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ORIGINAL STUDY

Treatment of chronic static scapholunate dissociation with the modified Brunelli technique : Preliminary results

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A series of 10 patients with reducible chronic post-traumatic scapholunate dissociation, treated with the modified Brunelli technique, is presented. The general outcome was good with a mean DASH score of 12, a range of motion of 69% and gripping force of 77% compared with the contralateral side.

Keywords : wrist ; trauma ; scapholunate ; ligament reconstruction ; outcome.

INTRODUCTION

The treatment of chronic scapholunate dissociation remains controversial. There is still no consensus between soft tissue reconstruction or bony procedures, i.e. limited arthrodeses.

Blatt (*3*) described a dorsal capsulodesis in 1987. Good outcomes have been reported with this technique, mostly for dynamic scapholunate instability (*10, 12-14*). When rotatory dislocation occurs, most studies revealed that some attenuation of extrinsic ligaments has also occurred. The volar scaphotrapezoidal ligaments seem to be usually involved. This was the biomechanical basis for the flexor carpi radialis tenodesis described by Brunelli and Brunelli in 1995 (*4, 5*). This technique has been modified by the hand team of Wrightington (*6, 15*). The aim of this study was to evaluate the outcome of a limited cohort of patients with chronic, static scapholunate dissociation with the modified technique.

MATERIAL AND METHODS

We reviewed 10 patients (7 males, 3 females) with a mean age of 40 years (range : 26 to 47), operated between 1998 and 2004, 7 on the right side and 3 on the left side, for chronic static scapholunate dissociation. They all had sustained an injury with a fall on the outstreched hand more than one year previously.There was an associated distal radius fracture in one case and a perilunate dislocation in another. The diagnosis was obvious on plain radiographs in 4 cases, on MRI in one and at arthroscopy in 5 cases (Geissler grade 2 or 3).

The mean follow-up was 29 months (range : 12 to 62). The evaluation was done by an independent observer. Patients were asked for their satisfaction and pain relief. They completed a DASH (disability of arm, shoulder and hand) (*7*) score and a PRWE (patient rated wrist evaluation) (*9*). Range of motion (hand held goniometer) and gripping force (Jamar dynamometer) were also evaluated. A standard radiograph was taken at final follow-up to measure the scapholunate angle and carpal

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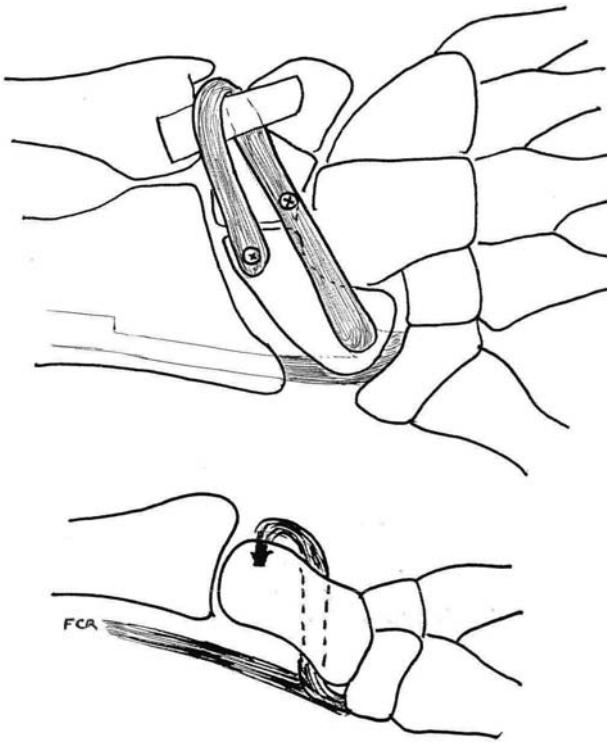

Fig. 1. — Schematic drawning of Brunelli's technique.

collapse (Nattras coefficient : carpal height divided by length of the capitate) (*11*). Working capacity was evaluated.

Operative technique

The wrist was first approached dorsally. The third extensor compartment was opened and the dorsal capsule was visualised. A ligament splitting (*2*) capsulotomy was performed. The carpus was inspected, scar tissue was removed, adhesions between the scaphoid and the capsule were released and the scaphoid was reduced and fixed with two K-wires, one to the capitate and one to the lunate. The wrist was then approached volarly through a limited Matti Russe approach. The bed of the flexor carpi radialis (FCR) was incised, exposing the scaphotrapeziotrapezoidal (STT) joint. A 3.2 mm hole was drilled from volar to dorsal in the distal part of the scaphoid. A distally based 10 cm strip of the FCR was harvested. It was passed through the hole and recovered dorsally, where it was fixed to the dorsal aspect of the lunate with a bone anchor. The remaining end was passed under the ulnocarpal ligament and turned back and fixed into the distal scaphoid, also with a bone anchor. The wrist was immobilised for 6 weeks. Mobilisation was started at 8 weeks, strengthening exercises at 12 weeks (fig 1).

RESULTS

The overall outcome was satisfactory : 2 patients were completely painfree, 7 were satisfied, one was not. The mean DASH score was 12 (SD 6.7) and the PRWE was 26 (range : 13 to 61). The range of motion and gripping force were significantly reduced compared to the contralateral side (table I) but were in all cases within the functional range. The postoperative gripping force was 77% (range : 59 to 102) of the contralateral side ; extension and flexion were both 69% of the contralateral side.

Mean time off work after operation was 18 weeks (range : 9 to 26) in 9 patients ; one patient could not resume his previous activity.

Radiographically the Natrass index was 1.54 (SD : 0.09). A carpal collapse (scapholunate angle > 60°) was seen in two cases.

DISCUSSION

Rupture of the scapholunate ligament is the most frequent ligament injury at the wrist (*8*). Interruption of the link between the scaphoid and the lunate leads to a rotatory subluxation of the scaphoid and collapse of the carpus known as DISI (dorsal intercalated segment instability). Although the diagnosis, classification and pathogenesis have been described as early as in 1972, treatment is still often delayed. Awareness of ligament rupture in the sprained wrist is the first step in treatment of these lesions. Persistence of the malalignement of the carpus results in degenerative osteoarthritis of the wrist, the SLAC wrist (scapholunate advanced collapse) (*16*). A substantial number of patients are seen in the subacute phase, more than 3 months after trauma with a still reducible scaphoid and without osteoarthritis. Several procedures have been proposed : soft tissue repair and reconstruction, partial arthrodesis and even salvage procedures such as proximal row carpectomy and wrist arthrodesis.

Table I. — Summary of data of the patients cohort (* = significant)

	mean	range	SD	p value
DASH score	12	5 - 33	6.7	NA
PRWE	26	13 - 61	15.9	NA
Gripping force Control	34 kg 45 kg	21 - 46 kg 26 - 68 kg	9.2 13.9	0.054*
Extension Control	48° 70°	28 - 70° 60 - 80°	13.3 6.4	< 0.001*
Flexion Control	49° 73°	20 - 75° 58 - 90°	10.2 10.2	< 0.001*
Radial deviation Control	17° 29°	4 - 32° 12 - 50°	8.4 11.9	0.017*
Ulnar deviation Control	34° 44°	12 - 50° 10 - 58°	10.8 13.2	0.08

In the seventies and eighties most surgical techniques focused on closing the scapholunate gap. Almquist *et al* (*1*) in 1991 extended a tendon graft of the extensor carpi radialis longus over the whole carpus to stabilise the scaphoid. In their report of 36 cases, 35% were painfree, 35% had pain on heavy activity and 24% had occasional pain. Extension averaged 52°, flexion 37° and gripping force 73% of the opposite side.

In 1995, Brunelli and Brunelli (*4, 5*) reported a tenodesis technique with the flexor carpi radialis. In the original description, a strip of the FCR was brought dorsally through the scaphoid and fixed to the radius. In 1998, the Wrightington group (*15*) reported a modification, fixing the tendon strip dorsally into the lunate. They reported the outcome in 22 patients : 13 of the 14 in the non-compensation group were satisfied. Overall there was extension of 49°, flexion of 42° and a gripping force of 58%. Garcia-Elias *et al* (*6*) subsequently modified this technique by bringing the tendon strip through the dorsal ulno-triquetral ligament and suturing it to itself. In their series of 38 patients, 28 were relieved of pain at rest, 8 had discomfort during heavy duty and 2 had constant pain. We used the Wrightington technique (*15*) in this series. Our results and others recently reported are encouraging but still we consider this series as preliminary, as the eventual goal of this reconstructive technique is to achieve a good long-term outcome and to prevent osteoarthritis.

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