Chronic Lunotriquetral Ligament Injuries: Arthrodesis or Capsulodesis

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1 Introduction

Several treatments for patients with isolated lunotriquetral (LT) tears have been described previously. The choice between an LT fusion (attempts to), repair and (complicated) ligament reconstruction, is not yet established [2, 3, 5–7, 9, 11].

LT arthrodesis gives variable outcomes and most ligament reconstructions are technically demanding, requiring extensive approaches. In 1996, Sennwald and collaborators [10] proposed a radially based flap of the extensor retinaculum to be inserted on the triquetrum and in so doing reconstructing a dorsal stabilizer of the LT joint (capsulodesis).

The purpose of this chapter is to compare Sennwald's technique with a similar group of patients previously treated at our department with an LT fusion.

2 Materials and Methods

2.1 Patients

We reviewed the patients treated for an isolated LT tear in our institution [12]. We considered the LT tear as the cause of the ulnar-sided wrist pain when the LT interval was tender, when the Reagan test was positive and when other causes of ulnar wrist pain were excluded. In all patients, the diagnosis was established or confirmed on arthroscopic findings.

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Two groups were established. Group I underwent an LT arthrodesis. There were 17 patients: 8 men and 9 women with a mean age of 32.6 years (SD 10). The dominant side was involved in eight cases. The men follow-up was 5.6 years (SD 1.99). Group II consisted of 13 patients, treated with a capsulodesis according to Sennwald [10]. There were 5 men and 8 women with a mean age of 30 years (SD 11) with ten times the dominant wrist involved. The follow-up was 2 years (SD 1.5). The differences in age, gender and involved side were not significant ($p > 0.05$, *t*-test). This is not a randomized study. The LT fusion technique was largely abandoned in 2001 due to the high failure rate [12]. Sennwald's capsulodesis became our first choice of treatment since 1999.

A traumatic event was recalled in 15 patients. The dominant symptom was ulnar-sided wrist pain in 14 and radial wrist pain in 6. The radiographs were normal in 23; a static VISI (volar intercalated segment instability) was present in 7. In none of the radiographs, an interruption of Gilula's line was observed. Arthrograms were performed in 21 wrists with communication between the radiocarpal joint through the LT interval and the midcarpal joint in 17 cases. All patients underwent an arthroscopy. Instability of the LT joint was observed in all through the midcarpal portal. The patients were treated by different surgeons with different level of experience.

2.2 Surgical Technique

The wrist was approached through a ligament-sparing incision, and the LT was explored.

During surgery, a broad diastasis of the LT joint was obvious in all patients, indicating a complete rupture of the LT ligament.

In group I, the LT joint was exposed and the cartilage removed. Usually, an autologous cancellous bone graft was inserted in the gap, and the LT joint was fixed with K-wires (3×) or staples (2×) or a Herbert screw (12×). A forearm cast was applied for 6 weeks.

In group II, a radially based flap of the retinaculum extensorum, 1 cm broad, is prepared and passed deep to the fourth and fifth compartments and fixed with a bone anchor into the triquetrum. A forearm cast was applied for 6 weeks.

2.3 Evaluation

The patients were evaluated by two independent observers (I.J. and WVDS). They were asked for satisfaction (very, fair, poor), pain and function on a visual analogue score (VAS) and if they should have the same procedure again. Range of motion and gripping force were measured. Complications were noted. In group I, a control radiograph was taken and evaluated for fusion.

Table 1 Summary data

	Group I – LT fusion	Group II – ligament reconstruction	*p* value
N	17	13	
M/F	8/9	5/8	
Age	32.6 years (10)	30 years (11)	
Follow-up (years)	5.6 years (1.99)	2 years (1.5)	
Satisfaction	8/9	8/5	0.43
Pain (VAS)	5.8 (1.84)	4.3 (2.69)	0.078
Function (VAS)	3.2 (3.83)	6.8 (1.84)	0.007*
Grip (in kg)	27.7 (12.37)	32.0 (16.29)	0.15
Extension	37 (21.3)	61 (18.5)	0.33
Flexion	40 (25.3)	55 (19.9)	0.44
Reoperation (Y/N)	11/6	3/11	0.02*

( ) standard deviation, *significant

3 Results

In group I, two patients were very satisfied, six were satisfied, nine were not, and ten should have the procedure again. They scored 5.8 on the pain score (0 = no pain, 10 = intolerable pain) and 3.2 (0 = no impairment, 10 = severe impairment) on the functional score. The grip strength was 28 kg; the key pinch was 7.3 kg. The extension was 37°, flexion was 40°, and forearm rotation was 141°. Complications were numerous: one had a reflex sympathetic dystrophy, five had a paresthesia in the dorsoulnar side of the hand, two had a pisohamatum impingement, and eight developed a pseudarthrosis of the LT fusion.

In group II, three were very satisfied, five were satisfied, five were not, and eight should have the same procedure again. The mean score on the pain score was 4.3 (SD 2.69). On the function score, it was 6.8 (SD 1.84). The grip strength was 32 kg; the key pinch was 7.3 kg. The extension was 61°, the flexion was 55°, and forearm rotation was 177°. Complications were less frequent 3 (23%) and consisted in paresthesia in the territorium of the dorsal branch of the ulnar nerve, one case with tendon adhesions and one painful scar. Significancy ($p < 0.05$) was reached for function (*t*-test) and reoperation ratio (Chi Square) (Table 1).

In group I, a reoperation was required in 11 patients (29 procedures including removal of hardware), and in group II, it was necessary in 3 patients (three procedures) (Chi Square, $p < 0.05$).

4 Discussion

Based on the observation that patients with congenital lunotriquetral coalition are usually without symptoms, LT arthrodesis has been the standard treatment option for LT ligament ruptures. The outcome however is not uniformly favorable, and complications

are numerous. The rate of nonunion varies between 0 and 57 % [4, 9]. High complication rates are mostly due to technical errors: nonunion, neurapraxia of the dorsal branch of the ulnar nerve and midcarpal joint discongruency. Patient satisfaction was only 57.1 % in the series of Shin et al. The rate of complications, others than nonunion, varies between 22 and 46 % [5]. The outcome is very variable, and the evaluation of results in the published series is not very detailed. Sennwald et al. called the LT arthrodesis a "controversial" procedure [9]. On the contrary, Guidera et al. [4] in a recent survey had very favorable results in 24 patients.

Reported results on LT ligament reconstructions in literature are less numerous. The available techniques are complicated, but in a comparative series of Shin et al. [5], the outcome for the patients with a reconstruction was better with less complications [11]. The procedure described by Sennwald et al. [10] is technically less demanding and reconstructs the dorsal intercarpal ligaments by a strip of the retinaculum. In the sequential section experiments of Ritt et al. [8], a VISI deformity can be obtained when both the LT and the dorsal extrinsic ligaments are divided; LT ligament section only had only partial effect on the overall carpal configuration: a full blown VISI is only seen after sectioning the extrinsic ligament. The Sennwald procedure is very similar to Blatt's capsulodesis in scapholunate dissociations [1].

Based on our survey, reconstruction of the LT is our first choice since it preserves better motion, has similar subjective outcomes compared to the LT arthrodesis and has, in a training hospital, a lower complication rate.

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