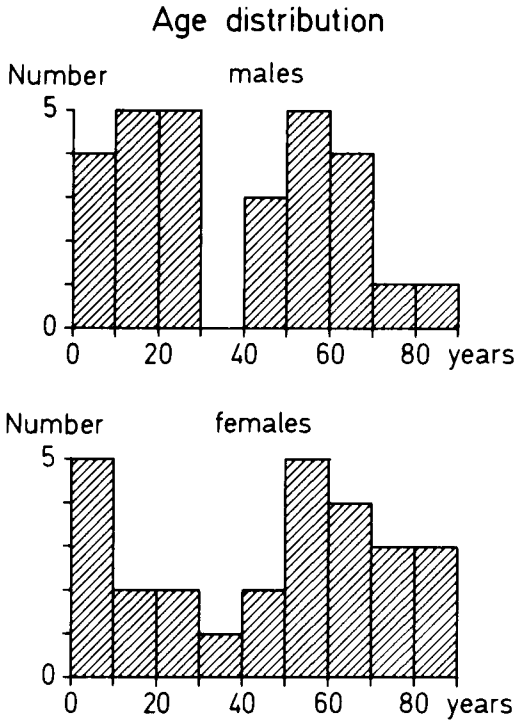

Figure 1. The age and sex distribution of the patients with uncomplicated fractures of the humerus.

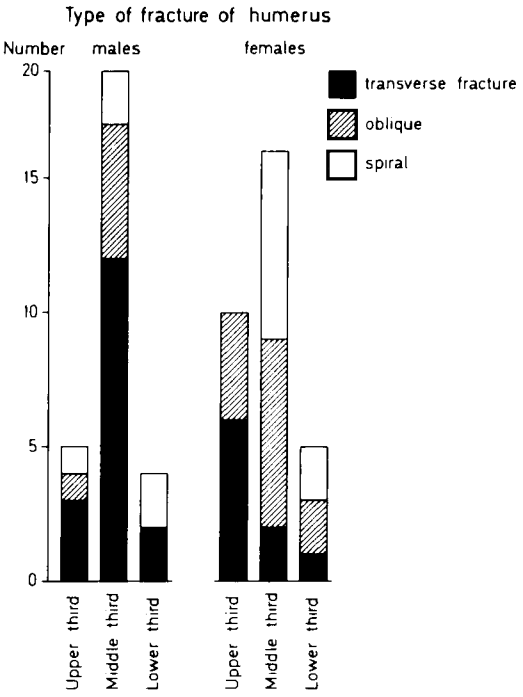

Figure 2. Grouping of the fractures according to the approximate level and type of fracture.

angle the patient gripped the lower end of the sling (Figure 3). This position prevented angulation of the fracture. If the patient found it difficult to hold the sling then it was fixed to the hand with adhesive tape. The sling was never wound round the hand as this might have impaired the circulation. At night the arm was supported by a pillow. Those patients who were unable to control the position of the arm using only a pillow had the upper arm and forearm supported in a plaster of Paris splint. In addition such a splint was occasionally useful during the daytime at the beginning of the treatment, if the fracture was painful, or the patient elderly and unable to carry out the instructions. In all cases the shoulder joint was left free.

At the first visit the patient was taught exercises for the shoulder, arm and hand according to instructions given by the surgeon himself and subsequently supervised by the physiotherapist. With the patient's hand still in the sling he was instructed to bend forwards and towards the injured side, holding onto a support with the good arm if necessary. In this position, with the elbow away from the trunk, the patient was able to swing the injured arm in circles without angulation of the fracture. The fact that the shoulder, elbow and wrist were free encouraged spontaneous movement, and within a few days most patients were able to use the hand at meals and soon they were able to dress themselves and to do light work even though the fracture was not clinically stable.

Two to three weeks after the accident, bony union had progressed so that the patients could elevate the arm and exercise the shoulder joint. At 3–6 weeks most fractures were stable with good callus formation (Figures 4, 5).

Table 1

Distribution of fractures according to sex and side

	males	females	total
Right	18	18	36
Left	10	13	23
Total	28	31	59

Figure 3. The simple hand sling.

Treatment did not require the patients to be detained in hospital unless this was indicated because of advanced age or social factors. Of the 59 patients with fractures of the shaft of the humerus who presented at this hospital during the period under review, 55 were treated in the way described.

COMPLICATIONS

Vascular. No vascular complications occurred.

Neurological. Neither radial paresis nor any other nerve injuries occurred during treatment. Two patients with primary radial paresis recovered when the nerve was surgically freed from callus.

Delayed union. This complication occurred in one case. A 43-year-old baker sustained a

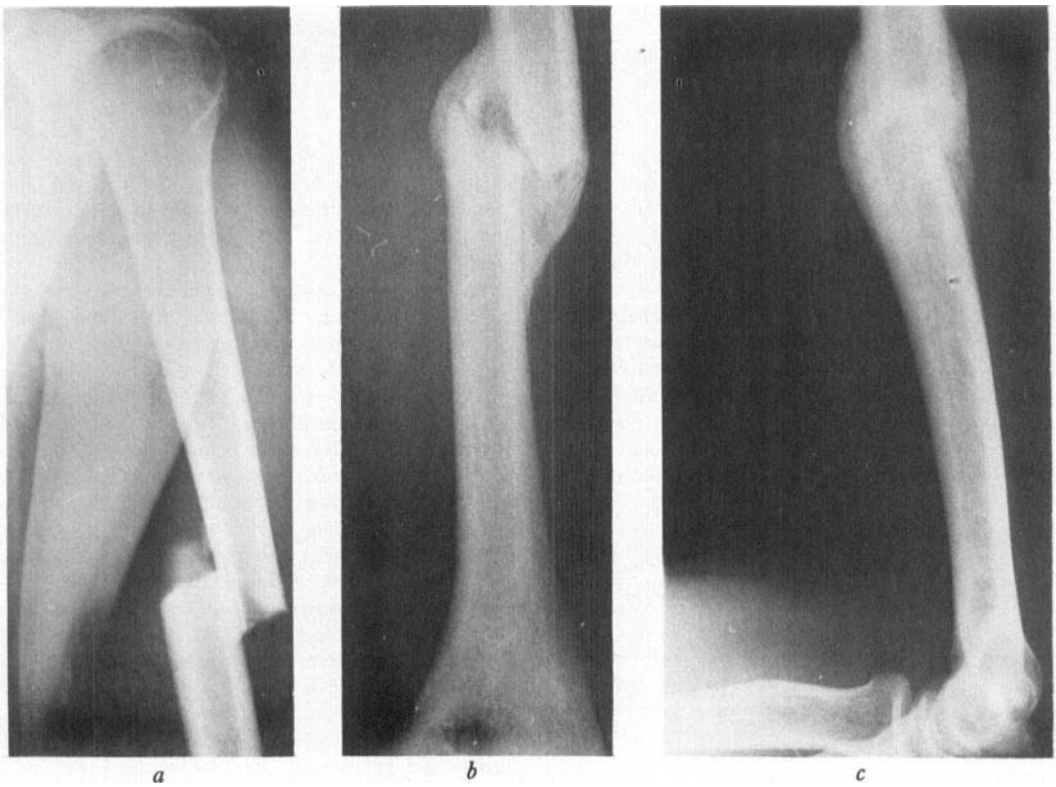

Figure 4. (a) Transverse fracture of the left humerus (August 13) in a 20-year-old lumberjack. Shortening of 2 cm. (b, c) X-rays of the same patient 2 months later when he returned to work. By October 3 he could lift weights of 5 kg above his head.

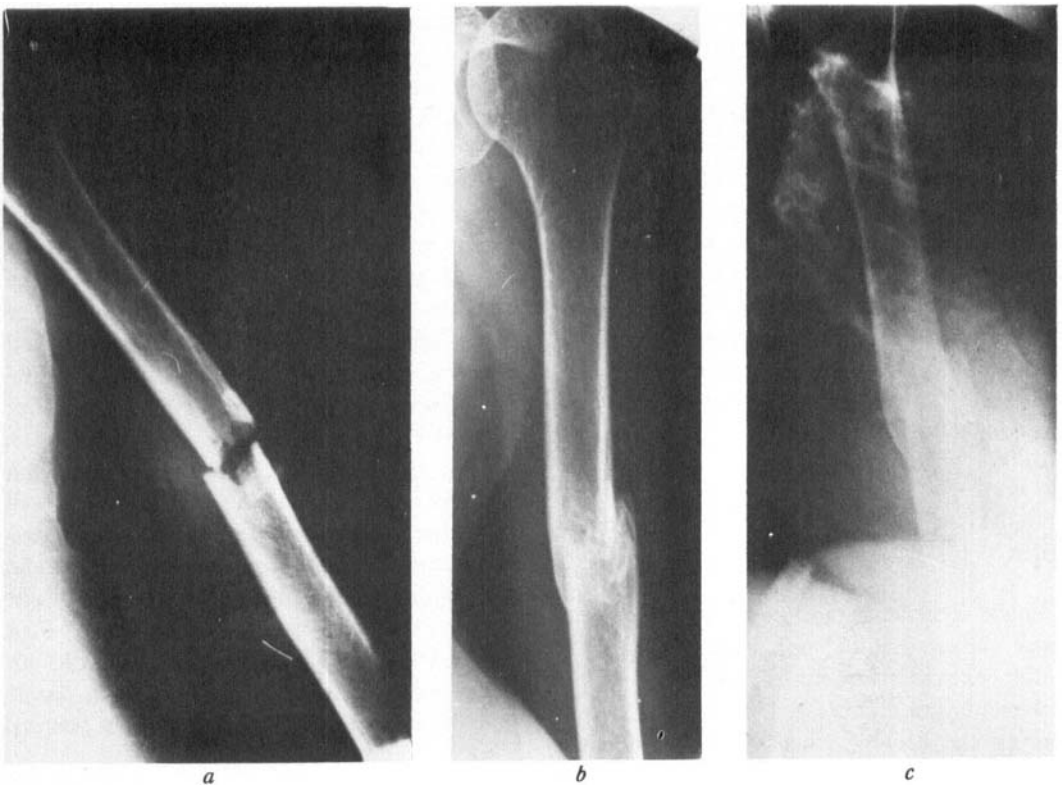

Figure 5. (a) Transverse fracture of the left humerus (January 6) in a 77-year-old woman. (b, c) X-rays of the patient at follow-up on October 15. Position of fracture had not changed since January 21, when the mobility of arm had been so good that the patient was satisfied and declined further treatment.

transverse fracture of the right humerus and was treated with a hand sling but within 2 weeks, against medical advice, the patient returned to work where his activities included, among other things, lifting pans above head height. Healing was delayed with a risk of pseudarthrosis so that 2 months after the accident the arm was placed in a thoraco–brachial plaster to prevent further excessive use of the arm. The plaster was, however, split to permit free movement of the shoulder and elbow; 2 months later the fracture was united.

Shortening of the arm. In transverse fractures this complication was rare if the patient was ambulant. A shortening of a few centimetres occurred in two elderly patients who because of other injuries were bed-ridden; however, the fracture fragments remoulded and the end result was functionally satisfactory. Some shortening also occurred in association with the healing of oblique or spiral fractures, but again such shortening caused no functional impairment.

Angulation. This complication did not occur to any significant extent in patients with oblique or spiral fractures. Transverse fractures occasionally showed an open angle of 10–15°, usually anteriorly, but there was no limitation of function.

Impairment of function of the upper limb joints. A temporary impairment of shoulder movement was noted in elderly patients in whom a fracture line extended towards the neck of the humerus. None of the patients had any impairment of movement in the elbow, wrist or hand.

Re-fracture. One case occurred. The patient was an 84-year-old man with advanced arthrosis deformans coxae who had an

oblique fracture of the humerus. This was treated with a sling and the fracture was fairly stable within 4 weeks. Two weeks later the patient fell once more and the arm was fractured again at the same level. The patient was regarded as too old for a plaster of Paris splint or operation and treatment with the sling was continued. Two months later the fracture was stable. There was a moderately reduced range of movement of the shoulder on examination 7 months after the accident but mobility was equal to that of the contralateral shoulder, and there were no functional sequelae.

DISCUSSION

Clinical experience and experimental studies have shown that the prospects of healing of lower extremity fractures are better if the fragments are compressed against each other during the healing process. The significance of compression is exemplified by the fact that tibial fractures with incipient pseudarthrosis can be made to unite by simple resection of the fibula.

In fractures of the humerus, however, the fragments are compressed against each other by the force of the muscles of the arm and no extra compression is necessary. The muscle force is sufficient to secure uneventful healing without overriding of the fragments (Watson-Jones 1955). As regards the use of a hanging cast Watson-Jones (1955) and Wiedmer (1974) warn against possible distraction which may delay union.

The results of treatment with a simple hand sling indicate that no extra compression is necessary. The weight of the arm is sufficient for reduction and the manipulation recommended by Koch (1971) therefore appears unnecessary.

Satisfactory healing requires a good circulation in the arm. This is brought about partly by the pumping action of muscular exercise. Impairment of the circulation due to immobilization of the arm and inactivity of the hand and fingers can lead to the shoulder–hand–finger syndrome (Moberg 1960), especially in elderly patients. Even if the arm is elevated in a thoraco–brachial plaster there is a risk of impairment of the circulation by fixation of the shoulder and this may lead to slow union (Koch 1971). Furthermore, it is obvious that after the use of such a plaster, return of full mobility of the shoulder joint takes time. A simple plaster of Paris splint leaves the shoulder free and therefore does not impair the circulation. The use of a simple hand sling without any splint at all is even better.

The great advantage of the use of a hand sling is not only that the fractures heal well but that they heal without serious complications. Injuries to vessels and nerves and the shoulder-hand-finger syndrome did not occur. Surgical complications also were avoided and, as a rule, the treatment did not require hospitalization. The patient could remain at home, and the high cost of hospital care could thus be reduced.

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Correspondence to: Ivar Spak, Department of Surgery, Simrishamns Sjukhus, S–272 00 Simrishamn, Sweden.