

COMMINUTED DISPLACED COLLES' FRACTURES

Treatment with Intramedullary Methylmethacrylate Stabilisation

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Four women aged 87, 77, 74 and 69 years with severely comminuted, displaced and intraarticular Colles' fractures of the dominant hand, where conservative treatment had failed, were treated by use of intramedullary methylmethacrylate stabilisation in order to retain optimal anatomical position of the fracture. The patients were followed by serial clinical, radiological and ⁹⁹Tc-methylenediphosphonate scintimetrical examinations for at least 1 year. Normal mobility of the wrist and power of the grip was obtained within 6 weeks postsurgery in all patients. Radiological cortical bone healing occurred within normal time and scintimetricaly the fractures were healed within 6 weeks. No secondary displacement of the fractures occurred.

It was concluded that this method might be considered in the treatment of certain severely comminuted and unstable Colles' fractures as it seems to offer a quick rehabilitation and so far no late problems.

Key words: comminuted Colles' fracture; intramedullary stabilisation device; methylmethacrylate

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The treatment of Colles' fracture is usually conservative. However, certain fracture types have a tendency to be unstable, especially if they are initially comminuted, displaced and intraarticular. Internal fixation as well as osteotaxis for these fractures have been tried (Dowling & Sawyer 1961, Scheck 1962, Cole & Obletz 1966, Green 1975, Cooney et al. 1979, Lucas & Sachtjen 1981) but the results are not completely satisfactory, though better than the results of conservative treatment (Hammond 1949, Bacorn & Kurtzke 1953, Smaill 1965, Spira & Weigl 1969, Sarmiento 1975). In order to restore the anatomy and thereby achieve better results, open reduction and internal stabilisation with intramedullary methylmethacrylate was tried in the treatment of a few of these special fracture types.

PATIENTS AND METHODS

During the period July 1980 to June 1981 four patients, all women, were treated for Colles' fracture of the dominant hand. These fractures were all severely comminuted, displaced and intraarticular. Figure 1 shows an example. The patients were 87, 77, 74 and 69 years of age. The initial treatment consisted of closed reduction of the fracture under two plane image intensification followed by external splintage. Redislocation to the initial fracture position always occurred, an average of 2.75 times (range 2-4) in spite of repeated fracture reductions supplied with continuous traction of the hand. Therefore open reduction and stabilisation with intramedullary bone cement was tried. The patients were operated 3, 8, 17 and 33 days after the initial trauma. A pneumatic tourniquet was used at all operations of which two were performed under general anaesthesia and the two others under respectively axillary bloc and intravenous regional anaesthesia. A straight dorsal incision was used, splitting the dorsal ligament and exposing the fracture between the tendon of extensor pollicis longus and the tendons of extensor carpi radialis longus and brevis, as shown in Figure 2.

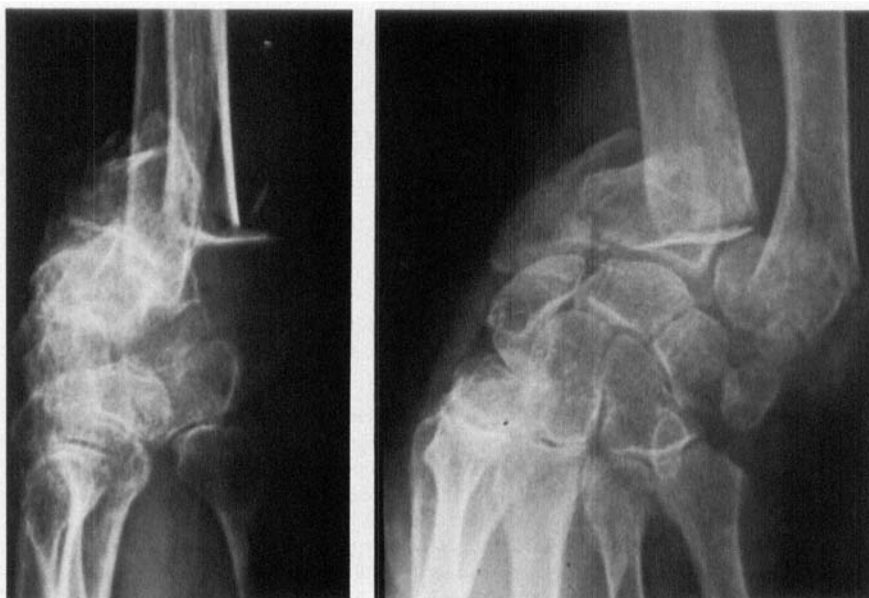
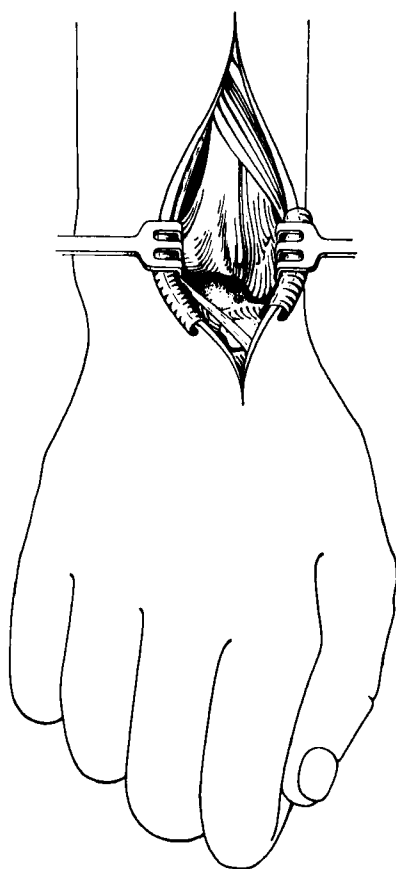


Figure 1. Severely comminuted, displaced and intraarticular Colles' fracture.



The fragments were reduced into position leaving the usual dorsal fracture defect open. The medullary canal distally and approximately 2 cm proximally was filled with bone cement through the dorsal fracture defect. Care was taken to avoid cement from covering the cortical edges. The fracture was held in anatomical position, if possible, until the cement had polymerised. The dorsal ligament was sutured with Dexon[®] nylon sutures closing the skin. An external splint was used for the next 24 hours after which active movement of the wrist was instituted. Figure 3 shows the postoperative result after 24 hours (A) and after 6 months (B) in the case illustrated in Figure 1. The patients were dismissed from the hospital after a few days and were trained ergometrically three times a week for the first 4 weeks postsurgery. The patients were followed clinically for mobility of the wrist and power of the grip. Serial radiological and ⁹⁹Technetium-scintimetrical examinations were performed after 4 weeks, 8 weeks and 6 months. ⁹⁹Technetium activity was calculated measuring the uptake of the isotope within a frame of 6 × 8 cm covering the wrist. Figure 4 illustrates controls after 4 weeks and after 6 months. A satisfactory clinical result was reached when the patient had obtained the same

Figure 2. Incision used for intramedullary bone cement stabilisation of Colles' fracture. The tendon of extensor pollicis longus is held in an ulnar direction and the tendons of extensor carpi radialis longus and brevis radially. The extensor retinacle has been split.



Figure 3. A, X-ray film 24 hours postsurgery of the Colles' fracture illustrated in Figure 1. B, X-ray film 6 months postsurgery of the same fracture. Notice that bone cement has not interfered with cortical bone union.

power of the grip (plus/minus 20 per cent) and the same mobility (plus/minus 15 per cent of the total mobility) as in the opposite wrist.

Radiological healing was said to be established when the bone continuity over the cortical lines was estab-

lished. Scintimetrical healing was said to have occurred when the highest ^{99}Tc uptake was reached, according to Lund et al. (1978). All patients were followed for at least 1 year.

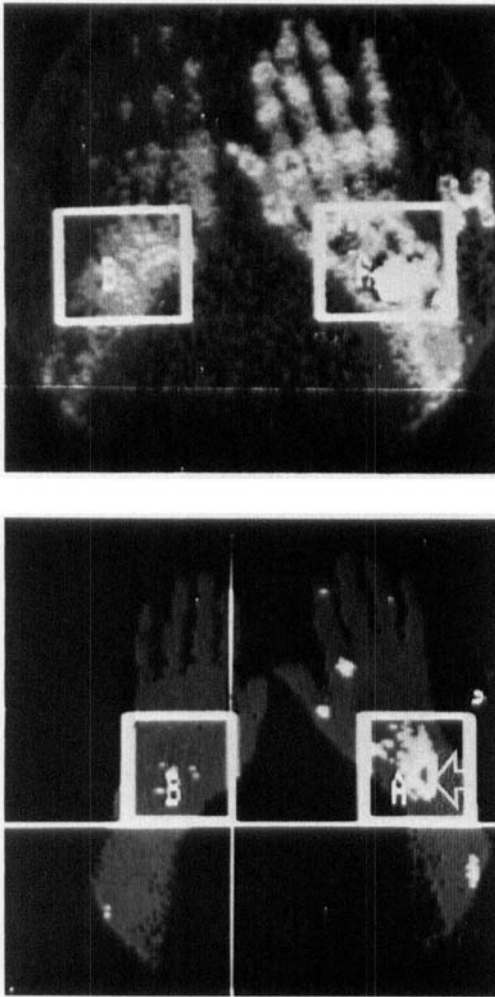


Figure 4. Top: Scintigram 4 weeks postsurgery. Technetium-activity is noticed over the whole fracture area. Bottom: Scintigram 6 months postsurgery. Technetium-activity is limited to the cortical boundaries of the distal radius as indicated by the arrow.

RESULTS

No infections were encountered. Radiologically no redislocation occurred. Healing was established within 8 weeks postsurgery in all cases. The scintimetrical measurements showed in all cases a maximum uptake at the 4-week control. The following controls showed a successive fall in the radioactivity. Clinically all patients obtained normal mobility and power of the grip within 6

weeks after the operation according to the criteria used, as the total mobility of the treated hand was respectively 104 per cent (380/365), 86 per cent (300/350), 85 per cent (305/360) and 93 per cent (325/350) when compared to the opposite hand. The results for power of the grip were 117 per cent (35/30), 80 per cent (20/25), 82 per cent (18/22) and 114 per cent (40/35) measured in kilogram pressure. Except for immediate postoperative pain no patient complained about more pain than could be managed by medication of a few Aspirins® for the next week.

DISCUSSION

Methylmethacrylate has been used as adjunct to internal fixation of malignant bone conditions (Franklin et al. 1974, Harrington et al. 1976, Harrington 1980). Also benign conditions have been treated with the aid of bone cement (Stubbs et al. 1975, Brattström & Granholm 1976, Harrington 1975, Herron & Dawson 1977, Pellici et al. 1981). The only other available report on the use of bone cement for the treatment of Colles' fracture (Charnley 1970) described three cases of the common type of Colles' fracture. These three patients testified about an uneventful course at the follow-up after 3 years. However, it was noticed radiologically that the dorsal fracture gap (which was occupied with bone cement) had failed to heal. Obviously this had not interfered with the stability of the fracture. As conventional osteosynthesis of severely comminuted and displaced fractures of the Colles' type is not entirely satisfactory (Lucas & Sachtjen 1981) and in the present cases was considered impossible because of the comminution.

The alternative with osteotaxis, though it might have provided acceptable results (Cooney et al. 1979), would have meant a long period of immobilisation and rehabilitation. A totally conservative treatment with short time of immobilisation followed by active movements was not used as treatment as there is substantial evidence that the better the quality of fracture reduction – the better the functional outcome (Lidström 1959, Cole & Oblatz 1966, Green 1975, Cooney et al.

1979, van der Linden & Ericson 1981). Thus intramedullary stabilisation with methylmethacrylate was tried. The results of the present series has shown that the method does not interfere with cortical bone healing provided the cortical edges are kept free from bone cement. The procedure can be performed under axillary or intravenous regional anaesthesia and it offers a quick rehabilitation of the wrist and power of the grip and has in the present series led to normal and painfree mobility of the wrist. However, this method should by no means be used as a routine treatment, but it ought to be considered in cases of severely comminuted, intraarticular and unstable Colles' fracture in elderly patients where quick mobilisation of their wrists is desirable.

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