Blatt's capsulodesis for chronic scapholunate instability

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Nineteen patients underwent a scapholunate interosseous ligament repair combined with a Blatt's capsulodesis for scapholunate instability between 1994 and 1999. The diagnosis was based on clinical, radiographic and arthroscopic assessments. Mean follow-up was 22 months (range : 8 months to 5 years). Fifteen patients were available for follow-up. Most (13 of 15) of the patients presented with predynamic or dynamic instability. Results were analysed clinically and radiologically. Thirteen patients showed good or excellent clinical result. There was statistically significant improvement in pain relief (VAS scores) and grip strength (58% of the opposite side). Mean extension and ulnar deviation were significantly improved (62% and 53% of the opposite side respectively) and there was significant reduction in wrist flexion (49% of the opposite side). Thirteen patients returned to their original level of activity. There was no significant change in the mean scapholunate gap and angle after surgery. Thirteen patients would recommend this operation. We believe that this procedure can produce encouraging results in cases of predynamic and dynamic instability in a patient population with low-demand wrists. Larger caseloads and more complete follow-ups would be desirable to derive strong evidence-based conclusions.

INTRODUCTION

Scapholunate instability was originally described by Taleisnik (13) as a radial or lateral instability and classified by Lichtman (8) as one of the perilunate instabilities and it remains the most common of carpal instabilities. The most successful treatment for this problem is obtained through an early diagnosis (2, 6). Awareness and recognition of this entity are thus imperative.

Blatt (1) described a dorsal capsulodesis as a method of operative stabilisation. This study elucidates the results of 19 capsulodeses performed for predynamic, dynamic and static scapholunate instability.

PATIENTS AND METHODS

This was a retrospective analysis of cases of scapholunate instability that underwent a dorsal capsulodesis performed by one single surgeon at one institution between 1994 and 1999. Nineteen dorsal radio-scaphoid capsulodeses were performed in as many patients. Fifteen patients were available for follow-up examination (table I). There were 12 males and 3 females. The mean age was 38 years (range : 30 to 65 years). Three of them were heavy manual workers (2 farmers and a plumber), nine were office desk workers, one was a housewife and two had retired prior to development of symptoms. Nine patients recalled a specific injury with which they could relate the onset of symptoms. No cases receiving workers' compensation were included. Patients were referred after an average of 8.2 months (7–14 months) of conservative treatment. All patients

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Table I. — Demographic data

Gender	
Male	12
Female	3
Average age (range)	38 (30-66 years)
Occupation	
Heavy manual	3
Office workers	9
Housewives	1
Retired	2
Workers' compensation	0
Dominant (R) wrist	13

Table II. — Classification (Watson et al, 1993)

Pre-dynamic Instability	4
Dynamic Instability	13
Static Instability	2

underwent a trial of conservative treatment for a minimum of 12 weeks (range : 12 weeks to 52 weeks). The mean follow-up was 22 months (8 months to 5 years). Thirteen patients had surgery on their dominant wrist.

Patients were assessed pre-operatively for pain, function (impeding work and activities of daily living), tenderness, range of motion, grip strength and the Kirk Watson test. The severity of the pain was rated according to the visual analogue score. Grip strengths were noted by means of a dynamometer in kgf. All patients had a positive scaphoid shift test. These patients then underwent a radiographic evaluation, which included PA views in a neutral position, radial and ulnar deviation, a lateral view and a clenched fist view. The scapholunate gap and angle were recorded. A wrist arthroscopy helped establish the diagnosis (4) and also assess the degree of chondral damage and associated injuries.

Patients were then classified into one of the three categories of instability (16). Patients with predynamic instability showed normal radiographs in loaded and unloaded wrists. They revealed a scapholunate step at arthroscopy. The radiographs of loaded wrists showed a scapholunate gap of > 2 mm in dynamic instabilities, though radiographs of the unloaded wrists were normal. Patients with static instability presented with a scapholunate gap on radiographs of > 2 mm in unloaded wrists. One could pass the wrist arthroscope from the radiocarpal joint into the midcarpal joint with ease in these cases. Most of the patients presented with predynamic and dynamic instability (table II).

The indications for surgery included :

Persistent disabling pain
Tenderness in the scapholunate area
Grip strength of < 80% of normal side
Decrease in wrist flexion/extension of > 15 degrees
Demonstrable scapholunate instability (scaphoid shift test)
Failure of conservative treatment for 12 weeks
Wrist arthroscopy :
Scapholunate step off or a gap > 2 mm (tip of scope)
or
Ability to visualise the capitate through this gap

Wrists with chondral damage were not included. Radiographs were only treated as adjuncts to a diagnosis and did not affect the decision to operate if they were normal. These patients then underwent an open interosseous ligament repair, when possible, and a dorsal capsulodesis as described.

Patients were followed up by an independent observer (AM) at an average of 22 months. They were evaluated with a grading system as reported by Glickel and Millender (5). The clinical grades were based on a scoring system that assigned points from 0 to 4. Grade 4 was an excellent result. Pain, range of motion and grip strength were compared with the opposite normal side. Subjective satisfaction (i.e. recommending the procedure) and return to work status were recorded. Radiographs similar to the preop assessment were taken. The scapholunate gap and angle were recorded and compared.

Operative Technique

Concept

This is a soft tissue technique for stabilisation of chronic rotary subluxation of the scaphoid. The concept of this operation is that a check-rein is created to prevent volar rotation of the distal pole of the scaphoid.

Technique

The radioscaphoid joint was exposed through a longitudinal dorsoradial incision. A 1.0 cm wide flap of dorsal capsulo-ligamentous tissue was raised, leaving its proximal edge securely attached to the dorso-ulnar aspect of the distal radius. The subluxated scaphoid was reduced by manipulation of the wrist, confirming reduction by restoring the anatomic appearance of the scapho-trapezial-trapezoidal joint. The reduced position was then maintained with a single 1.2 mm K-wire passed

obliquely from the distal pole of the scaphoid into the capitate. At a point well distal to the midaxis of rotation of the scaphoid, a notch was created down to fresh cancellous bone. The dorsal flap was then inserted into this notch and held in place with a Mitek anchor. The scapholunate ligament was repaired, if possible.

Postoperatively the patient wore a thumb spica cast for two months, at which time active range of motion exercises were begun. The K-wires were removed at three months postoperatively to allow intercarpal motion. Range of motion and strengthening exercises were then started.

Statistical analysis

Mean pre-operative values of pain, range of motion, grip strength and the scapholunate gap and angle on radiographs were obtained pre-operatively and postoperatively on the affected and normal wrists.

The data were analysed and the descriptive statistics (standard deviations) were calculated with Microsoft Excel (version 5.0). All other analyses were performed with the SPSS statistical package. The data was not amenable to normalising transformations. Categorical variables were compared (non parametric data) with the chi square test, with the level of significance set at alpha = 0.05.

RESULTS

Clinical

Clinical grades

The mean overall clinical score was 11.2 (range 3-15). One patient (6.7%) scored in the excellent range. Twelve patients (80%) scored in the good range. One each (6.7%) showed a fair and poor result. Of the two patients with non-dominant wrists, one scored in the excellent and the other in the good category. The average time to surgery in the good and excellent category was 8.7 months. In cases with poor and fair results it was 11 months ($p < 0.05$).

Pain

The mean VAS score improved from 3.9 to 8.2 after surgery ($p < 0.05$). Only one (6.7%) patient has no pain. Three (20.1%) patients have pain which is severe enough to decrease their activity. One (6.7%) patient has severe rest pain. Most (67%) experience pain with overuse or lifting, not severe enough to decrease activity.

Range of motion

There was a significant improvement in mean extension and ulnar deviation (41° vs. 33° and 17° vs 13° respectively) following surgery (table III). Radial deviation remained unchanged. Mean palmar flexion significantly reduced after surgery (from 44° to 37°) (table III).

When compared to the opposite side, there was a statistically significant global reduction of wrist movements. Mean extension and flexion were 62% and 49% of the opposite side respectively. Radial and ulnar deviation were 33% and 53% of the opposite side respectively (table III).

Grip strength

There was a significant improvement in mean grip strength after the procedure in our series. Average grip strength was 58% ($p < 0.05$) compared with the opposite wrist after surgery as compared to 35.1% preoperatively.

Return to work

The patient with an excellent clinical result was a 61-year-old retired gentleman. He did not have any problem with activities of daily living. The 12 patients who scored in the good range comprised a retired gentleman, nine office workers, a housewife and a farmer. All of them were not affected in their return to work, though the farmer has modified his activities significantly. The two patients with a fair and poor result were heavy manual workers (a plumber and farmer) and have not been able to return to work. The farmer believes he is worse off following the intervention.

Subjective ratings

Radiographic

The mean preoperative SL gap in loaded wrists was 2.6 mm (1.5 – 3.6 mm). The mean preoperative

Table III. — Results

Clinical Grades

Excellent	1
Good	12
Fair	1
Poor	1

Pain (mean VAS score)

Pre-op	8.2
Postop	3.9

Range of motion (mean)

Affected side

Movement	Preop	Post op	p value
Extension	33	41 (+)	< 0.05
Flexion	44	37 (-)	< 0.05
Radial deviation	5	5	> 0.05
Ulnar deviation	13	17 (+)	< 0.05

Postoperative

Movement	Affected side	Normal side	Percentage	p value
Extension	41	66	62	< 0.05
Flexion	37	75	49	< 0.05
Radial deviation	5	15	33	< 0.05
Ulnar deviation	17	32	53	< 0.05

Power grip strength (mean, % of normal side) in kgf

Affected side

Preop	Postop	p value
20.4	26	< 0.05

Postoperative

Affected side	Normal side	Percentage	p value
26	45	58	< 0.05

SL angle was 68° (45-87). At a follow-up of 22 months, the average SL angle was 64° (47 – 78) and the SL gap was 2.4mm (1.7 – 3.2 mm). There was no significant change in the SL angle or gap at follow-up (table IV).

Only two patients had a scapholunate gap of > 2 mm in unloaded wrists preoperatively. They had a scapholunate angle of 72° and 78°. There was no significant change in the SL gap or angle on a 2 year follow-up. They both showed a good clinical result.

The postoperative SL gap and angle did not bear any correlation with the clinical result.

COMPLICATIONS

One patient had a pin site infection which subsided on antibiotic treatment. He showed a good result at follow-up. One patient has developed reflex sympathetic dystrophy. He is a farmer and is currently being evaluated for alternate therapies.

Table IV. — Radiographic evaluation (loaded wrists)

	Pre op	Post op	p value
SL gap	2.6 (1.5-3.6 mm)	2.4 (1.7-3.2 mm)	> 0.05
SL angle	68 (45-87 degrees)	64 (47-78 degrees)	> 0.05

Note : only two cases of static scapholunate instability, both scored in the "good" category.

DISCUSSION

Since the first comprehensive report on scapholunate instability (10), considerable research has been conducted on the biomechanical behaviour of the scapholunate ligament. Scapholunate instability comprises a wide spectrum (16) which includes pre-dynamic instability, dynamic dissociation and static dissociation with chondral damage (ascertained by arthroscopy). There have been a number of soft tissue and bony procedures described for chronic instability.

The Blatt procedure has been proposed to redress the flexed scaphoid and buttress its proximal pole using a dorsal capsular flap re-directed from the rim of the radius to the distal aspect of the scaphoid. There have been conflicting reports on the results of this procedure.

Blatt (1), while describing this procedure, claimed good long-term results in 12 patients with a loss of no more than 20° of wrist flexion and an average recovery of 80% of grip strength. In another report, Blatt and Nathan (2), showed good clinical outcomes in 30 cases and demonstrated on MRI that with time an adaptive hypertrophy of the transferred tissue occurs. Laverina *et al* (7) reported a maximum loss of 17° of palmar flexion when combining a dorsal capsulodesis with a secondary repair of the scapholunate ligament. Wintman *et al* (17) in a retrospective analysis of 18 patients have reported a mean loss of 12° of flexion following surgery. There was a statistically significant relief of pain and improvement in grip strength. In a retrospective study on 17 patients, Muermanns *et al* (11) found this procedure to be a valuable therapeutic tool in cases of pre-dynamic and dynamic instability. There was a significant improvement in grip strength reported. Most of these studies used clinical and radiographic criteria to establish a diagnosis with arthroscopic confirmation.

On the contrary, there are a number of studies that have shown disappointing results following this procedure. Wyrick *et al* (18) studied 24 patients at an average follow-up of 30 months. They used a clinical grading system similar to our study and a radiographic grading system to evaluate their results. They found dismal results, particularly in cases with static instability. In a 15 year series (12) involving 72 cases of chronic scapholunate instability, different soft tissue stabilisation procedures were compared. All forms of treatment had comparable outcomes except ligament reconstruction using tendon grafts. The results of tendon grafts were dismal. In a prospective study on 44 cases (4), there was a significant reduction in grip strength and wrist movement following this procedure ; the authors found no difference in radiographic features following surgery.

Though our criteria of diagnosis, indications for surgery and clinical evaluation methods were quite similar to the above mentioned studies, we found better results at an average follow-up of 22 months. There was a statistically significant improvement in pain relief and grip strength, similar to some of the above mentioned studies. There was a significant improvement in extension and ulnar deviation and a significant decrease in flexion of the wrist. The majority (75%) of the patients returned to their previous occupations. There was no significant improvement in the SL gap and angle at follow-up.

We believe there could be a number of reasons for the good results that we observed from this procedure. Only 2 patients (10%) in our series presented with static instability. Previous studies with unfavourable results had a large percentage of patients in this category. The average scapholunate gap and angle in loaded wrists in our study was low (2.6 mm and 68° respectively). This meant that a majority of our patients were treated at an early stage. There were no cases awaiting settlement of compensation claims in our study. This has shown to affect result (4). Only three patients (16%) were heavy manual workers. Of them one showed a fair and the other a poor result. The rest (84%) were low-demand wrists.

We thus believe that this procedure can produce encouraging results in cases of pre-dynamic and dynamic instability in patients with low demand. Larger number and long-term follow-ups would be desirable to derive strong evidence-based conclusions.

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