INTRODUCTION

The natural history of an isolated scapholunate ligament injury is unclear. It is generally held however that the inevitable consequence of this injury is a form of secondary osteoarthritis known as scapholunate advanced collapse (SLAC) wrist (Watson and Ballet, 1984). This work assumes that the presence of a static scapholunate disassociation, that is a fixed gap between the scaphoid and lunate bones on X-ray, predisposes to arthritic change. At this time there is no long-term review of patients with an isolated scapholunate interosseous ligament injury with no evidence on X-ray of fixed changes. It is the purpose of this study to review a small number of patients with an isolated scapholunate ligament injury diagnosed by arthroscopy who had normal radiographs.

PATIENTS AND METHODS

Eleven patients suffering with chronic wrist pain attributed to scapholunate interosseous ligament injuries and normal radiographs were included in this study. All patients had a definite history of injury to the wrist or wrists, which occurred on average 4.5 (range, 1–11) years prior to diagnosis. The diagnosis was ultimately made by clinical examination, radiological investigation, and in all cases wrist arthroscopy. All patients were recalled after a minimum of 2.5 years for a clinical evaluation, which included assessment of pain with a visual analogue score (VAS), measurement of range of wrist motion and grip strength (Jamar Dynamometer). A functional assessment was also undertaken and compared to a similar evaluation at referral.

Radiological evaluation at the time of diagnosis and at follow-up was with a six shot wrist series. This included PA views in neutral and radial and ulnar deviation, a true lateral and PA and lateral clenched fist views. The scapholunate angle, scapholunate gap, radiocarpal index and presence or absence of degenerative changes were assessed. The scapholunate angle was measured by calculating the angle between the long axis of the scaphoid (line drawn tangential to the proximal and distal palmar edges of the scaphoid) and a perpendicular to a line drawn between the distal dorsal and palmar edges of the lunate as seen on the neutral lateral view. A scapholunate angle greater than 80° and a scapholunate interval greater than the luno-triquetral
interval were felt to be pathological (Stanley and Trail, 1994). The carpal height ratio was measured using the technique described by Youm et al. (1978) (Fig1).

Arthroscopic assessment was undertaken by one of the senior authors. The criteria for diagnosing an interosseus scapholunate ligament injury were those used by Dautel et al. (1993), Adolfsson (1994) and more recently Kozin (1999) (Table 1). These include the presence of excess gapping between the scaphoid and lunate, as seen from both the radiocarpal (Fig 2) and midcarpal joints (Fig 3), step-off at the scapholunate joint in comparison to the luno-triquetral joint as seen from the mid-carpal joint and any defect in the scapholunate ligament when viewed from the radiocarpal joint. According to Kozin’s system, all of the wrists were either Grade 1 or Grade 2. Other arthroscopic findings included some minor degenerative changes effecting the radio-styloid in two cases.

Table 1—Arthroscopic classification of scapholunate ligament injuries (Kozin, 1999)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>Attenuation or haemorrhage, no incongruency</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Incongruency or step-off of carpal space, slight gap less than width of probe</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Incongruency or step-off of carpal space, probe passed between scaphoid and lunate</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Incongruency or step-off of carpal space, scope (2.7 mm) passed through gap between scaphoid and lunate</td>
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</tbody>
</table>

RESULTS

There were 11 patients with 12 affected wrists. The average age was 43 years (range 28–67 years) with an average follow-up from diagnosis of 7 years (range 2.5–13 years) (Table 1). As mentioned previously the mean time from injury to diagnosis was 4.5 years (range 1–11 years) and thus the mean time from injury to final assessment was 11.5 years (range 3–13 years). One patient had bilateral problems (Table 2). All the patients were right handed. Eight patients had their right wrist affected and two had their left.

All 11 patients gave a definite history of injury with eight having occurred at work. Seven injuries were described by the patient as having occurred in hyperextension and one in hyperflexion. The rest could not give an accurate description. Seven patients had claimed for compensation: five of these cases had settled and two were continuing.

All 11 patients were still experiencing pain at follow-up with a mean measurement on the visual analogue scale (0 = no pain, 10 = worst pain imaginable) of 3.2 at rest worsening to 6.6 after activity. This compares with a mean visual analogue pain score as measured at diagnosis of 7.6 at rest and 8.2 after activity. All patients were still taking oral analgesia intermittently and some were still receiving physiotherapy. Seven wore a splint from time to time for symptomatic relief. All patients complained of pain on the radial side of the wrist with tenderness in the anatomical snuff box. In addition, all patients experienced discomfort on the Watson manoeuvre but only two demonstrated a significant clunk.

The ranges of extension/flexion and ulnar/radial deviation were significantly lower than for the unaffected wrist \( (P<0.01) \) at final follow-up (Table 3). However, the range of wrist motion had not deteriorated significantly since the time of diagnosis.
Grip strength was also lower in the injured hand with a mean of 24 kg compared to a mean of 40 kg on the unaffected side (\( P < 0.001 \)). However, it had not deteriorated since the time of diagnosis (Table 3).

Of the 11 patients, only one was in the same occupation as that prior to the injury, and his job description had changed to allow lighter duties. Of the remaining ten patients, four were unemployed and one had retired. The others were generally performing lighter work, though one continued to work as a heavy goods vehicle driver (Table 2). All patients had given up sporting activities and the majority had difficulty with heavier gardening and household tasks. A common finding was difficulty using a screwdriver: five of the 11 were unable to use one and three were unable to carry heavy shopping.

The radiological results are given in Table 4. The scapholunate angle, scapholunate gap and carpal height ratio had not altered significantly between diagnosis and follow-up. However, signs of radiocarpal degenerative change were seen in one patient at follow-up who had had no arthroscopic evidence of this at diagnosis. The two patients with minor degenerative changes noted at arthroscopy had no radiological evidence of degenerative change at follow-up.

DISCUSSION

The natural history of untreated scapholunate interosseus ligament injury is still unclear. Although Harrington et al. (1987) and Watson et al. (1997) stated that secondary osteoarthritis in the form of SLAC is an inevitable consequence of a scapholunate disruption, there is little supportive evidence. Larsen and Brondum (1993) performed a retrospective review of 18 cases of carpal instability diagnosed by clinical and radiological means, most of which had been treated surgically with either plate fixation or Kirschner wires. Their mean length of follow-up was 9 years with a range from 1 to 20 years. At review four of their 18 cases had undergone a wrist arthrodesis and another four had radiological signs of significant osteoarthritis. Twelve of the 18 were satisfactory in terms of pain and grip strength, despite persisting radiographic instability in nine.

We believe our study is unique as it reports a group of patients with untreated, isolated, scapholunate interosseus ligament injury, and shows no rapid deterioration in the status of the patients over an average period of 7

<table>
<thead>
<tr>
<th>Patient</th>
<th>Time of injury</th>
<th>Date of diagnosis</th>
<th>Follow-up since injury (months)</th>
<th>Age</th>
<th>Previous occupation</th>
<th>Current occupation</th>
<th>Dominant hand</th>
<th>Affected wrist</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>~1993</td>
<td>1995</td>
<td>60</td>
<td>67</td>
<td>Teacher</td>
<td>Retired</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>2</td>
<td>3/96</td>
<td>1997</td>
<td>32</td>
<td>32</td>
<td>Nurse—Altered Job Description</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>3</td>
<td>2/91</td>
<td>1992</td>
<td>84</td>
<td>53</td>
<td>Driver</td>
<td>Unemployed</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>4</td>
<td>~1991</td>
<td>1998</td>
<td>84</td>
<td>49</td>
<td>Secretary</td>
<td>Gift shop owner</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>5</td>
<td>6/91</td>
<td>1995</td>
<td>84</td>
<td>28</td>
<td>Auxiliary nurse</td>
<td>Housewife</td>
<td>R</td>
<td>L</td>
</tr>
<tr>
<td>6</td>
<td>6/96</td>
<td>1997</td>
<td>30</td>
<td>28</td>
<td>Driver</td>
<td>Retail manager</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>7</td>
<td>~1985</td>
<td>1992</td>
<td>156</td>
<td>47</td>
<td>Housewife</td>
<td>Unemployed</td>
<td>R + L</td>
<td>R</td>
</tr>
<tr>
<td>8</td>
<td>10/89</td>
<td>1997</td>
<td>108</td>
<td>51</td>
<td>Catering assistant</td>
<td>Unemployed</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>9</td>
<td>1985</td>
<td>1996</td>
<td>156</td>
<td>43</td>
<td>Driller</td>
<td>HGV driver</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>10</td>
<td>4/96</td>
<td>1998</td>
<td>32</td>
<td>41</td>
<td>Plumbing engineer</td>
<td>Not worked since injury</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>11</td>
<td>4/91</td>
<td>1993</td>
<td>90</td>
<td>38</td>
<td>Miner</td>
<td>Store man</td>
<td>R</td>
<td>L</td>
</tr>
</tbody>
</table>

HGV = heavy goods vehicle.

Table 3—Mean (range) of wrist range of motion and grip strength

<table>
<thead>
<tr>
<th></th>
<th>Affected wrist at diagnosis (degrees)</th>
<th>Affected wrist at follow-up (degrees)</th>
<th>Unaffected wrist at follow-up (degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorsiflexion</td>
<td>46 (25–62)</td>
<td>45 (30–64)</td>
<td>62a (52–75)</td>
</tr>
<tr>
<td>Palmarflexion</td>
<td>34 (–5–58)</td>
<td>35 (10–58)</td>
<td>58b (50–65)</td>
</tr>
<tr>
<td>Ulnar deviation</td>
<td>24 (18–42)</td>
<td>25 (18–42)</td>
<td>33a (25–39)</td>
</tr>
<tr>
<td>Radial deviation</td>
<td>18 (5–24)</td>
<td>16 (10–24)</td>
<td>23a (18–32)</td>
</tr>
<tr>
<td>Pronation</td>
<td>85 (70–90)</td>
<td>83 (70–90)</td>
<td>85 (70–92)</td>
</tr>
<tr>
<td>Supination</td>
<td>85 (70–90)</td>
<td>80 (70–90)</td>
<td>85 (72–88)</td>
</tr>
<tr>
<td>Grip strength</td>
<td>25 (4–39)</td>
<td>24 (5–38)</td>
<td>40b (18–48)</td>
</tr>
</tbody>
</table>

*Significant difference (\( P < 0.02 \)) between injured and normal wrists at follow-up.
**Significant difference (\( P < 0.001 \)) between injured and normal wrists at follow-up.
years from diagnosis. At review all patients continued to have a painful wrist, although their pain levels at review were less than that at diagnosis. In contrast range of wrist motion and grip strength had not improved with time. All our patients had adapted their lifestyle to accommodate for their wrist disability, and this uniformly involved some change of occupation. In addition there was no rapid deterioration in the radiographic appearances over time, and no patient developed a dynamic or static collapse pattern. However, radiographic signs of radiocarpal degenerative change were seen in one patient, and two others had early degenerative changes noted at arthroscopy. It should be noted, however, that no patient had evidence of a widening of the scapholunate interval or a DISI deformity at diagnosis or review, and thus none had complete scapholunate dissociation. We must assume therefore that the extrinsic ligaments were probably intact in all our patients, and were able to prevent carpal collapse. As a consequence the transfer of loads across the radioscaphoid and radiolunate articular surfaces probably remained within normal limits, and prevented the development of degenerative change.

The possibility that our arthroscopic findings were due to simple degenerative changes within the scapholunate ligament was considered. However, we believe the step-off and gapping between the scaphoid and lunate bones seen at arthroscopy, which was the site of discomfort on clinical examination, and the specific history of trauma would indicate a traumatic rather than a degenerative aetiology.

Whilst this study outlines the natural history of untreated scapholunate interosseous ligament injury, comparison with other publications which claim that surgical treatment has a significant advantage over non-operative treatment is difficult. Most publications include patients with a spectrum of injuries ranging from isolated interosseous ligament injury through to complete scapholunate dissociation which is visible on plain radiographs. These studies universally report an improvement in pain and function after surgery, though there is no evidence that these treatments are any better than non-operative methods. (Watson and Hampton 1980; Watson et al., 1981; Blatt, 1987; Conyers, 1990; Deshmukh et al., 1999). In addition, there is no evidence that scapholunate ligament reconstruction or partial wrist fusion prevents or delays the onset of degenerative change (SLAC wrist). Thirdly, all operative interventions decrease wrist motion, and result in pain and function levels which are comparable with the outcomes observed in our group of patients treated by non-operative means. What is clear however is that an accurate description of the injury, particularly its severity, is required when reporting the outcome of various treatment methods.

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References


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