

Late stabilisation of skier's thumb injury

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Late instability of collateral ligament of the thumb MP joint occurs often when the primary treatment of skier's thumb fails. Several methods for the late stabilisation have been presented. Our modification of a technique previously presented omitted the use of pull-out wire fixation of the free tendon graft. It provided good stabilisation of the MP joint and excellent strength recovery after two-year follow-up. Temporary K-wire fixation proved to be unnecessary.

The acute tear of the ulnar collateral ligament (UCL) of the thumb metacarpophalangeal (MP) joint, commonly called the skier's thumb, is one of the most common ligament injuries in the hand. It results in considerable weakening or loss of thumb's lateral pinch grip if left without proper treatment. Later it may lead to radial subluxation and/or painful osteoarthritis of the MP joint. Operative repair is the treatment of choice in a total tear of the ligament. If late instability occurs the treatment options are reinsertion with bone anchors, stabilisation with dynamic tendon transfer or static ligament reconstruction with free tendon graft, or an arthrodesis of the MP joint. Late reinsertion of the collateral ligament with bone anchors may not be reliable if the operation is performed later than six weeks after the trauma (1,2). Arthrodesis is a reliable option especially when osteoarthritis has already developed in the MP joint. Younger patients without osteoarthritis prefer saving the motion of the MP joint. Several dynamic and static tendon transfer techniques have been presented in the literature. We have developed a modification of the static tendon transfer technique presented by Glickel et al. (3), which we consider to be the most anatomical of the techniques presented in the literature. A temporary K-wire fixation of the MP joint is often recommended with ligament reconstruction in the hand. Whether it provides any advantage to the end result has not been studied earlier.

Patients and methods

Thirty-two patients with instability of the thumb metacarpophalangeal (MP) joint due to total rupture of ulnar collateral ligament were operated on. The indications for operation were painful chronic instability of the thumb MP joint with giving away of more than 30 degrees without considerable osteoarthritic changes in the radiographs. The average age of the patients was 43 years (18–58 years). There were 18 male and 12 female patients. All of them were employed except for one who had retired. The original diagnosis was missed or for some other reason no primary treatment was given in 25 patients. The instability was in the dominant hand in 21 out of 32 thumbs. Twenty-two out of 32 patients had a strenuous occupation. The mean delay from the injury until the operation was 34 months (2–192). There was no statistically significant difference between the two groups in the age distribution and in the delay from accident to final treatment of the injury.

The UCL was reconstructed by using a modification of the technique presented by Glickel et al. 1993 (3). In our modified technique the drill channel in the proximal first metacarpal bone does not penetrate the radial cortex but the dorsoradial cortex (Figure 1). This allows the operator to adjust the right tension of both ends of the tendon transfer and securely suture them to the graft itself as they are pulled back to the ulnar side of the MP joint. The use of pull-out wire is not needed with this technique. The patients were

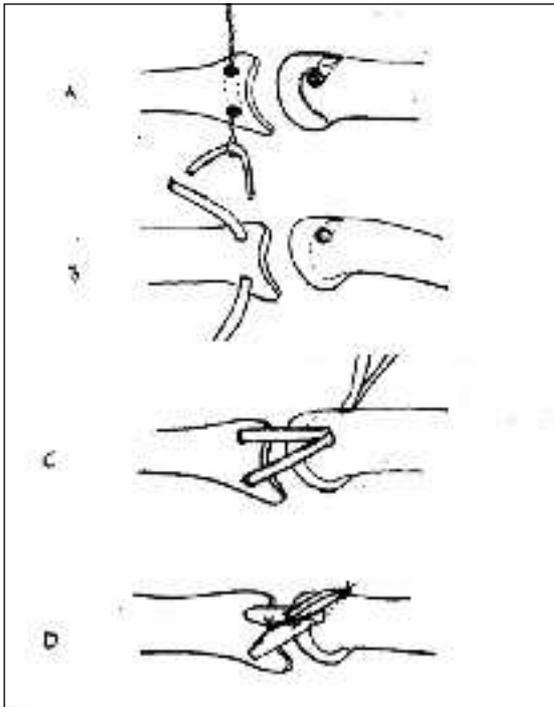


Figure 1. Operative technique used by the authors for the late reconstruction of ulnar collateral ligament of the thumb MP joint. A and B) Free tendon graft is pulled through a 2 mm drill channel in the proximal phalanx with a 0,4 mm cerclage loop. C) Both ends of the tendon graft are then pulled through a 3.2 mm drill channel and a proper tension of the new ligament is adjusted. D) The sides of the tendon graft are sutured together at the side of the MP joint and finally the ends of the tendon graft are sutured to the graft itself with nonabsorbable suture material.

randomized into two groups. Half of the patients received a temporary 1,25 mm K-wire placed through the MP joint for six weeks, while the other half did not. In both groups postoperative immobilisation was provided by plaster cast for two weeks continued for additional four weeks by a thermoplastic splint. K-wires were removed at six weeks postoperatively and free mobilisation was then allowed.

The follow-up examinations were performed by any of the seven doctors at the Department of Hand Surgery, Helsinki University Hospital. All patients were assessed subjectively, objectively and by radiographs preoperatively, 2, 8 weeks, one and two years postoperatively with exception that radiographs were not taken at 2 and 8 weeks. Subjective evaluation con-

sisted of postoperative pain and overall satisfaction. Objective examinations included range of flexion and the ulnar laxity of MP joints of both thumbs measured with a finger goniometer. The grip strength of both hands was measured with Jamar® Dynamometer and the key pinch and pulp pinch strengths were measured with Baseline® Pinch Gauge (Preston Corp, Clifton NJ, USA).

Results

All employed patients returned to work at the same level of physical activity as they were preoperatively. Eight patients (25 %) considered the overall satisfaction as excellent, 13 (41 %) as good, six (12 %) as fair, and five (16 %) as poor. Comparison between the two groups is presented in Table 1.

Table 1.

Subjective result	Number of patients	
	K-wire group	No K-wire group
Excellent	4	6
Good	7	4
Fair	4	2
Poor	1	4
Total	16	16

Preoperatively the overall average radial laxity of the injured MP joint was 55 (30–85) degrees compared to 23 (10–70) degrees in the uninjured side. At one-year follow-up it was 24 (0–65) degrees and at two-year follow-up it was 26 (10–65) degrees. Comparison between the two groups is presented in Table 2.

Table 2.

	MP joint laxity (degrees) in operated/ non-operated thumb		
	K-wire group	No K-wire group	T-test
Preoperative	53 / 19	58 / 24	n.s./n.s.
1 year post-operatively	20 / 18	27 / 23	n.s./0.03
2 years post-operatively	24 / 19	28 / 22	n.s./n.s.

Pulp pinch strength increased considerably from the preoperative 66 % (25–117%) to 95 % (53–136%) at 1-year and to 100 % (67–133%) at 2-year follow-up. Comparison between the two groups is presented in Table 3.

Table 3.

	Pulp pinch strength (% of the non-operated)	
	K-wire group	No K-wire group
Preoperatively	66	66
1 year postoperatively	97	95
2 year postoperatively	97	103

Key pinch strength also increased from the preoperative 75 % (38–100%) to 95 % (67–133%) at 1-year and to 101 % (75–138%) at 2-year follow-up. Comparison between the two groups is presented in Table 4.

Table 4.

	Key pinch strength (% of the non-operated)	
	K-wire group	No K-wire group
Preoperatively	80	71
1 year postoperatively	94	97
2 year postoperatively	101	101

The range of MP joint flexion decreased from the preoperative 115 (40–140) degrees to 90 (67–133) degrees at 1-year follow-up and then slightly increased to 92 (50–120) degrees at 2-year follow-up. At two years follow-up fifteen out of 32 (47 %) thumbs were painless, 15 (47 %) had some moderate pain during strenuous activities, and two (6 %) patients complained about constant pain in all activities (Table 5). An arthrodesis of the MP joint was performed in two patients (12,5 %) in both groups. The reason for the arthrodesis was recurrent instability in two, overcorrection of the radial subluxation leading to ulnar subluxation in one, and prolonged pain in one patient.

Table 5.

	Number of patients	
	K-wire group	No K-wire group
No pain	7	8
Some pain during strenuous tasks	8	7
Considerable pain during any task	1	1

Even though osteoarthritis was considered as a contraindication for late ligament reconstruction, analysis of the radiographs showed mild arthritic changes in ten (31 %) out of 32 MP joints preoperatively. The last follow-up showed mild arthritic changes in 20 (65 %) and strong changes in one (1 %) MP joint. Subluxation recurred in two patients in both groups.

Discussion

Proper early treatment is the best method to avoid late instability of the thumb MP joint. If late instability occurs ligament reconstruction with static tendon transfer is a reliable method when no considerable osteoarthritis has developed. The longer a complete rupture has existed, the less likely it is that restoration of stability by anatomic repair will be successful (1). Some surgeons, however, have been successful in restoring stability by mobilizing and using the remnant of the torn ligament. Currently, the techniques commonly used for UCL reconstruction are adductor advancement (4) or reconstruction with a free tendon graft. We see no advantage to using an isolated dynamic transfer when static replacements for the incompetent UCL are available. Its potential disadvantage is the weakening of the adductor pollicis muscle. In static ligament reconstructions there are technical modifications of how the graft is passed through or attached to the metacarpal and proximal phalanx. We chose a technique presented for the first time in the English literature by Glickel et al. (3). The advantage of this technique is the most anatomical placement of the tendon graft. The authors use a pull-out wire for the fixation of the tendon graft. Pull-out wires increase slightly the risk of wound infection and their removal is rather painful for the patient. We replaced the pull-out wire by placing the radial end of proximal drill channel for the double thickness tendon graft more dorsally and pulling the ends of the tendon graft around the dorsal cortex back to the ulnar side and af-

ter adjusting the right tension suturing it to itself. Our modification provided good stability of the MP joint and excellent recovery of thumb pinch strengths. Our results were comparable with the results utilizing the original technique. There were no wound infections in our study.

The role of temporary K-wire fixation of the MP-joint is another subject of controversy. Glickel et al. recommend using it (2). Its removal is a small but an additional operation with risks of infection and nerve damage. According to our study K-wire fixation did not improve the functional result of the ligament reconstruction of the thumb MP joint.

References

1. Helm RH: Hand function after injuries to the collateral ligaments of the metacarpophalangeal joint of the thumb. *J Hand Surg [Br]*. 1987;12:252-255.
2. Glickel SZ, Barron A, Catalano LW: Dislocations and ligament injuries in the digits. In: *Green's Operative Hand Surgery*. Fifth edition. ed. Green DP, Hotchkiss RN, Pederson WC, Wolfe SW. Elsevier Churchill Livingstone, Philadelphia, 2005, pp. 343-388.
3. Glickel SZ, Malerich M, Pearce SM, Littler JW: Ligament replacement for chronic instability of the ulnar collateral ligament of the metacarpophalangeal joint of the thumb. *J Hand Surg [Am]*. 1993;18:930-941.
4. Neviasser RJ, Wilson JN, Lievano A: Rupture of the ulnar collateral ligament of the thumb (gamekeeper's thumb): Correction by dynamic repair. *J Bone Joint Surg Am*. 1971;53-A:1357-1364.