Author Query Form

Journal Title **:** The Journal of Hand Surgery (JHS)
Article Number **:** 410154

Dear Author/Editor,
Greetings, and thank you for publishing with SAGE. Your article has been copyedited and typeset, and we have a few queries for you. Please address these queries when you return your proof corrections. Thank you for your time and effort.

Please ensure that you have obtained and enclosed all necessary permissions for the reproduction of artistic works, (e.g. illustrations, photographs, charts, maps, other visual material, etc.) not owned by yourself, and ensure that the Contribution contains no unlawful statements and does not infringe any rights of others, and agree to indemnify the Publisher, SAGE Publications Ltd, against any claims in respect of the above warranties and that you agree that the Conditions of Publication form part of the Publishing Agreement.

Please assist us by clarifying the following queries:

1. Because Figures 1 and 2 shared a figure caption, likewise Figures 3 and 4, I have renamed them so that Figure 2 is now Figure 1b, Figure 3 is now Figure 2a and Figure 4 is now Figure 2b. Is this ok?.
2. Table 1 did not have a caption so I have called it “Patient data”. Is this ok?.
3. No funding statement was provided so I have put in the standard statement for articles without funding. Please read this and confirm that it is correct.

Full length article

JHS(E)

The Journal of Hand Surgery
(European Volume)
00(00) 1–4

DOI: 10.1177/1753193411410154
jhs.sagepub.com
SAGE

The use of screws in the treatment of scapholunate instability

J. M. Cognet
SOS Mains Champagne Ardenne, Polyclinique Saint André, Reims, France

M. Levadoux
Service de Chirurgie Orthopédique, HIA-Sainte Anne, Boulevard Sainte Anne, 83800 Toulon Naval, France

X. Martinache
SOS Mains Champagne Ardenne, Polyclinique Saint André, Reims, France

Abstract
Seven patients with chronic scapholunate instability (Geissler grade 2–4) were treated by percutaneous placement of screws across the scapholunate joint after arthroscopic debridement of the remnants of the scapholunate ligament. In all seven cases, the screw caused partial destruction of the lunate and/or scaphoid requiring screw removal within 6 months. We no longer perform this procedure.

Keywords
scapholunate screws, arthroscopy, wrist, instability

Date received: 16th March 2010; revised: 10th April 2011; accepted: 19th April 2011

Introduction

The treatment of chronic scapholunate ligament injuries before the onset of osteoarthritis remains controversial. Herbert (1991) proposed screw fixation across the scapholunate joint to protect an open repair of the scapholunate ligament, based on the observation that some patients with failure of scapholunate arthrodesis nonetheless had excellent results with a painless stable pseudoarthrosis once the fixation screw had been removed. Good results were subsequently reported in 22 of 33 wrists (Filan and Herbert, 1998). The technique of reduction and association of the scaphoid and lunate (RASL procedure) (Rosenwasser et al., 1997) comprises an open approach to exercise the attenuated remnants of the scapholunate ligament and remove the cartilage of the opposing scaphoid and lunate surfaces until cancellous bone is exposed, followed by screw fixation across the correctly aligned scapholunate joint. An arthroscopic RASL procedure was described by Aviles et al. (2007). We hypothesized that arthroscopic debridement of the scapholunate ligament remnants and screw fixation across the scapholunate joint would encourage the formation of stable ligamentous tissue across the scapholunate joint.

Patients and method

Seven patients suffering from chronic scapholunate instability were treated with scapholunate screws by three surgeons. Each operator was a senior surgeon experienced in surgery of the hand and wrist as well as arthroscopic surgery. Traction of 6 kg through a traction tower allowed distraction of the radiocarpal and midcarpal joints. The arthroscopic portals were the 1-2, 3-4, 4-5, MCR and MCU. The radiocarpal joint was inspected through the 3-4 portal. A shaver inserted through the 4-5 portal was used for debridement of the scapholunate ligament remnants and a synovectomy of the area of posterior capsular reflection was performed. The arthroscope was then introduced via the MCU portal to explore the joint and evaluate a possible midcarpal instability (Dautel and Merle, 1993).

The wrist was then separated from the traction tower and two 0.8/1-mm pins were introduced through the 1-2 portal into the scaphoid.

Corresponding author:
J. M. Cognet, SOS Mains Champagne Ardenne, Polyclinique Saint André, Reims, France
Email: jmrc@free.fr

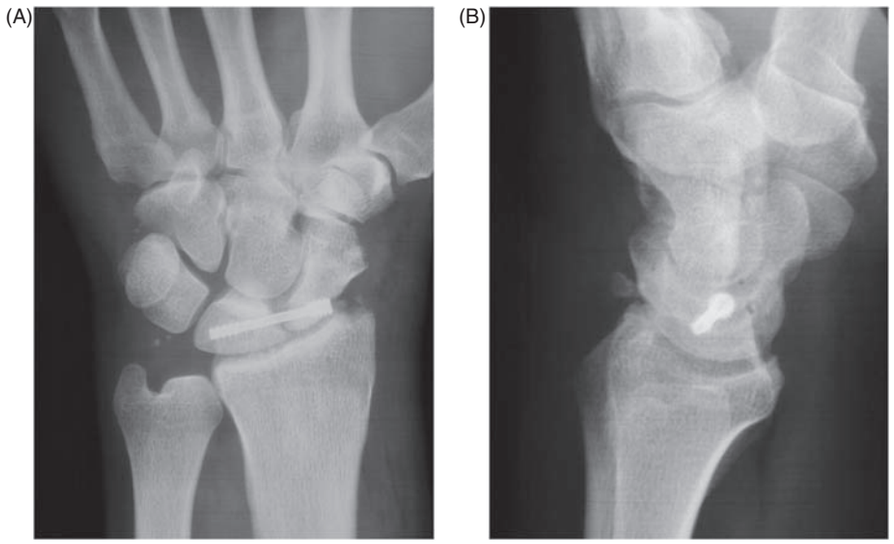

Figure 1. (a,b) Screw used for the stabilization of the scapholunate joint; arthroscopic radial styloidectomy was performed at the same time to facilitate the screw insertion.

After verification under fluoroscopy of the appropriate placement of the pins, the wrist was replaced on traction and the pins were drilled into the lunate. A cannulated screw (2.3 mm, BIOTECH®) was inserted over one of the pins, the other pin acting to prevent rotation. The two pins were then removed. In cases of fixed dorsiflexion of the lunate, the lunate was held in the correct alignment by temporary radiolunate pinning prior to insertion of the scapholunate screw. Postoperatively, the wrist was immobilized in a removable splint for 15 days, and then allowed free mobilization.

Results

The average age of the seven patients was 47 years (range 32–62); six were men and three were military personnel from combat units. Mean follow-up was 50 months (range 26–72). The screws were all removed within 6 months of insertion. In each case there was partial destruction of the lunate and/or scaphoid caused by the threads of one or both ends of the screw (Figures 1 and 2). Pain improved in one patient after removal of the screw. Four patients required additional palliative surgery and two patients continued to experience pain but declined further intervention (Table 1).

Discussion

The management of scapholunate ligament injuries is controversial and there is no consensus on the best management for chronic instability, which is usually defined as more than three months after injury (Baratz and Dunn, 2004). Ligament repair with or without capsulodesis, ligamentoplasty, scapholunate arthrodesis, and partial carpal arthrodesis have been described but no technique has been shown to have superiority or inter-operator reproducibility (Kuo and Wolfe, 2008). Pin fixation is the most common method of stabilization of the scapholunate joint. Pins have advantages of simplicity of use, easy adjustment and low cost, but also potential for nerve or tendon damage, skin irritation and infection. Pins usually require removal by 8 weeks, before completion of ligament healing which is estimated to be at 3 months. The use of pins also requires a reduction and compression of the scapholunate joint to prevent persistence of the scapholunate gap.

Herbert (1991) performed a repair of the scapholunate ligament and recommended leaving the scapholunate screw in place for 18 months. Good results were subsequently reported in 22 of 33 wrists (Filan and Herbert, 1998). The best results were obtained in relatively recent injuries in patients with light to moderate activity levels.

The RASL procedure (Rosenwasser et al., 1997) adopts a more aggressive approach to the scapholunate joint in which the cancellous bone of the opposing surfaces is exposed to facilitate the formation of fibrous tissue between them. In a sense, it mimics the failed scapholunate arthrodesis in which Herbert (1991) had observed some good results once the screw had been removed. The authors argue that

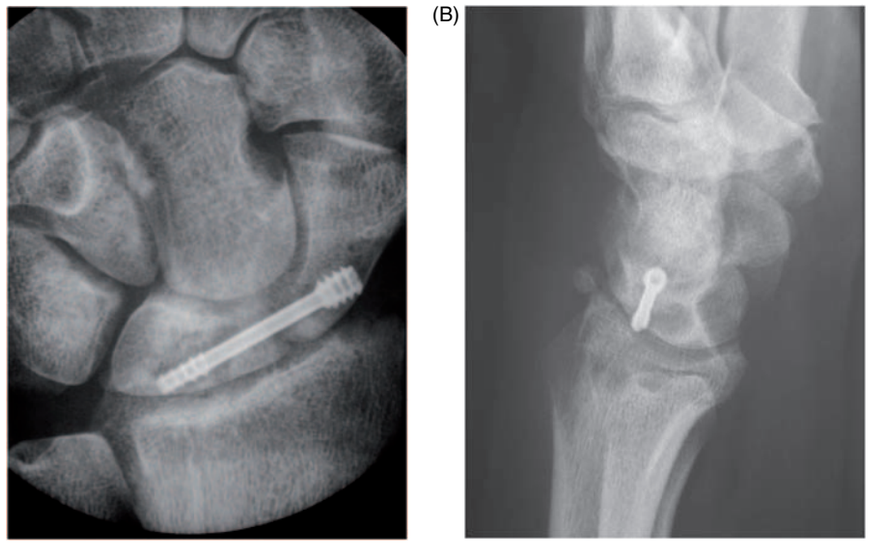

Figure 2. (a,b) Cut-out of the screw with bone loss (same patient as Figure 1).

Table 1. Patient data

	Sex	Age	Geissler stage	Result	Screw removal (months postop)	Second procedure	Third procedure
Patient 1	F	46	II	Poor	3	Four corner arthrodesis	No
Patient 2	M	54	IV	Poor	3	Ligamentoplasty	Wrist arthrodesis
Patient 3	M	62	IV	Poor	4	Proximal row carpectomy	Wrist arthrodesis
Patient 4	M	50	IV	Poor	3	Four corner arthrodesis	No
Patient 5	M	32	IV	Poor	4	No	No
Patient 6	M	42	IV	Poor	5	No	No
Patient 7	M	43	IV	Poor	3	No	No

the scapholunate screw reproduces the axis of rotation between the scaphoid and lunate and allows the formation of a neo-ligament between them. However, we can find only one publication describing the results of the RASL procedure, which is a review article by the originators (Goldberg et al., 2006) that contains in a single paragraph giving the results in 24 cases. An arthroscopic technique of the RASL procedure was described in a technical note (Aviles et al., 2007), but no results are given.

Kuo and Wolfe (2008) report the use of a temporary scapholunate screw in addition to a scaphocapitate pin to support a combination of scapholunate ligament repair and Blatt capsulodesis, removing the pin at 2 months and the screw at 4 months. The authors cite their concern for screw loosening and/or breakage as the reason for screw removal.

Our technique differs from those of Aviles et al. (2007) and Rosenwasser et al. (1997) in the absence of debridement of the surfaces of the scapholunate joint down to bleeding bone. Our hypothesis was based on the work of Whipple (1995). Arthroscopic debridement would have led to the formation of a fibrous neo-ligament as advocated by Whipple. But the rapid loosening of the screws may in part due to the short period of immobilization when compared to the 3 weeks of Aviles et al. (2007), 4–6 weeks of Rosenwasser et al. (1997), or 6 weeks of Filan and Herbert (1998), leading to the failure of our treatment. Our results confirm the orthopaedic axiom that metal fixation across a moving joint or bone interface will eventually lead to failure of the implant. We no longer use this technique for scapholunate stabilization.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of interests

None declared.

References

Aviles AJ, Lee SK, Hausman MR. Arthroscopic reduction-association of the scapholunate. Arthroscopy. 2007, 23(105): e1–5.

Baratz ME, Dunn MJ. Ligament injuries and instability of the carpus: Scapholunate joint. In: Berger RA, Weiss AP (eds) Hand Surgery. Philadelphia, PA, Lippincott Williams and Wilkins, 2004: 481–94.

Dautel G, Merle M. Tests dynamiques arthroscopiques pour le diagnostic des instabilities scapholunaires. Ann Chir Main Memb Super. 1993, 12: 206–9.

Filan SL, Herbert TJ. Herbert screw fixation for the treatment of scapholunate ligament rupture. Hand Surg. 1998, 3: 47–55.

Goldberg SH, Strauch RE, Rosenwasser MP. Scapholunate and lunotriquetral instability in the athlete: Diagnosis and management. Oper Tech Sports Med. 2006, 14: 108–21.

Herbert TJ. Acute rotary dislocation of the scaphoid: a new technique of repair using Herbert screw fixation across the scapho-lunate joint. World J Surg. 1991, 15: 463–9.

Kuo CE, Wolfe SW. Scapholunate instability: Current concepts in diagnosis and management. J Hand Surg Am. 2008, 33: 998–1013.

Rosenwasser MP, Miyasajsa KC, Strauch RJ. The RASL procedure: Reduction and association of the scaphoid and lunate using the Herbert screw. Tech Hand Up Extrem Surg. 1997, 1: 263–72.

Whipple TL. The role of arthroscopy in the treatment of scapholunate instability. Hand Clin. 1995, 11: 37–40.