Arthroscopic capsular release for contracture of the wrist - a new technique

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INTRODUCTION

Following trauma or surgery to the wrist, stiffness of the wrist is common. Open radio-carpal and DRUJ capsular releases have been reported.1-8 Arthroscopic release has been successfully used for contracture of the knee, shoulder and elbow, but has not been reported in the wrist.1-8 Cadaveric studies have been performed to assess the safety of arthroscopic capsulotomy in the shoulder, but not in the wrist.1-8

The purposes of this paper are to:
1. To present a technique of arthroscopic capsular release of the wrist,
2. To assess the proximity of the neurovascular structures to the volar capsule.

ANATOMICAL STUDY

The distance of the neurovascular structures from the radio-carpal capsule joint was measured on 10 transverse MRI images and two cadaveric wrist transverse sections. The results are presented in Fig 1 and Table 1.

OPERATIVE TECHNIQUE

Surgical technique

A diagnostic radiocarpal and midcarpal arthroscopy and debridement was performed with the hand suspended using a 2.7 or 1.9mm scope.8 With the arthroscope in the 3-4 portal a hooked instrument is inserted and the capsule is opened. The section of the volar capsule included the short and long radiocarpal, radioscaphocapitate (RSC), long radiotriquetral (LRT), scapholunate (SL), capitohamate (CH), and hamatomate (HM) ligaments, as well as the radial and ulnar collateral ligaments. A gentle closed manipulation was performed after the procedure. The post-operative treatment consisted of full, unrestricted mobilisation of the wrist, assisted with a carrot wrist block. Physiotherapy assisted mobilisation was also performed.

Fig 1: Cross-sectional anatomy of the radio-carpal joint with average distances to the major neurovascular structures.

Table 1: Distance from the radio-carpal joint capsule

<table>
<thead>
<tr>
<th>Structure</th>
<th>Range (mm)</th>
<th>Average (mm)</th>
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</thead>
<tbody>
<tr>
<td>Median N</td>
<td>4 - 9</td>
<td>6.9</td>
</tr>
<tr>
<td>Ulnar N</td>
<td>4 - 9</td>
<td>6.7</td>
</tr>
<tr>
<td>Radial A</td>
<td>3 - 7</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Table 1: Distance from the radio-carpal joint capsule

C A S E S

Two patients were treated by arthroscopic capsular release for stiffness of the wrist refractory to conservative management. In both cases the restricted range of motion was due to capsular contracture. The measurements for pain (VAS 0-10), range of motion and grip strength are presented in Fig 3-5.

Case 1:

A 23-year-old man who had an excision of a large right lunotriquetral ganglion cyst and bone grafting from the ischiadic tuberosity at 16 years of age (Fig 6). He remained stiff and had no relief of pain. Radiographs showed no intra-articular incongruity and no evidence of a dorsal arthrofibrosis of the radius. Both patients were satisfied with the outcome and able to return to their previous occupations. There were no neurovascular complications. There was no clinical or radiological evidence of carpal instability at 6 months following surgery (Fig 6).

Case 2:

The second patient was a 35-year-old woman who sustained an intra-articular distal radial fracture, which was treated by closed reduction and percutaneous K-wires. Five months following removal of the cast and extensive physiotherapy, the wrist remained stiff. Radiographs showed no intra-articular incongruity and no evidence of a dorsal arthrofibrosis of the radius. Both patients were satisfied with the outcome and able to return to their previous occupations. There were no neurovascular complications. There was no clinical or radiological evidence of carpal instability at 6 months following surgery (Fig 6).

Fig 5: Grip-Strength (Percentages of contralateral wrist in top right corner).

DISCUSSION

Functional range of motion: as reported by Palmer and Werner, was achieved in both patients.1-8 The arthroscopic technique is minimally invasive and allows an extensive release without the major dissection required for an open release.6

Carpal instability: Hayes et al. have reported that the section of the RSC and RL ligaments alone does not lead to significant ulnar translation of the carpus, and that either the palmar or dorsal ulnar ligament complexes alone can prevent ulnar translation.13 The carpal capsulotomy leaves the palmar ulnar ligament and dorsal ulnar ligament complexes intact.

Fig 6: Post-operatively lateral and PA radiographs for case 2.

Ideal patient: The patient in which the joint stiffness is due to capsular contracture with a normal articular cartilage and joint congruity. Patients with displaced intra-articular fractures, or carpals incongruency are unlikely to obtain good results. If the main problem is joint pain or generalised arthropathy then the results are less likely to be successful.

CONCLUSION

Arthroscopic capsular release is technically feasible, safe and provides a significant improvement in range of motion using a minimally invasive technique.

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References: