A LOCKING NAIL FOR FRACTURES OF THE HUMERUS

H. HABERNEK, E. ORTHNER

From Bad Ischl and Zell/See, Austria

We reviewed 19 patients treated for upper arm fractures using Seidel's locking nail system, which allows for early function after operation. The overall results were good with no cases of pseudarthrosis, infection or radial nerve palsy. All the patients regained full shoulder movements with no evidence of rotator cuff lesions.

Fractures of the shaft of the humerus may be treated by several different methods, including conservative treatment with a U-splint or a brace (Böhler 1953; Sarmiento et al 1977). ASIF plating is usually reserved for more complex problems such as open fractures, radial nerve palsy which fails to recover, neurovascular lesions, and nonunion (Poigenfürst and Jakesz 1976; Giebel, Tscherne and Reissman 1986). A few authors have reported the use of intramedullary methods, but all of them have the inherent disadvantage of instability.

A locking nail system has recently been described which can be used for most fractures of the middle 60% of the humeral shaft. The system offers absolute stability with proximal and distal locking, allowing for early functional recovery and fewer complications. Only one report has been published in the English literature (Seidel 1989). We now report the early results in the first 19 cases treated in two Austrian hospitals.

PATIENTS AND METHODS

All 19 patients were treated between October 1989 and April 1990 and were reviewed personally after at least three months follow-up. There were 15 women and four men with average ages of 55 and 48 years respectively. There was one pathological fracture from breast cancer metastasis; the others were skiing injuries. All but one of the fractures were treated by static locking nails, and the one patient given a distally dynamic nail required secondary static locking a few days later because of migration of the nail. Operations were performed two to seven days after injury because the nail system had to be ordered individually from the distributors for each case. Technique. Under general anaesthesia the patient is placed supine with the trunk raised 30°. The arm is draped separately, to allow free access to the humerus and shoulder (Fig. 1) and the fracture is reduced manually under image intensifier control.

A 4 to 5 cm incision is made lateral to the acromion and the deltoid is split. The posterior margin of the greater tuberosity is exposed by splitting the supraspinatus tendon, the medullary canal is opened with an awl, and a guide wire is inserted. The canal is then reamed to accept a 9 mm drill bit (though this was not advised by Seidel (1989)). The spreading bolt is inserted and the nail

Fig. 1

The patient lies supine on the operating table. The draped arm is inclined 30° forward and rests on a side table or extension. Only one image intensifier is used.
introduced using the guiding device. Residual misalignments can now be corrected. A special screw-driver is then inserted through the nail into the spreading bolt. Spreading is achieved by rotation of the bolt to the left (Fig. 2).

The introduction and distal spreading should be performed carefully, to avoid splitting the bone. In the reduced position, the proximal end of the nail should lie deep to cortical bone, to avoid later impingement on the rotator cuff. The proximal screws are then inserted to provide static proximal locking (Fig. 3). After the placement of a suction drain, the rotator cuff, the deltoid, subcutaneous tissue and the skin are closed.

A sling is provided, which is worn until the patient is capable of active shoulder movements, so as to avoid passive overstretching of the rotator cuff. Shoulder exercises begin after removal of the suction drain, starting on a continuous passive motion device.

RESULTS

Fractures healed at an average of two months after operation, and there were no cases of nonunion, infection, or secondary radial nerve palsy. Four patients had varus angulations of up to 10°, and three had recurvatum deformity of up to 5°, but none of them showed any functional or cosmetic impairment. Apart from one patient, operated on for pathological fracture through a metastasis, and who was seen at operation to have a rotator cuff defect, all cases regained full shoulder movement with no functional impairment by an average of six weeks (Figs 4 and 5). Return to work varied from four to ten weeks (median five weeks).

DISCUSSION

Humeral shaft fractures are usually considered to be benign and can nearly always be treated conservatively (Böhler 1953; Sarmiento et al 1977). Complications have been reported after open reduction and ASIF plating (Giebel et al 1986), and with intramedullary Küntscher nailing. Hackethal rodding or Ender nailing do not provide stable fixation (Küntscher 1967; Decker and Brunner 1977; Ender 1978; Durbin, Gottesmann and Saunders 1983).

A stable osteosynthesis provides a major advantage in patients with multiple trauma, and for fractures with neurovascular lesions or nonunion. The method is an attractive alternative to the eight to ten weeks required in a cast or brace, and is quick, safe and simple. Active joint function is possible soon after operation. Locking intramedullary nails have given excellent results in other regions of the body (Klemm and Börner 1986).

Nevertheless, the system has a few teething troubles, and some technical improvements could help:

1) Larger holes at the proximal end of the nail would allow the use of cancellous screws with continuous
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Pathological fracture in the middle third of the humeral shaft due to carcinoma of the breast. Good callus formation six weeks postoperatively.

The cap washer which is provided was not used because of the danger of damage to the rotator cuff and biceps tendon.

secondary displacement of the fracture. Both proximal screw holes should be filled.

For this reason we consider that only fractures in the middle 60% of the humerus should be managed with this nail, and it is advisable to start with simple fractures in the more distal parts of the shaft because of the danger of secondary radial palsy in the more complicated cases. Locked nailing of fractures in the lower fifth of the humeral shaft is not advised because the shortness of the distal fragment could lead to secondary misalignment. First or second degree open fractures could also be treated with this nail, though we have not done so.

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REFERENCES


