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## Surgical Technique

## The Treatment of Chronic Ulnar Collateral Ligament of the Thumb Injury Using Extensor Pollicis Brevis: Surgical Technique



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Chronic rupture of the ulnar collateral ligament of the thumb is a complex lesion that typically results in chronic joint instability, functional limitation in pinch, and persistent pain at the metacarpophalangeal (MCP) joint of the thumb. Different surgical techniques have been proposed, including tendon graft and transpositions. In this article, we report our experience in treating chronic ulnar collateral ligament injuries using extensor pollicis brevis tendon in a Sakellarides modified technique. During the surgical procedure, we detach the extensor pollicis brevis proximally and drive the tendon through the neck of the first metacarpal and the base of the proximal phalanx to reconstruct the ligament at the ulnar side. In our experience, the surgical technique provides good MCP joint strength and stability and allows a good functional recovery with few postoperative complications. This technique provides good stability of the MCP joint using an absorbable suture and allows early mobilization of the joint with minimal stiffness.

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The ulnar collateral ligament (UCL) of the metacarpophalangeal (MCP) joint of the thumb is a critical structure providing lateral and dorsal stability during activities that require grip and pinch strength of the hand (Fig. 1).<sup>1</sup> Skier's thumb is defined as a complete tear of the UCL from the proximal phalanx at the level of the MCP joint after an acute, forceful abduction of the thumb, such as when a skier falls without letting go of the ski pole. A gamekeeper's thumb is caused by repetitive stress on the thumb during activities such as using a wrench, twisting electrical cords, or wringing out heavy cloths.<sup>2</sup>

A Stener lesion occurs when the disrupted ligament is displaced superficial to the adductor pollicis aponeurosis, leading to interposition of the aponeurosis between the UCL and the MCP.<sup>3</sup> This injury typically results in chronic joint instability, functional limitation in pinch, and persistent pain.<sup>4</sup> Because the ligament has been completely damaged and removed from its normal anchored position, it cannot heal properly. When this occurs, surgery is required

to return the ligament to its anatomical position. Otherwise, permanent loss of thumb stability and gripping force may occur.

Symptoms of the UCL injury include pain, instability of the MCP joint of the thumb, and weakness in prehension and the chronicity of the injury. Physical examination of the thumb demonstrates the instability of the MCP joint, impossibility of opposition of the thumb, and the weakening of gripping force.<sup>5,6</sup>

Usually, a full or partially injured thumb ligament is recognized by clinical examination of the thumb. However, sometimes a complete injury can be difficult to detect<sup>7</sup> because the adductor muscle aponeurosis of the thumb can be trapped between the MCP joint and the ligament, which can make the joint seem stable upon clinical examination. In these cases, magnetic resonance imaging is extremely useful in determining whether there is a Stener injury, and in defining the position of the injured UCL.<sup>4</sup> It can also show partial tears and damage to the cartilage of the MCP joint. It represents the reference standard for detecting bone and ligament status in a global framework. Ultrasound is cheaper and easier to perform, but it is not a sensitive examination in cases of chronic injury. X-rays are also performed to rule out the possibility of an avulsion fracture of the proximal phalanx at the UCL insertion.<sup>8</sup> Although acute skier's thumb injuries can be partial ligament injuries and often heal successfully with 4 to 6 weeks of thumb immobilization in a cast, chronic injuries often present a more

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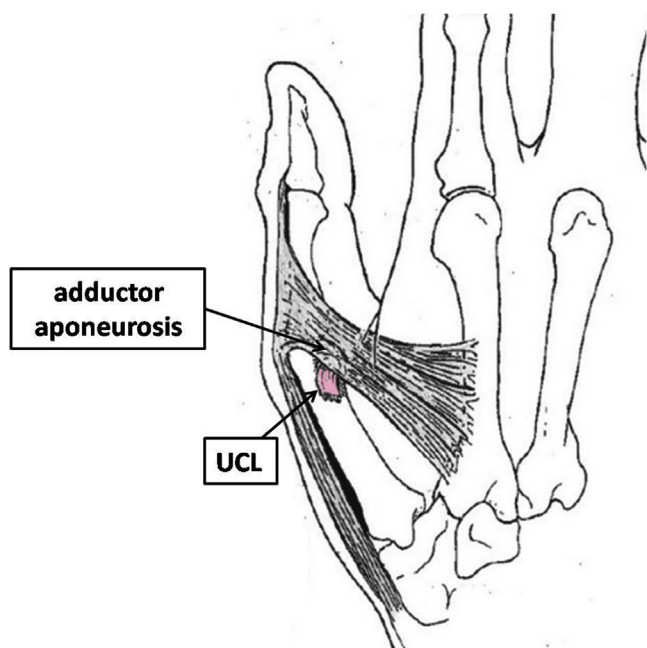


Figure 1. Anatomical representation of UCL of the thumb.



Figure 2. Extensor pollicis brevis proximally detached.

Table 1

Surgical Options in Chronic UCL Rupture: Dynamic Stabilization With Tendon Transfer or Static Stabilization With Tendon Graft

Authors	Surgical Technique	Type of Stabilization
Sakellarides and DeWeese <sup>12,13</sup>	Transfer of a split or full EPB tendon to the ulnar side of the proximal phalanx	Dynamic
Kaplan <sup>14</sup>	Transfer of the extensor indicis proprius to the extensor pollicis longus and repair of the dorsal capsule	Dynamic
Neviaser et al <sup>9</sup>	Adductor pollicis advancement 1 cm distal to the MCP articulation and capsulorrhaphy	Dynamic
McCue et al <sup>15</sup>	Adductor pollicis advancement combined with UCL advancement	Dynamic
Glickel et al <sup>11</sup>	Graft of the palmaris longus tendon using 3 bone tunnels (apex-proximal triangular tunnel configuration)	Static
Fairhurst and Hansen <sup>16</sup>	Graft of full EPB tendon in an apex-distal, or reverse, triangular bone tunnel configuration	Static
Allred <sup>17</sup>	Fourth toe extensor autograft	Static
Osterman et al <sup>18</sup>		
Strandell <sup>19</sup>	Use of a split of EPB graft	Static
Frykman and Johansson <sup>20</sup>	Slip of the abductor pollicis longus secured to the base of the proximal phalanx ulnarly	Static

challenging management dilemma for the surgeon because the UCL may be retracted or attenuated.

### Indications and Contraindications

Different surgical options have been proposed for the treatment of UCL lesions. In general, the most common surgical treatment for acute injuries consists of primary suture of the ligament or reattachment of the torn UCL to its anatomical position at the base of the proximal phalanx using an anchor.<sup>4,9–11</sup> If there is an avulsion fracture, it is also necessary to fix the fragment to repair the fracture. Once anchored to the bone, the UCL should heal within 12 weeks. Other options for managing chronic injuries include interference screws, ligament repair, ligament reconstruction with a free tendon graft, and arthrodesis of the MCP joint. Dynamic stabilization with tendon transfer or static stabilization with tendon graft have been reported in the literature because they offer a reliable method of reconstruction in the case of important injuries (Table 1).

It is important to consider that a primary direct suture is not a promising choice in chronic UCL rupture owing to the poor quality of tissues that compromise ligament restoration and function. Ligament reconstruction or graft are suitable in such cases.

We focused on the technique of Sakellarides and DeWeese,<sup>12,13</sup> which involves the use of the extensor pollicis brevis (EPB) and redirects the freed portion of the tendon through a drill hole in the neck of the first metacarpal and through a second drill hole at the base of the proximal phalanx and then anchors the tendon with the pullout technique. In this report, we describe a surgical variation of this technique.

### Surgical Technique

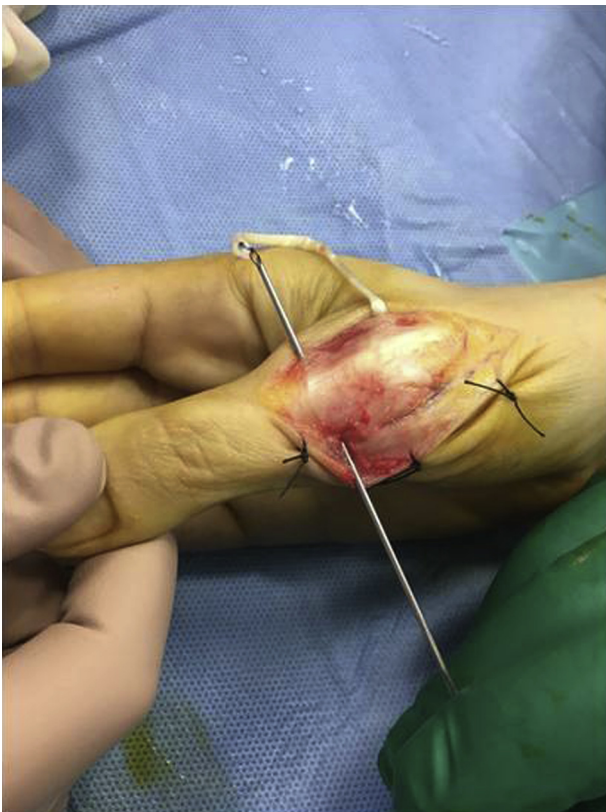
In our surgical procedure, we make a curved incision over the MCP joint of the thumb, being careful to avoid the branches of the superficial radial nerve on the side of the incision. After carefully spreading the tissues with blunt retractors, the EPB



**Figure 3.** Drill at the neck of the first metacarpal to drive the tendon.



**Figure 5.** Tendon fixation with absorbable suture.



**Figure 4.** Tendon passage at the base of the proximal phalanx to reconstruct UCL.

tendon is identified and detached proximally, with a small incision at the retinaculum of EPB and abductor longus pollicis (Fig. 2). This tendon is then freed until its insertion at the base



**Figure 6.** Clinical examination: valgus stress test after chronic injury of UCL of the thumb.

of the proximal phalanx. We drill the bone surface with a 3-mm drill at the neck of the first metacarpal and at the base of the proximal phalanx. First, we drive the tendon through the metacarpal hole from the radial to the ulnar side using a spinal needle (Fig. 3). As a second step, we drive the tendon through the phalanx, from the ulnar to the radial side (Fig. 4), to reconstruct the UCL. At the end of the procedure, we complete the square and fix the tendon at the radial side of the base of the proximal phalanx using an absorbable simple interrupted suture (Fig. 5).

The advantage of our technique is that we do not use pull out as in the original Sakellarides technique, but use only an absorbable



**Figure 7.** Radiological signs of subluxation of first MCP joint after chronic UCL injury.

suture with no external device. We perform a double reconstruction of the tendon on the radial and ulnar sides. This double passage strengthens the suture to allow for faster recovery and enhance grip strength and stability of the MCP joint. We suggest using absorbable suture to reduce the risk for superficial granulomas around the MCP joint

### Postoperative Management

In our experience, after surgery, a volar orthosis is recommended for 3 weeks to protect the reconstruction. After 3 weeks, active and passive complete mobilization is started.

### Case Illustration

We describe the case of a female patient who experienced chronic (>6 weeks) rupture of the UCL after an indoor sport trauma and who had not undergone prior treatment. She was aged 52 years and had had no prior thumb injuries. She demonstrated laxity in valgus stress of the first MCP joint (Fig. 6) with lack of a firm end point. Metacarpophalangeal joint stability, intensity of pain according to the visual analog scale, grip strength, and opposition of the thumb were subjectively graded from 1 to 6 according to the patient's evaluation and clinical examination (1 = excellent outcome and 6 = unacceptable outcome; mean value = 4 in our specific case). The patient showed considerable pain and a lack of opposition and grip and pinch strength compared with the contralateral side. Radiological diagnosis was made through x-rays (Fig. 7), which showed malalignment of the first metacarpal and the proximal phalanx and an increase of the joint space under valgus stress. After the surgical procedure, we clinically



**Figure 8.** Clinical examination after surgical repair: negative valgus stress test.



**Figure 9.** Clinical examination after surgical repair: good grip and pinch strength.

evaluated the patient after 4 and 6 weeks. We report that all of the following parameters were completely restored: range of motion of first MCP, pain medication, thumb stability, and grip and pinch strength (Figs. 8, 9), with good radiographic alignment of the first MCP joint (Fig. 10).



**Figure 10.** X-ray after surgical reconstruction of UCL of the thumb using EPB.

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