Ulnar shortening osteotomy for ulno-carpal impaction syndrome due to a malunited distal end radius

Dinesh Sunny Veliath

Abstract
Fractures of the distal end of radius account for, one-sixth of fractures encountered by the Orthopaedic surgeon. A variety of procedures have been described for the management of a mal-united lower end radius fracture as well as its complications.2

The author reports the management of such a case, where the patient had classic symptoms of ulno-carpal impaction syndrome, with incongruity the distal radio-ulnar joint (without degeneration), but with a normal radio-carpal joint.

Key words: Ulno-carpal impaction syndrome, Malunion, Radius

Introduction
As greater understanding of the biomechanics of the wrist joint comes into awareness, numerous procedures have been described for the management of a mal-united fracture of the lower end of radius.2 The procedures address the various components of the malunited fracture and the pathology it causes.

Ulno-carpal impaction syndrome, distal radio-ulnar joint instability, radio-carpal degeneration along with carpal instability is some of the pathologies that arise, depending on the severity of the mal-union.2

The functional deficits in terms of loss of grip strength, limitation of pronation and supination can be debilitating.

The ulnocarpal joint aids in forearm rotation as well as carpal kinematics. The joint is comprised of the distal radio-ulnar articulation, triangular fibrocartilage complex, Lunate, Triquetrum, Hamate, and Pisiform, and the intra and extra capsular ligamentous and soft tissue constraints.3

The ulnar impaction syndrome can be defined as the impaction of the ulnar head against the triangular fibrocartilage complex and ulnar carpus.4,5 Studies have also shown the relationship between the degree of initial displacement / severity of the fracture and the degree of tear of the TFCC.6

The modalities of management of TFCC pathologies include noninvasive investigative modalities like CT scan or MRI scan17-19 and invasive modalities like wrist arthroscopy.

Radiological guidelines aids the surgeon, in decision making, both intra-operatively as well as postoperatively so as to the amount of deformity which is acceptable and also helps in correction of any residual deformity.2

Case report
A 51 year old housewife presented with a mal-united fracture of the distal end radius of the left, non-dominant side, of 6 years duration. She was initially managed by a below elbow cast for a period of 5 weeks.

At the time of presentation she had gradual progressive restriction of routine household and personal activities due to the pain.

Clinically:
1. Diffuse swelling along the course of ulnar border of the wrist
2. Positive ulnar grind test
3. Tenderness at the head of the ulna
4. Forced pronation / supination elicited pain at the ulno-carpal joint
5. No tenderness at the DRUJ, mid-carpal joint or at the wrist joint.
As per calculations 6 mm of bone was removed and after verifying that there is no limitation in pronation and supination, the osteotomised bone was stabilized using a 6 hole DCP. (Figure. 3) The limb was then immobilised in an above elbow splint, for a period of 6 weeks. After that mobilisation was started, with full return to normal activities 3 months after the procedure.

Follow up was done every two months. The photos are the latest follow up at 11 months. (Figure. 4 and Figure. 5) She is now totally symptom free and is carrying out her activities of daily living effortlessly. Since she is asymptomatic, wrist arthroscopy for debridement of the TFCC has not been carried out.

### Discussion

Overloading between the distal ulna and ulnar carpus

<table>
<thead>
<tr>
<th>Radiological parameter</th>
<th>Value Obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radial inclination</td>
<td>22 degrees</td>
</tr>
<tr>
<td>Radial tilt</td>
<td>10 degrees (Volar tilt)</td>
</tr>
<tr>
<td>Radio-ulnar step off at DRUJ (Ulnar Variance)</td>
<td>6 mm</td>
</tr>
<tr>
<td>Normal side</td>
<td>24 degrees</td>
</tr>
<tr>
<td></td>
<td>12 degrees</td>
</tr>
<tr>
<td></td>
<td>Normal relation</td>
</tr>
</tbody>
</table>

Table. 1. Table comparing the radiological parameters of both the wrists
occurs as a result of a positive ulnar variance. This positive ulnar variance results in attrition to the triangular fibrocartilage. Clinically the patient presents with ulnar-sided pain and swelling with an insidious onset. USO is the treatment of choice for correcting positive ulnar variance, which relieves the pain by reestablishing a neutral or slightly negative ulnar variance. Other procedures like the wafer resection of the distal ulna either open or by arthroscopy have been described for idiopathic positive variance.

The role of arthroscopy in the management of degenerative tears of the TFCC has been described. In this patient an option of doing a secondary repair or debridement of the TFCC was kept after the index procedure. However she obtained relief and so far has no symptom to warrant arthroscopic debridement.

Biomechanical studies have also demonstrated the role of tightening of the TFCC ligaments while doing an ulnar shortening osteotomy.\textsuperscript{14-16}

Osteotomy of the radius, either intra-articular or extra-articular is done in the presence of un-acceptable radiological parameters of the distal radius, with or with out carpal instability. A variety of procedures has been described for the same.\textsuperscript{2} In this patient the radiological parameters of the radius were within normal limits.

Ablative procedures have also been described. These include either arthrodesis or ablative procedures of either the distal ulna or the distal radio-ulnar joint.\textsuperscript{2}

Arthrodesis is usually reserved when there are degenerative changes involving the articular surface. In this patient clinicoradiologically she did not have any degenerative changes in either the wrist or the distal radio-ulnar joint.\textsuperscript{2}

In conclusion, ulnar shortening osteotomy is beneficial in cases where there is an acceptable radial angulation with features
suggestive of ulnar impingement. Careful planning of the length of ulnar resection is needed as excessive pressure over the DRUJ, with subsequent degeneration, can occur if the ulna is shortened excessively.\(^{18}\)

References

Case Report

Dinesh et al.: Ulnar shortening osteotomy for ulno-carpal impaction syndrome due to a malunited distal end radius


Source of funding: Nil; Conflict of interest: Nil

Cite this article as: