ULNAR IMPINGEMENT SYNDROME

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We report the ulnar impingement syndrome, which is caused by a shortened ulna impinging on the distal radius and causing a painful, disabling pseudarthrosis. Of the 11 cases reported, 10 were due to excision of the distal ulna after injury to the wrist; the other was a result of a growth arrest after a fracture of the distal ulna in a child. The symptoms are a painful, clicking wrist and a weak grip; clinical examination reveals a narrow wrist with pain on compression of the radius and ulna and on forced supination. Radiographs in the majority of cases show scalloping of the distal radius corresponding to the site of impingement. The mechanism by which ulnar impingement occurs after radio-ulnar convergence is illustrated. The plan of management for the young patient with traumatic dysfunction of the distal radio-ulnar joint is discussed; excision of the lower end of the ulna is not advised in such patients.

Excision of the distal ulna has been recommended as the treatment of traumatic dysfunction of the distal radio-ulnar joint since it was popularised by Moore (1880) and Darrach (1913). Other reports which followed were universally enthusiastic about its success (Boyd and Stone 1944; Dingman 1952; Kessler and Hecht 1970) and indications broadened for its use in rheumatoid arthritis and the correction of Madelung's deformity (Ranawat, DeFiore and Straub 1975).

The indications for Darrach's procedure after fracture of the distal radius and ulna are pain and limitation of rotation at the distal radio-ulnar joint; the incidence of this dysfunction is high. Lidström (1959) found pathological movement at this joint in 15% of his patients and Frykman (1967) reported pain at that site in 19%.

Published series describe excellent results of Darrach's procedure, with one exception (Ekenstam, Engkvist and Wadin 1982). Complications that have been reported include anteroposterior (dorsovolar) instability, subluxation of the distal ulna, a clicking wrist on rotation of the forearm, ulnar translocation of the carpus and, in two series, pseudarthroses which were "of no clinical significance" (Lugnegård 1969; Hartz and Beckenbaugh 1979).

Anteroposterior instability has long been recognised as a cause of pain and discomfort, but the fact that convergence of the radius and ulna can occur when the distal ulna is shortened has not been appreciated. We pre-
Pain and discomfort after Darrach's procedure has been thought to result from anteroposterior instability of the distal ulna. This has led various authors to describe specific operations to counteract this problem; these include flexor carpi ulnaris tenodesis (Edmonson and Crenshaw 1980), volar capsular transfer (Blatt and Ashworth 1979) and extensor carpi ulnaris tenodesis (Goldner and Hayes 1979). Boyd and Stone (1944) felt that proper attention to surgical technique could prevent this instability and described in detail their method of leaving the ulnar styloid and performing a minimal resection of the distal ulna subperiosteally. Dingman (1952) concluded that the best results were those in which the anatomy of the distal radio-ulnar joint was restored and this was achieved by subperiosteal resection of the ulna with subsequent regrowth. Other authors state that this instability is not important, and that it makes no difference to the outcome what type of resection is performed (Lugnegård 1969; Hartz and Beckenbaugh 1979). Hartz and Beckenbaugh found 30% of their cases had a clicking wrist, but this was not symptomatic. In the same paper, they described six cases of pseudarthrosis

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Injury</th>
<th>Operations</th>
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<tr>
<td>1</td>
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<td>Darrach 1979</td>
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<tr>
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<td>Darrach 1979</td>
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<td>Sprain of wrist when a wrench slipped 1977</td>
<td>Ganglion excised 1977</td>
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<td>11</td>
<td>M</td>
<td>35</td>
<td>Subluxation of distal radio-ulnar joint after injury</td>
<td>Darrach 1982</td>
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</table>

**DISCUSSION**

The commonest cause of a shortened distal ulna is excision of the ulnar head, the indications for which include traumatic dysfunction of the distal radio-ulnar joint, subluxation of the ulnar head, rheumatoid arthritis and the correction of Madelung's deformity. After fractures of the distal radius and the ulna, the aims of excision of the ulnar head are to increase the range of movement and to reduce pain.
Causes of convergence: four factors are involved in the ulnar impingment syndrome. Figure 4—Diagram to show the pre-stressed effect of the interosseous membrane and the pull of pronator quadratus. Figure 5—Diagram to show the pull of extensor pollicis brevis and abductor pollicis longus, and the loss of the ulnar buttress.

between the radius and the ulna, but this was not clinically significant. This is a reiteration of Lugnegård (1969) who stated that the pseudarthrosis that occurs after Darrach’s procedure is of no clinical significance. In these two papers, the authors failed to identify ulnar impingement as a cause of persisting pain. We have shown that ulnar impingement resulting from radio-ulnar convergence can cause a painful, disabling pseudarthrosis.

When the distal ulna is shortened, for whatever reason, and loses its buttress at the radio-ulnar joint, radio-ulnar convergence is inevitable. This convergence is caused by the actions of extensor pollicis brevis, abductor pollicis longus, and pronator quadratus, and by the effect of the interosseous membrane; the dynamics are shown in Figures 4 and 5. Ulnar impingement is of clinical significance, as in seven patients pain was sufficiently disabling to prevent them from working. All suffered considerable restrictions in their lifestyle. The good results that Dingman (1952) obtained after re-growth of the ulna may be explained by the ulnar buttress having reformed and so preventing the development of radio-ulnar convergence and the subsequent impingement.

In the treatment of ulnar translocation of the carpus, Gonçalves (1974) advised Baldwin’s operation to deal with the dysfunction of the distal radio-ulnar joint. This operation may well stop carpal translocation but the propensity for ulnar impingement is still present.

Excision of the distal ulna does not restore grip strength to normal. Ekenstam et al. (1982) found that grip strength was reduced in 10 out of 24 patients. Fernandez (1982) states that a decrease in grip strength is a common complaint after Darrach’s procedure in young adults; this may be a reflex inhibition due to the pain of ulnar impingement, as impingement is increased while gripping.

The best treatment for distal radio-ulnar joint symptoms after injury in younger active patients is reconstruction not excision. For instability, soft-tissue reconstruction to restore stability (usually dorsal capsular plication) is appropriate. When malalignment of the radius or ulna exists, osteotomy is warranted with stabilisation of the distal radio-ulnar joint if needed. In the elderly patient or in rheumatoid arthritis, however, excisional arthroplasty will suffice, principally because the hands and wrists are not likely to be subjected to major loading.

Once ulnar impingement has occurred, and a painful wrist has resulted, further excision of the ulna is irrational. All that will result is more proximal impingement, as we have shown in this series. Similarly, attempts...
to stabilise the distal ulna by tethering it to the radius are likely to fail since this will exacerbate the radio-ulnar convergence. Repairs using the extensor carpi ulnaris as a tenodesis to restore stability are more logical to contend with anteroposterior instability as well as convergence and impingement. When shortening of the ulna is such that repair is not possible, we have attempted to reconstruct the distal radio-ulnar joint by inserting a Silastic cap on the distal ulna, or by ulnar lengthening, or radial shortening, or a combination of all three. No firm treatment recommendation can be given until further experience is gained.

While surgical excision accounts for most cases of a short distal ulna, in one of our cases it was due to growth arrest after a fracture with epiphysial damage. Ulnar impingement syndrome must be considered a possible complication of such a fracture (Figs 6 to 8). The only course of action once unequal growth has occurred is to consider radial shortening or ulnar lengthening with reconstruction of the distal radio-ulnar joint.

REFERENCES


