

BLATT DORSAL CAPSULODESIS FOR SCAPHOLUNATE INSTABILITY

S. MUERMANS, L. DE SMET, H. VAN RANSBEECK

This retrospective series reviews 17 patients with scapholunate instability treated with the Blatt procedure between 1994 and 1997. Indications were 11 cases of preradiographic instability, three dynamic and three static instabilities. Subjective and objective assessment was carried out. Average pain and level of activity score was 60.8/80 (good). Only three patients failed to continue their jobs. Ten patients were fully satisfied, and seven had minor to major reservations. Flexion loss averaged 11° and extension loss was 11.3°. Grip force improved significantly by 11.2 kg. Associated scapholunate interosseous ligament repair in 6 patients resulted in no further improvement. Major complications were deep infection (one case) and reflex sympathetic dystrophy (two cases). Given the lack of a superior procedure, we considered the Blatt capsulodesis a valuable therapeutic option for cases of preradiographic and dynamic instability, or as an adjunct to scapholunate interosseous ligament repair in more acute lesions.

Keywords : wrist ; ligament ; scapholunate ; capsulodesis, Blatt.

Mots-clés : poignet ; ligament ; scapho-lunaire ; capsulodèse ; Blatt.

INTRODUCTION

Scapholunate (SL) dissociation is the most common presentation of carpal instability. Although it occurs frequently, its treatment is surrounded by controversy and is heavily dependent on age and stage of the injury. In 1987, Blatt (2) devised a dorsal capsular checkrein mechanism to prevent rotatory subluxation of the scaphoid. A radially-based dorsal capsular strip is inserted under tension in the dorsum of the distal scaphoid by a transosseous pull-out wire. This ensures its

reduction and keeps the scaphoid from palmar flexion and proximal dorsal subluxation. The technique was originally developed for chronic static rotatory subluxation, and Blatt extended the indications to symptomatic dynamic and acute static scapholunate (SL) instability. Others (10, 17) have joined this philosophy with success. We reviewed 17 patients treated with this procedure.

MATERIALS AND METHODS

Patients

Between October 1994 and February 1997, 17 patients, 11 females and 6 males, underwent the Blatt procedure. The dominant wrist was involved in 10 patients. The average age was 30 years (range, 18-53 years). Ten patients recalled previous wrist trauma, 4 had a history of temporary overuse and 3 had spontaneous onset of symptoms. The diagnosis was confirmed by a positive Watson test (16) in 16 patients and by conventional radiography in 6 patients. Arthrography was carried out in 10 patients and was positive in 4. Arthroscopy was confirmative in all 11 cases performed. At arthroscopy, an accompanying triangular fibrocartilage complex (TFCC) injury was diagnosed in 7 patients, two of whom required debridement. Indications for the Blatt procedure comprised 11 cases of preradiographic instability, 3 dynamic and 3 static instabilities following the classification of Dautel and Merle (5). Among the 3 patients with static instability, 2 were traumatic ; one was secondary to Kienböck's disease. Most patients were subjected to a course of conservative treatment, consisting of nonsteroidal anti-

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inflammatory (NSAI) drugs, local steroid injections, temporary plaster immobilization and/or bracing. Three patients had a history of previous intervention elsewhere, closed reduction with casting of a perilunate dislocation (one case) and arthroscopic debridement (two cases), one combined with partial wrist denervation. Average time from injury to operative treatment was 23.8 months. At operation, 16 patients had a modified Blatt procedure (distal fixation by Acufex tag or Mitek anchor) and one had a reversed Blatt procedure (distally-based capsular flap with proximal fixation in the distal scaphoid). In six cases we performed a combined primary scapholunate interosseous ligament repair, when the ligament was amenable to repair. One patient underwent curettage and bone grafting of a lunate cyst as an associated procedure.

The mean follow-up was 30 months (range, 5-42 months). All operations were performed by or under the direct supervision of the senior authors (LDS and HVR).

Evaluation

Evaluation was performed by a blinded observer (S.M.), who did not take part in the operations. Because of the retrospective aspect of this study, some preoperative parameters were incomplete in a few patients.

Patients were submitted to subjective and objective assessment. Pain level, professional status and activities of daily living (ADL) feasibility were recorded in a pain and level of activity score (fig. 1). The maximum score

1. Pain during activity

No pain (15 points)	Intolerable pain (0 points)
I _____	I _____

2. Pain at rest

No pain (15 points)	Intolerable pain (0 points)
I _____	I _____

3. Pain at night

None	10 points
Moderate	5 points
Severe (sleep disturbance)	0 points

4. Profession and recreation

A) Profession :

- B) I am :
- working
 - out of work
 - off work due to this pathology
 - off work due to other problems
 - I have no profession

- C) I :
- do all work and recreational activities
 - do most work and recreational activities but have to avoid heavy loading of the wrist
 - do not carry out any work or recreational activity due to wrist
 - cannot do anything with my hand/wrist
- | | |
|--|-----------|
| | 20 points |
| | 10 points |
| | 0 points |

5. Activities of daily living

- I:
- do all domestic work
 - do most domestic work, except heavy loading etc.
 - am seriously limited
 - do not carry out any domestic work because of wrist
 - cannot do anything with my wrist (assistance in personal hygiene)
- | | |
|--|-----------|
| | 20 points |
| | 15 points |
| | 10 points |
| | 5 points |
| | 0 points |

Fig. 1. — Pain and level of activity score.

was 80 points. A score of >70 was considered as excellent, 60-70 as good, 50-60 as fair and <50 as poor. Personal satisfaction was evaluated by asking the patients if they would have the procedure again if their other wrist were involved. Clinical examination included presence of the Watson sign (16), range of motion (conventional goniometer) and grip force (Jamar dynamometer). Radiographic analysis included measurement of scapholunate gap, scapholunate angle, lunocapitate angle, radiolunate angle, ulnar variance and presence of osteoarthritic changes. Pre- and postoperative clinical and radiological data were compared and subjected to appropriate statistical analysis: paired and unpaired Student's t-test and Wilcoxon test with the level of significance set at $p < 0.05$. Finally, complications were thoroughly evaluated.

Surgical technique

A longitudinal dorsoradial incision was used in the 3-4 extensor interval, creating a proximally based, 1 cm wide dorsal capsular flap from the ulnar side of the capsular incision. If necessary, the scaphoid was reduced by palmar pressure with the wrist in ulnar deviation. Reduction was maintained by scaphocapitate or scapholunate K wires. The capsular flap was inserted under tension in a roughened gutter created in the dorsum of the distal scaphoid. Fixation was provided by means of an Acuflex tag (15 \times) or Mitek anchor (2 \times) tied with a Ticron 2/0 suture. Dorsal capsular repair was performed before skin closure. A thumb spica cast was applied for an average of 6.5 weeks. At that stage, cast and K-wires were removed, and a hand rehabilitation program was started.

If the scapholunate interosseous ligament was repaired (six patients), this was done by reinsertion of the ligament into the scaphoid by transosseous sutures. One lunate cyst needed to be grafted. One case of grade I lunatomalacia was left untreated at the time of intervention.

RESULTS

A pain and level of activity score was obtained in 16 of 17 patients. Details are outlined in table I. The average score was 60.8/80 (= good). Ten patients had excellent or good outcomes; six had fair or poor results. Twelve patients resumed their previous employment, two turned to less strenuous labor and three were not able to continue their jobs.

Ten patients were fully satisfied with the procedure, whereas seven had minor to major reservations.

On clinical examination, the Watson test had become negative in all patients except one. Range of motion is detailed in table II and was subjected to a one-sample t-test. There was an 11° loss of flexion and a similar loss of extension (11.3°). A significant increase in grip strength of 11.2 kg was demonstrated (1-sample t-test and Wilcoxon paired ranks, $p < 0.05$).

Radiographs failed to reveal any significant postoperative changes in gap, scapholunate, radiolunate or lunocapitate angle (table III). Average ulnar variance was slightly negative, as might be

Table I. — Range of motion in degrees. Mean values (+/- SD)

Motion	Preoperative	Postoperative	Change
Flexion	57.0 (21)	45.7 (18.1)	-11 (20.8)
Extension	60.8 (14.4)	49.4 (10.6)	-11.3 (19.7)
Radial deviation	12.7 (5.4)	16.4 (5.7)	+3.6 (8.8)
Ulnar deviation	31.4 (17.3)	34.0 (9.7)	+2.6 (18.73)

Table II. — Grip strength in kg (+/- SD)

Strength	Preoperative	Postoperative	Change
Average	19.4 (13.1)	30.6 (13.6)	+11.2 (16.4) ($p < 0.05$)

Table III. — Radiographic parameters. Average (+/- SD)

Modality	Preoperative	Postoperative	Change
SL gap (mm)	3.0 (1.7)	2.5 (0.9)	-0.5 (1.1)
SL angle (degrees)	53 (22)	58.4 (14)	+5 (13.9)
LC angle (degrees)	7.3 (17)	8.5 (15.2)	+1.2 (13.8)
RL angle (degrees)	9.3 (13)	4.3 (17)	-4.7 (11.4)

expected from previous reports on anatomical predisposition to scapholunate instability (5). One patient gradually developed radioscaphoid osteoarthritis after the operation. Another patient who presented with a perilunate dislocation developed a scapholunate advanced collapse wrist despite reduction and capsulodesis. This was the result of early postoperative infection with expulsion of the Acuflex tag, loss of reduction and subsequent SLAC. The patient however failed to consult our department, thus no revision could be undertaken. Another patient who demonstrated grade 1 lunatomalacia at the time of operation had evolved to radiographic grade 3 on follow-up examination.

Among the complications was one case of deep infection, as mentioned above. Two patients developed reflex sympathetic dystrophy, one of whom is presently under treatment with stellate ganglion blocks. The other failed to improve on blocks and is satisfied after a total wrist arthrodesis. One case of grade 1 lunatomalacia evolved to grade 3. Another patient complained of trapezometacarpal pain and needed a scaphotrapezotrapezoidal (STT) fusion. Another patient developed a neuroma of the dorsal branch of the ulnar nerve but became asymptomatic after a submuscular transposition was carried out. These complications

were considered unrelated to the Blatt technique itself or its indications.

DISCUSSION

Scapholunate instability is the most common form of carpal instability. Varying degrees of dissociation are distinguished, ranging from pre-radiographic and dynamic instability to static instability with subsequent SLAC deformity. By and large, therapeutic options can be classified as open/closed reduction, soft tissue procedures (ligament repair, capsulodesis, ligamentoplasty) and limited carpal fusions.

Soft tissue procedures either aim at ligament reconstructions and/or scaphoid balancing. The four-bone tendon weave (1), the Kuhlmann plasty (9), the Brunelli procedure (3, 13) and the extensor carpi radialis longus "tension band" plasty (11) are rather used for subacute or chronic static SL instability. Most studies equally show typical loss of flexion, sometimes an extension lag and a grip strength of 65 to 80% of normal. Clinical results overall seem to be better than the radiological realignment obtained. Most series report a significant proportion of residual discomfort.

In 1987, Blatt introduced a dorsal capsulodesis technique to correct cases of late rotatory subluxation (2). This acts as a dorsal checkrein mechanism to prevent palmar flexion deformity of the scaphoid. In his original series of 12 patients, indications were mainly static chronic SL instability. Long-term results were most gratifying, with full recovery of extension and less than 20° of flexion loss. Average grip strength recovered to 80%. The majority of patients returned to their preinjury level of work. Later, Blatt obtained

Table IV. — Pain and level of activity scores (total of 80 points)

Evaluation	Score	Number
Excellent	(70-80)	6
Good	(60-70)	4
Fair	(50-60)	2
Poor	(< 50)	4

equally satisfying results for all reducible types of SL dissociation, symptomatic dynamic instability and acute static deformity. However, he did not mention exact duration of follow-up, specifications about pain relief or number of patients resuming their professional activities.

In this review, we evaluate the Blatt procedure for 11 cases of preradiographic instability, three dynamic and three static instabilities. Other authors have also reported on Blatt's operation (17) or a modification thereof (10). Caution is warranted in comparing results because the indications were varied, technical aspects of the procedure were not identical and different subjective scoring systems were used. Wintman's series (17) and ours report predominantly on dynamic instabilities, whereas Blatt (2) and Lavernia *et al.* (10) rather describe cases of static instability. Furthermore, Lavernia *et al.* did not differentiate results of isolated capsulodesis, single SLIL repair or combined SLIL repair with capsulodesis. In our series, six patients had combined SLIL reconstruction as the ligament was amenable to repair. Numbers however were too small to reveal any significant improvement over the 11 patients with single capsulodesis. Wintman *et al.* (17) extensively demonstrated statistically significant improvement for pain and functional parameters, and overall pain relief is equally suggested in the other series. Ten patients in our population were fully satisfied, leaving seven with personal marks that were not always clinically evident. As opposed to other studies, we did not use a scoring system to quote personal satisfaction. All series show a typical loss of palmar flexion varying from 11° to more than 20° in the original Blatt article. We also noted a similar loss of extension (-11.3°). Grip strength typically improved from the preoperative condition in most series, with a statistically significant increase in this study (+ 11.2 kg, $p < 0.05$). Postoperative carpal degeneration is comparable in most series.

Limited carpal fusions aim at stabilization of the reduced scapholunate joint or at midcarpal fixation to prevent carpal collapse. Simple scapholunate fusion frequently fails to unite because too heavy forces are transmitted through this small joint surface (7). The popular scaphoid-trapezoid-

trapezium arthrodesis is designed for chronic static instability and for cases where SL reduction is difficult. Durable long-term results were reported by Watson *et al.* (15), but other authors (6, 8) mentioned a significant proportion of complications, such as nonunions, motion loss, and prevalence of radioscaphoid and trapezometacarpal osteoarthritis due to altered kinematics (14). Scaphocapitolunate fusion might create a greater loss of flexion extension arc (12) but more adequately approaches normal radiocarpal kinematics (14) and therefore causes less long-term degeneration.

Until now, no straightforward therapeutic regimen has been proposed for scapholunate instability. This is reflected in the number and variety of treatment options available. However, none of these has proven to be superior, and all have complications to some degree. In our experience, we have found the Blatt capsulodesis a valuable therapeutic option mainly for cases of preradiographic and dynamic instability.

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SAMENVATTING

S. MUERMANS, L. DE SMET, H. VAN RANS-BEECK. Dorsale capsulodesis volgens Blatt voor scapholunare instabiliteit.

Deze retrospectieve reeks beschrijft 17 patiënten met scapholunare instabiliteit, behandeld tussen 1994 en 1997 door middel van Blatt-procedure. Als indicatie waren er 11 gevallen van preradiografische, drie van dynamische en drie van statische instabiliteit. Een subjectieve en objectieve evaluatie werd uitgevoerd. De

gemiddelde pijn en activiteitscore bedroeg 60,8/80 (= goed). Drie patiënten konden hun vroegere werk niet meer aan. Tien patiënten waren volledig tevreden doch 7 hadden nog mineure tot majeure bedenkingen. Het gemiddeld flexieverlies bedroeg 11 graden en het extensieverlies was 11,3 graden. Er was een significante toename in grijpkracht van 11,2 kg. Additioneel scapholunair interosseus ligament herstel bij 6 patiënten kon geen significant verschil aantonen. Als majeure complicaties waren er 1 diepe infectie en 2 gevallen van RSD. Gezien het gebrek aan enige superieure behandelingsmethode, beschouwen de auteurs de Blatt-procedure een zinvolle behandeling voor preradiografische en dynamische instabiliteit.

RÉSUMÉ

S. MUERMANS, L. DE SMET, H. VAN RANS-BEECK. Capsulodèse dorsale selon Blatt dans le traitement des instabilités scapho-lunaires.

Cette série étudie 17 patients traités par capsulodèse selon Blatt pour instabilité scapho-lunaire entre 1994 et 1997. Les indications étaient 11 instabilités pré-radiographiques, 3 dynamiques et 3 statiques. Nous avons réalisé une évaluation subjective et objective. Le score moyen de douleur et de niveau d'activité postopératoire était 60,8/80 (= bon). Dix patients étaient tout-à-fait satisfaits et 7 émettaient des plaintes mineures ou majeures. Trois patients n'ont pas repris le travail. La perte de flexion moyenne était de 11° et la perte d'extension 11,3°. Une amélioration significative de 11,2 kg de la force de préhension était notée. La réparation simultanée du ligament interosseux scapho-lunaire chez 6 patients n'a pas apporté d'avantage significatif. Trois complications majeures ont été notées : une infection profonde et deux algodystrophies. En l'absence d'une meilleure technique, les auteurs considèrent la capsulodèse selon Blatt comme un traitement valable de l'instabilité scapho-lunaire pré-radiologique et dynamique.