

THE SKIER'S THUMB

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The incidence of skier's thumb (rupture of the ulnar collateral ligament of the first metacarpophalangeal joint) is increasing. To determine whether conservative or surgical treatment is indicated, ultrasound (US) and magnetic resonance imaging (MRI) have been advocated in the last few years. Surgery should be performed in the case of an unstable joint with a ligamentous tear or in the presence of a displaced bony fragment. Several techniques for surgical repair in acute and old ruptures are proposed. Conservative and postoperative treatment consists of immobilization of the joint in a splint or thumb spica cast for 4 weeks. The best results are obtained in bony avulsion fractures.

Conservative treatment of lesions requiring surgical treatment may result in permanent disability of the joint ; thus, correct diagnosis is mandatory.

Keywords : skier's thumb ; ulnar collateral ligament ; sonography ; magnetic resonance ; indication for surgery.

Mots-clés : pouce du skieur ; ligament collatéral ulnaire ; échographie ; résonance magnétique ; indication chirurgicale.

INTRODUCTION

The term "skier's thumb" describes an injury to the ulnar collateral ligament of the first metacarpophalangeal joint (7, 38). This injury was initially termed "game-keeper's thumb", describing a chronic occupational injury to this ligament in Scottish gamekeepers because of their method of killing rabbits by forcefully extending the neck (8). In alpine wintersports accidents the incidence of so-called "skier's thumb" has increased four-fold in the last 20 years (13). Today the incidence is considered to be about 3% of all injuries in skiing accidents, half of them requiring surgical re-

pair (22). The mechanism of the injury is forceful abduction of the thumb associated with striking the ground, striking the ski pole handle or forced abduction of the thumb which is caught in the ski pole strap (31). Injury to the ligament may also result from other sporting activities such as basketball, hockey, wrestling and cycling (19).

The patients complain of pain on the ulnar side of the first metacarpophalangeal joint. Swelling and hematoma are present in acute ruptures. The patients may be unable to hold large objects. The proximal stump can sometimes be palpated as a tender tumor on the ulnar side of the metacarpal head. In severe lesions, increased ulnar deviation is present in full flexion.

ANATOMY

The proper portion of the ulnar collateral ligament originates from the metacarpal head and inserts distally on the more palmar side of the lateral tubercle of the proximal phalanx. It is taut in full flexion of the metacarpophalangeal joint and lax in full extension. The accessory ulnar collateral ligament is slightly superficial and palmar to the proper ligament and inserts at the volar plate. It is taut in full extension and lax in full flexion (32, 39).

Injuries of the ulnar collateral ligament include partial and complete tears. Stener (38) observed that the distally detached ligament can retract proximally. The adductor pollicis aponeurosis

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becomes interposed between the ligament and its bony attachment, preventing satisfactory healing of the ligamentous injury with conservative treatment. These displaced tears have subsequently been called Stener lesions. The incidence of this Stener lesion ranges from 14% to 66% (32).

Pure ligamentous lesions most often occur at the distal end of the ligament, rarely at its proximal origin, and in about 10% in mid-substance (9). The ulnar collateral ligament may also avulse from the distal insertion with a bony fragment. In children with open growth plates, such avulsion fractures are often Salter-Harris III fractures (12); Salter-Harris I and II fractures have also been reported (3).

DIAGNOSTIC PROCEDURES

Several diagnostic procedures are helpful to determine whether conservative or surgical treatment is indicated.

Plain xrays of the thumb are always required to rule out a fracture or to diagnose a bony avulsion of the ligament. To document ulnar instability, stress xrays are performed in full flexion (29). For fear of further displacing an already torn but not yet displaced ligament, other less invasive methods such as ultrasound (US) and magnetic resonance imaging (MRI) have been tested in the last few years.

Ultrasound with a 38-mm, 7.5-Mhz linear probe has proven very reliable (26, 27). In experienced hands a sensitivity of 88% and specificity of 83% for displaced ruptures and 91% for non-displaced ruptures was found (14). The torn, retracted ligament shows the aspect of a tadpole with its thick head along the ulnar side of the metacarpal head, the base of the proximal phalanx seems "empty" (figs. 1, 2).

Magnetic resonance imaging (T2-weighted sequence) has been shown to produce better results, but the patient series have been small (11, 15) or studies were made in surgically created tears of the ligament in cadavers (37). The aspect of the torn ligament has been described as a "yo-yo on a string" appearance (37) or as that of a cauliflower (fig. 3). The regular use of MRI is restricted by availability and cost.

CLASSIFICATION (table I)

Based on anatomical studies by Palmer and Louis (29) four types of acute injuries of the ulnar collateral ligament have been defined: Type I and II are fractures, either undisplaced or displaced, type III and IV are ligamentous tears, either stable or unstable. A fifth type has been added by Louis *et al.* (21) describing an avulsion of the volar plate, which can easily be mistaken for a type II lesion. But this type is stable on stress examination and does not require surgical repair. A sixth type has

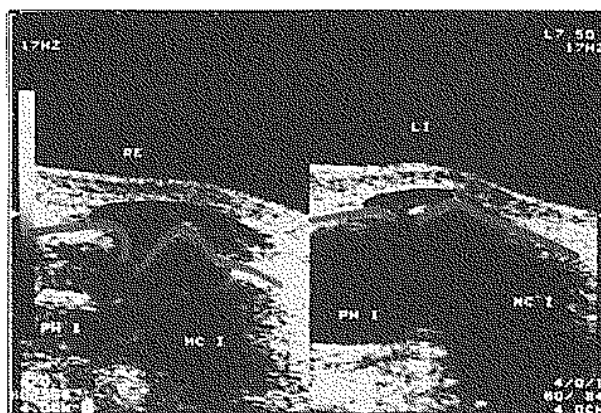


Fig. 1. — Ultrasound of the metacarpophalangeal joint. MC I is the metacarpal head, PH I is the base of the proximal phalanx. On the right side (marked li) is a normal joint with a smooth echolucent ligament. On the left side (marked re) the ligament is swollen, but still attached to the base of the proximal phalanx (PH I).

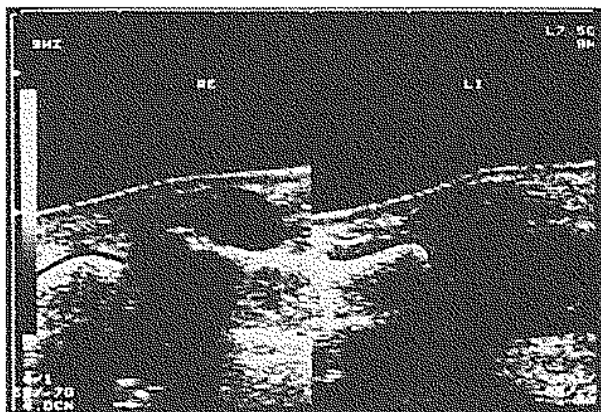


Fig. 2. — Ultrasound image of a Stener lesion in comparison with the normal, contralateral side. Right side (marked li): normal aspect. Left side (marked re): The ligament has the aspect of a tadpole with its thick head; along the metacarpal head, the base of the proximal phalanx is "empty".

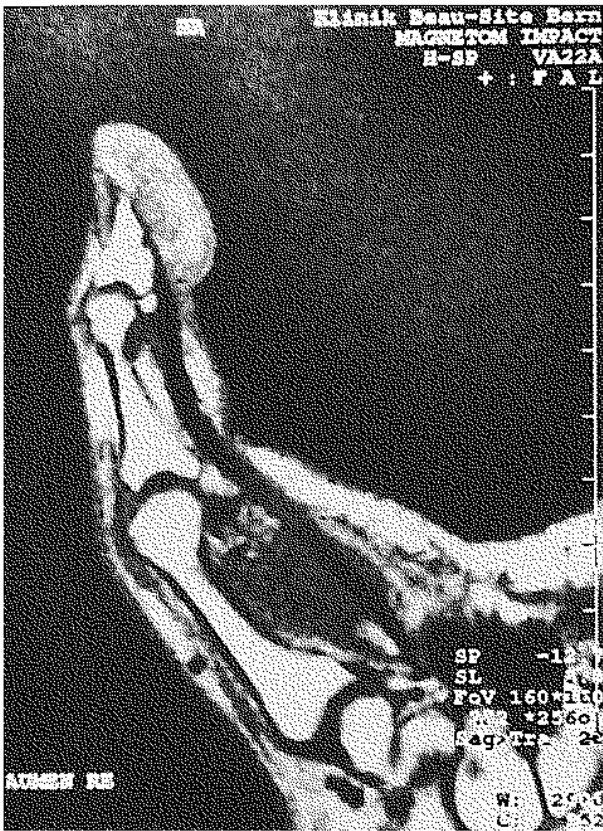


Fig. 3. — Magnetic resonance imaging of the same patient as in fig. 2. The torn, retracted ligament has the aspect of a cauliflower and lies along the volar side of the metacarpal head.

been found by Hintermann *et al.* (16) and Höcker and Pachucki (17). It shows an ulnovolar fracture *and* a ligamentous tear. As it can easily be mistaken for a type I lesion (undisplaced fracture), a clinical and radiological examination in type I lesions is recommended despite the risk of further dislocation of the bony fragment.

INDICATION FOR SURGERY (table II)

Surgery is required in fractures (type II) with displacement of more than 2 mm, joint incongruence and/or significant rotation of the fragment (19).

In ligamentous tears, the so-called Stener lesion represents *the* indication for surgical repair (type IV) as the retracted ligament with the interposed adductor hood will not find its way back to the distal insertion at the base of the proximal phalanx. A Stener lesion should be suspected in the presence of significant ulnar joint instability of 35° (29, 30) to 40 to 45° (6), as well as in the presence of ulnar instability of more than 20° over the contralateral side (18). In ultrasound the image of a tadpole and in MRI the “yo-yo on a string” appearance strongly indicate the need for surgical exploration.

Table I. — Classification of Skier's thumb

Type	Injury	Treatment	Reference
I	fracture undisplaced	conservative	Palmer and Louis 1977
II	fracture displaced	surgical	
III	ligamentous tear, stable	conservative	
IV	ligamentous tear, unstable	surgical	
V	“volar lip” fracture	conservative	Louis 1986
VI	ulnovolar fracture and ligamentous tear	surgical	Hintermann 1993

Table II. — Indications for surgery

- ulnar instability > 35°	}	ligamentous tear
- ulnar instability > 20° to contralateral side		
- retracted ligament on US and MRI		
- > 2mm displacement	}	fracture
- joint incongruity		
- rotated fragment		

SURGICAL TREATMENT

Surgery can be either primary or postprimary, i.e. after a few days, when swelling is regressing ; it is carried out on an outpatient basis under regional anesthesia.

The approach is by a straight dorsoulnar skin incision. An alternative is a slightly curved incision. The ulnar sensory branch of the radial nerve that runs along the ulnar collateral ligament must be identified ; it can be isolated by a vessel loop. Then, the adductor hood is incised near the extensor tendons leaving a narrow margin of 1 to 2 mm for subsequent suturing. The sensory nerve is protected by reflecting the adductor tendon to the ulnar side. Care must be taken at the distal end of the tendon where the nerve comes dangerously close to the incision. The ligament is reduced and repositioned at its distal insertion point.

Following ligament repair, the adductor hood is sutured with continuous resorbable suture, and the skin is closed over a drain.

Refixation can be carried out by "fish-hook" pull-out wires (10, 38) (fig. 4) or with the use of



Fig. 4. — Refixation of the distally avulsed ligament by means of a pull-out wire. Note the ulnovolar insertion point (see text).

small suture-to-bone anchors (5). The ligament is reinserted in the anatomical position, meaning as far volar as possible to counteract the tendency of the phalanx to subluxate in a volar direction. Midsubstance tears are sutured directly (10, 33, 38).

Bony avulsion fractures are fixed with small lag screws in cases with larger fragments (19) (fig. 5) or with a tension band wire, possibly in combination with a K-wire (4, 33). Temporary transfixation of the metacarpophalangeal joint is rarely necessary (9).

Two to three weeks after the acute injury, direct ligament repair is no longer possible. In secondary procedures a variety of techniques are proposed. These can be categorized as follows :

- direct repair in an anatomical position with a free tendon graft, usually with a palmaris longus

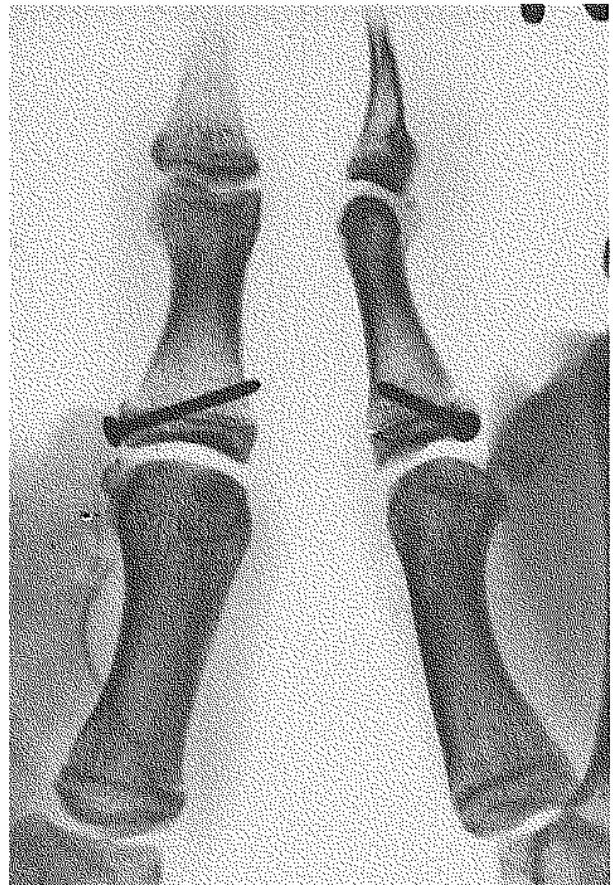


Fig. 5. — A 14-year-old boy with a displaced bony avulsion fracture (Salter-Harris III), fixed with a 1.5-mm lag screw.

transplant (39). This technique has been modified by Bäuerle and Reill (2) and Smith (36) with a horizontal drill hole through the base of the proximal phalanx. Instead of a free transplant, a strip of the extensor pollicis brevis can be woven in place of the ulnar collateral ligament (34).

- indirect repair by tendon transfer of the extensor indicis proprius (20) or advancement of the adductor pollicis tendon (25).

Synthetic ligamentoplasties with dacron or polytetrafluoroethylene have been described by Moutet *et al.* (24).

Arthrodesis is recommended in joints with preexisting osteoarthritis (23, 33).

Temporary arthrodesis with a K-wire after ligamentoplasty does not seem necessary (35).

Postoperative treatment consists of immobilization in a cast or splint/spica cast (fig. 6) for 4 weeks. Active mobilization out of the splint is allowed after 3 weeks. The pull-out wire (if used for fixation) is removed after 4 weeks.



Fig. 6. --- Postoperative joint immobilization in a spica cast for 4 weeks.

RESULTS AND PROGNOSIS

The best results are obtained with primary repair in the acute stage (1). In primary repair, the best results are obtained after bony avulsion fractures, followed by distal ligament tears. The least favorable prognosis is found after midsubstance tears (10).

Results are inconsistent and poorer after treatment of chronic lesions (1, 28, 40). Reconstructive procedures with tendon graft or adductor muscle transfer seem to provide better results than late primary repairs or advancement of the ulnar collateral ligament, but the numbers in the reported series are too small to show statistical significance (1, 28). In the presence of metacarpophalangeal joints with mild degenerative changes, reconstructive surgery is still recommended; in joints with moderate or severe changes, arthrodesis is the best salvage procedure (1).

Primary repair of the ulnar collateral ligament is therefore recommended in the presence of a clinically unstable joint (6).

CONCLUSIONS

Lesions of the ulnar collateral ligament are serious injuries to the thumb. Therefore, correct diagnosis allowing early surgical repair is important. In the last few years ultrasound and MRI have proven to be important diagnostic tools in experienced hands. Primary repair is superior to late reconstruction.

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SAMENVATTING

D. HEIM. Skiërsduim.

De incidentie van skiërsduim (ruptuur van het ulnair collateraal ligament van het metacarpofalangiale gewricht van de duim) is toegenomen. Om te zien wanneer een conservatieve operatieve behandeling is aangewezen werd een studie met echografie en MRI uitgevoerd in de laatste jaren. Chirurgische behandeling is aangewezen in gevallen met een onstabiel gewricht met een ligamenteair letsel of met een verplaatst botfragment. Er werden verschillende technieken voor acute en oude rupturen voorgesteld. Conservatieve en postoperative behandeling bestaat uit immobilisatie van het gewricht in een duimspica voor 4 weken. De beste resultaten werden bekomen in deze met een botavulsie. Conservatieve behandeling van deze letsels welke operatief zouden moeten behandeld worden leidt tot blijvende instabiliteit van het gewricht. *Besluit* : Correcte diagnose is aangewezen.

RÉSUMÉ

D. HEIM. Le pouce du skieur.

La fréquence du «pouce du skieur» (déchirure du ligament latéral ulnaire de l'articulation métacarpo-phalangienne) a nettement augmenté ces dernières années. Pour déterminer le traitement adéquat (conservateur ou opératoire), l'échographie et la résonance magnétique jouent aujourd'hui un rôle important. Une intervention chirurgicale est indiquée dans le cas d'une instabilité articulaire importante due à une déchirure du ligament ou à un arrachement osseux avec déplacement important du fragment. Il existe plusieurs options opératoires pour des cas aigus et chroniques. Le traitement conservateur ou postopératoire inclut une immobilisation de l'articulation métacarpo-phalangienne dans une attelle pendant 4 semaines. Les meilleurs résultats sont obtenus dans des cas avec arrachement osseux. Le recours au traitement conservateur dans un cas relevant du traitement chirurgical, peut conduire à une invalidité permanente de cette articulation. Un diagnostic correct est donc impératif.