CASE REPORT

Ilizarov method for management of chronic non-union of distal radius causing a ‘Z’ deformity of the wrist


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A 38-year-old previously fit and well patient has been referred to the senior author about 3 years after having a major road traffic accident in which he had sustained multiple long bone fractures, including that of his dominant right distal radius and ulna. The radial fracture had been managed in the local hospital by closed manipulation, K-wire stabilisation and plaster cast immobilisation. The distal radial fracture reduction was lost post-operatively and this led to a severe deformity of the right wrist due to non-union of the off-ended and volarly displaced distal fragment (Fig. 1). The ulnar fracture also failed to unite. The resulting ‘Z’ shaped deformity of the wrist was associated with painful dysfunction of the wrist and hand (Fig. 2). He was unable to make a fist and did not have any useful function in the hand. He also sustained a severe open fracture of right tibia requiring below knee amputation. He was having difficulty in transfer into a wheel chair, as he was unable to weight bear on his right hand during transfer.

After the initial assessment and careful counseling of the patient, it was decided to correct the deformity by Ilizarov method followed by arthrodesis of the wrist. An Ilizarov frame was applied with percutaneous wires and pins, and the deformity was corrected by gradual distraction followed by translation. A 3-ring configuration was used, with one wire through the base of the metacarpals attached to the distal ring and two rings attached to the forearm using wires and pins (Figs. 3 and 4). The patient was followed up weekly in our non-union out-patient clinic while the gradual distraction and translation of the distal fragment of the radius was done under supervision. The elbow and hand movements were maintained with regular physiotherapy. Complete deformity correction was achieved in 6 weeks. The wrist was then arthrodesed by using a low-profile dorsal plate at 8 weeks, while keeping the Ilizarov frame on (Fig 5). The frame was removed at 6 weeks after arthrodesis.

After a further course of physiotherapy, the patient achieved a good functional outcome with the ability to make a fist (Figs. 6 and 7) and use the right hand to operate his manual wheel chair. At the time of final follow-up, 8 months since arthrodesis, his elbow movements were full and the forearm movements showed 70° of supination, 20° of pronation. The grip strength in the right hand measured 28 kg compared to 46 kg in the left hand. He was able to use the right hand for weight bearing during...
transfer on to a wheel chair. The distal ulnar frac-
ture did not unite, but he remained asymptomatic
from this.

Discussion

Varying degrees of malunion following a distal radial
fracture is common, but non-union is extremely
rare. The non-united fragment often becomes
osteoporotic, making internal fixation of the frag-
ments more difficult. The wrist stiffness associated
with an established non-union is often difficult to
correct surgically. In a chronic non-union associated
with severe deformity and completely stiff wrist
joint, correction of the deformity followed by wrist
arthrodesis may provide better and predictable out-
come compared to internal fixation.

The deformity correction prior to wrist arthrodes-
asia can be achieved acutely or by gradual method.
Acute correction of the deformity may require
extensive exposure and bone shortening, in order
to achieve satisfactory correction. Gradual correc-
tion using Ilizarov method has the advantage of
allowing controlled and progressive correction of
the deformity without devascularising the small
non-united distal fragment, and to prevent bone
shortening. Controlled correction of shortening,
translation and rotational deformity is possible. In
our patient, satisfactory correction of the deformity
was achieved using the Ilizarov method, facilitating
wrist fusion.

To our knowledge, there has been no published
case report on the usage of Ilizarov technique in
deformity correction and subsequent wrist arthrod-
esis in severely deformed chronic non-union of the

![Figure 1](image1.jpg)

Figure 1 Fracture non-union resulting in a ‘Z’ deformity at the wrist.

![Figure 2](image2.jpg)

Figure 2 Fracture non-union leading to inability to make a fist.

![Figure 3 and 4](image3.jpg)

Figures 3 and 4 Antero-posterior and lateral views of wrist during distraction and translation.

![Figure 5](image4.jpg)

Figure 5 Wrist arthrodesis done using a low-profile dorsal plate while the Ilizarov frame was on.
distal radial fracture like our case. There is however, a case report on the usage of the Ilizarov technique in the treatment of distal radial non-union with physeal arrest in a 10-year-old child.\textsuperscript{1}

**Conclusion**

Ilizarov method is valuable option in successfully managing these rare and difficult cases of chronic non-union of distal radius with severe deformity.

**References**


**Figures 6 and 7** Clinical photographs taken at the time of final follow-up showing excellent functional outcome.