FOREARM REALIGNMENT WITH ELBOW RECONSTRUCTION USING THE ILIZAROV FIXATOR

A CASE REPORT

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A case of osteogenesis imperfecta, presenting with bowed deformity of both forearm bones and dislocation of the radial head was treated by separate elongation of both bones using Ilizarov's external fixator.

Ilizarov's method has opened new possibilities in the treatment of complex skeletal deformities (Cattaneo et al 1985; Dal Monte and Donzelli 1987; Fontanazza, Razzano and Mastromarino 1987; Grill and Franke 1987; Cattaneo, Villa and Catagni 1988; Fabry et al 1988). Gradual distraction or compression using the Ilizarov fixator facilitates progressive correction of severe limb malformations. Correction of bowing of both ulna and radius, combined with radial head reduction, using this method has not been previously reported. We report the case of a girl with gross forearm and elbow deformity due to osteogenesis imperfecta and her treatment using the Ilizarov technique.

CASE REPORT

A 15-year-old girl with osteogenesis imperfecta tarda type II, according to Seedorff's classification (Tachdjian 1990), was referred for treatment of her right arm. She presented with severe anterolateral bowing of both forearm bones (Fig. 1), and grossly restricted mobility of the elbow. Flexion was limited to 15° and the joint hyperextended to 20°. The arm was fixed in mid-pronation, the wrist allowed 15° extension and 20° flexion, with no adduction and only 10° abduction.

Fig. 1

The pre-operative appearance.

Fig. 2

Pre-operative radiographs showing severe forearm bowing with radial head dislocation.

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Radiographs showed bowing of both radius and ulna with a 4 cm proximal overgrowth of the radius, with the head tilted laterally. The bones were very osteoporotic with some ossification of the intra-osseous membrane (Fig. 2). On the left side she had a similar deformity but with good elbow function.

Fig. 3

Diagram of the procedure, showing the position of the pins. UO = ulnar osteotomy, RO = radial osteotomy, arrows indicate asymmetric distraction.

Fig. 4

Radiographs of the elbow showing reduction of the radial head.

Fig. 5

Postoperative radiographs showing improved alignment.

Reconstruction to realign the radius and ulna with simultaneous reduction of the radial head was performed, using the Ilizarov technique. The bones were fixed separately with one Ilizarov ring each, the ulna proximally and the radius distally. A mid-diaphyseal stabilisation of both bones was carried out by three transfixing wires tensioned on a third ring. Subsequently, two osteotomies were performed through separate small skin incisions, the ulna was divided proximally, between the upper and middle rings and the radius below the middle ring (Fig. 3). By gradual distraction between the upper two rings, the ulna was lengthened by 4 cm, and as a consequence the radius migrated distally to the same extent resulting in reduction of the radial head (Fig. 4). Moreover, the lengthening was asymmetrical by 1 mm a day medially and 0.5 mm laterally, and this corrected the ulnar bowing. Distally, distraction was performed for a shorter period to achieve realignment of the radius.

Fig. 6

Final clinical appearance.

After the correction the fixator was kept in place for another eight weeks, until consolidation was obtained. At the end of treatment there was satisfactory realignment of the forearm (Fig. 5) with improvement of both elbow and wrist function. Elbow movements were from 15° to 90° flexion (Fig. 6). The wrist recovered normal function except for a 15° loss of dorsiflexion. There was a small increase in forearm supination, of about 20°. The patient was able to perform all normal activities of daily life, and was extremely satisfied with both the functional and cosmetic result.

DISCUSSION

Surgical corrections of severe limb deformities have usually been limited to long bones of the lower limb and occasionally the humerus. The most commonly employed technique is that of Sofield and Millar (1959) in which correction is achieved by multiple osteotomies and internal fixation with various intramedullary devices.

Rare reports of intramedullary rodding of the forearm bones appear in the literature, all with unsatisfactory results (Williams 1965; Mirbaha 1966; Root 1981). In osteogenesis imperfecta, forearm bowing may

be associated with radial head dislocation. King and Bobechko (1971) have reported a 27% incidence of this deformity. Excision of the radial head in an attempt to improve elbow movements gives unsatisfactory results (Dal Monte and Donzelli 1987).

It is obvious that correction of this deformity is technically extremely difficult using intramedullary rods. Fixation with plates on fragile bones, after multiple osteotomies, is mechanically unsound and we could find no such report in our review. Moreover, to correct the radial head dislocation an additional open procedure on the joint would be necessary.

A three-dimensional correction using an external fixator has been successful in this case. We chose to use the Ilizarov fixator as the very small transfixing pins cause little trauma and assure stable fixation of these fragile bones. Also, by applying gradual distraction it is possible to change the position of a bone (in this case, the radius) without the need for joint surgery. It has the advantage of keeping the patient functional throughout the procedure and allows intensive physiotherapy. The Ilizarov system is, in our experience, an ideal method for correction of difficult deformities with poor quality bone, where traditional methods would fail.

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