

Surgical Treatment of Skier's Thumb Injuries:

Case Report and Review of the Literature

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Abstract

Inappropriate treatment of skier's thumb injuries has been reported to result in chronic painful instability, weakness of pinch, and arthritis. Therefore, surgical treatment is recommended for those fractures with 2 mm or more of displacement, or significant articular involvement with incongruity or rotation. The goal of surgery is restoration of anatomy with stable fixation.

In this study we present some cases managed with internal fixation of the injury. This technique has the advantage of anatomic stable fixation with good outcome.

Key Words: Thumb, fracture, open reduction, internal fixation.

Introduction

“GAMEKEEPER’S THUMB” was the term coined in 1955 to describe the chronic injury to ligaments of the thumb, seen in gamekeepers in Scotland who killed wounded rabbits by grasping and twisting the animal’s neck between the base of the thumb and index finger (1). The injury involves the ulnar collateral ligament (UCL) of the metacarpophalangeal (MCP) joint of the thumb. Although caused by long-term stress, gamekeeper’s thumb is virtually identical to the now more common acute injury called “skier’s thumb.” Skier’s thumb results from the forceful adduction of a skier’s thumb when it is rammed against the ski pole during a fall or other mishap. Impact with a steering wheel in an auto collision is another common cause of this injury (1).

In 1962 Stener was the first to describe the displacement of the completely ruptured UCL proximal to the aponeurosis of the adductor pollicis muscle (2). In Stener’s lesion, the displaced ligament cannot fall back spontaneously to its original position, and operative treatment is necessary to prevent chronic joint instability and subsequent arthritic changes (2, 3). The UCL is either avulsed from its insertion on the base of the proximal phalanx with or without a bone fragment or torn in its substance with the distal torn end deep to the adductor aponeurosis (3). An unrecognized Stener lesion usually causes chronic laxity of the UCL. For this reason a conclusive diagnosis of the pathologic features of the UCL is crucial for determining treatment (3).

Evaluating UCL injuries of the MCP joint of the thumb is difficult and relies on good clinical assessment and experience (4). Traditionally, diagnosis has been obtained by clinical examination supported by conventional radiography, arthrography, magnetic resonance imaging (MRI), and ultrasound studies (5, 6). There is some debate in the literature about absolute guidelines for the clinical assessment of incompetence of the UCL. Probably the most accurate parameters were proposed by Heyman et al., who suggested 35° of laxity of the

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ulnar side of the MCP joint when stressed in extension and 15° more laxity than the contralateral side when stressed in 30° of flexion (7).

Several authors have reported good results with ultrasonographic examination of the integrity of the UCL in skier's thumb, although substantial experience of the examiner and proper hardware to distinguish the soft tissue structures seen during examination are crucial (6, 8, 9). Ultrasound and magnetic resonance imaging have been used to evaluate ligamentous injuries, but are not indicated for skier's thumb injuries (9, 10).

Inappropriate treatment of skier's thumb injuries has been reported to result in chronic painful instability, weakness of pinch, and arthritis (11, 12). Therefore, surgical treatment is recommended for those fractures with 2 mm or more of displacement, or significant articular involvement with incongruity or rotation. The goal of surgery is restoration of anatomy with stable fixation. The aim of this study was to evaluate the results of surgical treatment of skier's thumb injuries.

Patients and Methods

This is a retrospective review of 16 patients with 16 skier's thumb injuries fixated with screws or Kirschner wires, between March 1993 and August 2003. Information was obtained through review of clinic notes, photographs, hand therapy measurements, and operative reports.

The group consisted of 14 men and 2 women with an average age of 35.5 years (range, 18–68). The dominant hand was involved in 14 cases. Mechanism of injury included falls from a standing height (n = 4), sports injuries (n = 6), blunt crush injuries (n = 4), and a motor vehicle accident (n = 2). The diagnosis was confirmed after physical examination and standard radiographs. During this period all skier's thumb injuries were treated operatively. The average time from trauma to operation was 12 hours (range, 4–48).

All of the surgeries were performed using regional anesthesia. A chevron-shaped incision with

the apex volar to the mid-axial line of the MCP joint was used. This incision allows for adequate exposure volarly where the fracture is located, and dorsally where a sensory nerve to the thumb must be identified and protected. The joint and fracture site were inspected and cleared of hematoma. The choice of fracture fixation technique depends on several factors, including the size of the fragment, the presence of comminution, and the experience and preference of the surgeon. Screw fixation (1.0 mm or 1.5 mm) was used in 14 patients and Kirschner wire fixation was used in the remaining two.

The initial splint was removed within one week of surgery, a forearm-based thumb spica splint was fabricated, and flexion and extension exercises were given. X-rays were checked every 3 weeks until the fracture healed. Immobilization was continued for 6 weeks. At 6 weeks after surgery, the fractures were healed, strengthening exercises were begun, and splinting was discontinued.

Bony union was confirmed by review of the radiographs. Range of motion of the thumb was measured with the use of a standard goniometer. Results were considered excellent, good, fair or poor according to criteria defined by Gingrass (Table).

Case Report

One of the patients, a 42-year-old man, had a trauma to his right thumb after falling from a height, resulting in a skier's thumb injury (Fig. 1). After radiographic examination Kirschner wires were used to fixate the fracture (Fig. 2). After 3 months the wires were removed because of skin irritation.

Results

The final evaluation was performed by the first author (MD), with the evaluation protocol consisting of standard radiographs of the hand and functional assessment of thumb. The average follow-up period was 4.5 years (range, 2–10).

All of the fractures had united by 6 weeks, with a mean of 4 weeks (range, 3–6). Union was

TABLE
Gingrass' Criteria for Assessment of Thumb Injuries

Palmar Abduction	Excellent	Good	Fair	Poor
>45°	TF > 100°	TF 60–100°	TF 0–60°	
40–45°		TF >75°.		
30–40°			TF >80°	
<30°				TF <80°

TF = total flexion of metacarpophalangeal and interphalangeal joints.
Result is lowered one category if interphalangeal flexion <10°.



Fig. 1. Preoperative X-ray of case.



Fig. 2. Fixation of skier's thumb with Kirschner wires.

defined radiographically and clinically with physical examination. To assess function of the thumb, Gingrass criteria were used (Table). According to these criteria, 13 patients had excellent results and 3 patients had good results.

Complications included superficial infection and hardware removal in 2 patients who had a fixation with Kirschner wires. The superficial infections resolved with oral antibiotics and local

wound care. In addition, both of these patients required a second surgical procedure for hardware removal because of prominence and skin irritation at 12 and 22 weeks, respectively. We identified no cases of deep infection, and no patient required wound coverage because of a skin complication. We did not identify any patients with nonunion, malunion, complex regional pain syndrome, tendon rupture or neurological problem.

Discussion

The aim of this study was to evaluate the results of surgical treatment of skier's thumb.

Inappropriate treatment of these injuries has been reported to result in chronic painful instability, weakness of pinch, and arthritis (11, 12). Therefore, surgical treatment is recommended for those fractures with 2 mm or more of displacement, or significant articular involvement with incongruity or rotation. The goal of surgery is restoration of anatomy with stable fixation.

The choice of fracture fixation method depends on the size of the fracture fragment as well as surgeon experience and preference. For larger fractures, it is preferable to use 1.5 mm minifragment screws with interfragmentary compression (11). Tension band wiring or Kirschner wire fixation is a useful technique for those fragments not large enough to support a screw, whereas the use of suture anchors is recommended for smaller and comminuted fractures (11).

It is important to note that the ulnar collateral ligament must be reattached, reconstructed, or reconfigured as close as possible to its original configuration. Failure to do so may alter normal MCP joint range of motion (13). Bean et al., in an *in vitro* study, repositioned the proximal origin of the UCL, in sequence, 2 mm palmar and 2 mm proximal from its original anatomic location. They noted that palmar placement of the origin of the UCL increased radial deviation from a mean of 18 to a mean of 27 degrees; proximal placement decreased it from 18 to a mean of 11 degrees. There was no effect on flexion or extension from displacing the proximal origins of the UCL. The distal insertion of the UCL was detached and repositioned in sequence 2 mm dorsal, 2 mm distal, and 2 mm palmar. Dorsal displacement of the UCL insertion on the proximal phalanx increased radial deviation from 18 to 25 degrees, and distal positioning of the insertion decreased it from 18 to 10 degrees. Distal repositioning of the insertion of the UCL decreased MCP joint flexion from 56 to 47 degrees, and palmar placement decreased it from 56 to 49 degrees. Dorsal displacement had no ef-

fect on flexion, and extension and ulnar deviation were not affected by ligament repositioning.

Conclusion

In order to prevent the complication of nonoperative treatment of skier's thumb injury, surgical fixation is recommended.

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