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## Surgical Technique

## Surgical Management of the Trapezium Canal Syndrome: An Uncommon Presentation of Tenosynovitis of Flexor Carpi Radialis

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Flexor carpi radialis (FCR) tenosynovitis is a condition characterized by pain over the volar radial wrist caused by inflammation of the FCR tendon sheath. It is an uncommon and often unrecognized pathology that could be misleading from a diagnostic and therapeutic point of view. Treatment usually involves immobilization, nonsteroidal anti-inflammatory drugs, and injections. In refractory cases, operative release of the FCR tendon sheath may be indicated. In this article, we report our experience in treating FCR tenosynovitis by surgically decompressing the trapezium canal, through which the tendon runs, at the wrist. In our experience, this surgical technique allows a good functional recovery with the resolution of painful symptoms without notable complications.

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The flexor carpi radialis (FCR) is one of the muscles of the volar superficial layer of the forearm. With its action, it flexes, abducts, and pronates the wrist. Because of its biarticular function, the FCR also collaborates, even if minimally, in the flexion of the elbow. The FCR originates on the anterior aspect of the medial epicondyle (epitrochlea) of the humerus, on the superficial fascia of the forearm (antebrachial fascia), and from the surrounding intermuscular septa. Its fibers insert at the base of the second metacarpal bone (77%) or at the base of the third metacarpal (23%).<sup>1</sup> In the terminal part, the FCR tendon runs superficial to the carpal tunnel and through its own osteofibrous canal (Fig. 1). This canal has peculiar anatomic landmarks, and 90% of its space is occupied by the FCR.<sup>2</sup> The radial wall of the FCR tunnel is formed by the body of the trapezium and by the joint capsule of the first carpometacarpal joint. The palmar side is formed by the crest of the trapezium and the transverse carpal ligament. On the ulnar side, the tunnel is delimited by a septum of the retinaculum, which starts from the dorsal interface of the trapezium and the scaphoid and enters the transverse bundles of the transverse

carpal ligament; dorsally, the FCR canal is formed by the body of the trapezium (Fig. 2).<sup>3</sup> In 84% of cases, the trapezium-trapezoid junction joins the superior face of the tunnel. Before the tendon runs into the tunnel, it slides on a trajectory over the volar distal pole of the scaphoid. This complex anatomical background is determinant because the lack of space in which the tendon runs can play an important role in the pathophysiology of tenosynovitis.<sup>4</sup>

## Clinical Presentation

Flexor carpi radialis tenosynovitis at the wrist is a relatively frequent and often underestimated disease, most commonly occurring in young and middle-aged patients who are manual laborers or who practice sports in which hand overuse and repetitive gestures are performed.<sup>5,6</sup> This disease usually affects the dominant limb. The pathogenesis can be related to intrinsic factors (rheumatic diseases, dysmetabolic diseases, infections, overuse syndrome), extrinsic factors such as bone anomalies (distal pole of the scaphoid), fractures (trapezium, scaphoid, pseudarthrosis, etc), soft tissue alteration, osteoarthritis of nearby joints (scaphotrapezium-trapezoid or trapezium-metacarpal joint), or after trapezio-metacarpal surgical procedures.<sup>7,8</sup> Clinical presentation of FCR tenosynovitis involves pain over the volar radial wrist and at the center of the thenar eminence, swelling at the base of the thenar eminence and along the course of the tendon that is accentuated with flexion, and radial

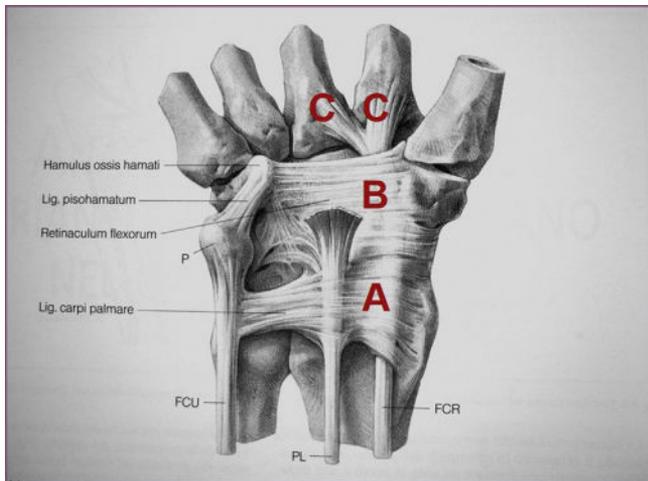
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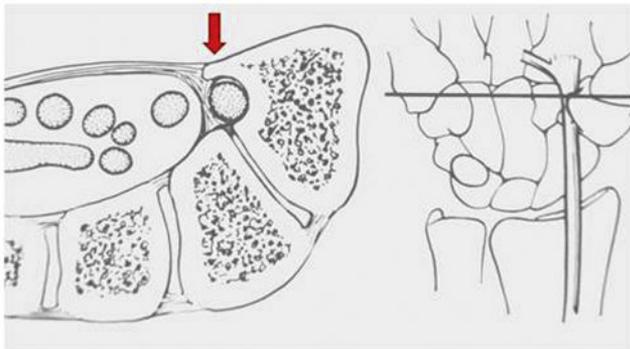
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**Figure 1.** Anatomic landmarks for the FCR. **A** Scaphoid projection. **B** Trapezium osteofibrous canal. **C** Flexor carpi radialis entheses.

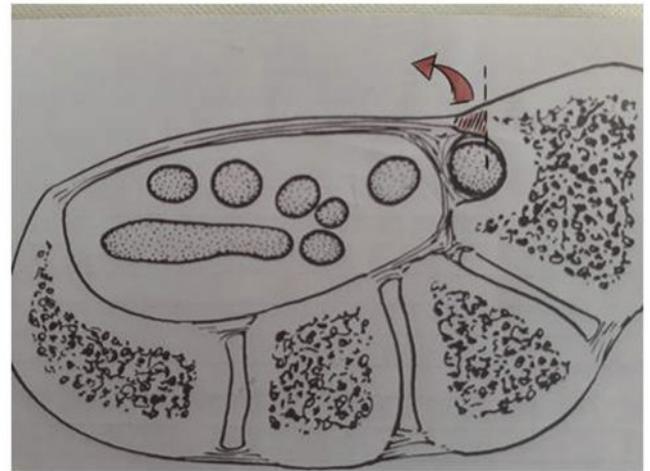


**Figure 2.** Axial view of the trapezium canal.

deviation of the wrist against resistance, especially with the abduction of the second and third fingers.<sup>9–11</sup> Radiographic examination can show morphological alteration at the scapho-trapezium-trapezoid joint with bone erosion and osteoarthritis. Computed tomography reconstructions may be used to achieve a 3-dimensional view of the osteofibrous canal. Magnetic resonance imaging is performed to document reactive tenosynovitis at the wrist and tendon thickness because of a reactive process. Ultrasonography is highly operator dependent, but a well-trained sonographer can diagnose FCR tenosynovitis. In FCR tenosynovitis, the challenge is to determine if the symptoms are related to a primary inflammation of the tendon or to an alteration of the volume and morphology of the surrounding structures in which it lies. In fact, morphological alteration of the osteofibrous canal in which FCR runs can produce tenosynovitis in so-called “trapezium canal syndrome.” Conservative treatment involves immobilization of the wrist, anti-inflammatory drugs, and local infiltration with corticosteroids in acute presentation. If a conservative approach fails, surgical decompression is indicated.<sup>12–13</sup> There is limited literature to date describing the outcomes of surgical decompression.

### Surgical Management

When conservative treatment fails, it may be necessary to plan a surgical exploration of the FCR to relieve pain and distress at the volar region of the wrist. In our surgical procedure, we make a volar



**Figure 3.** Axial view of surgical decompression of the FCR at the trapezium canal.



**Figure 4.** Coronal view of surgical decompression of the FCR at the trapezium canal.

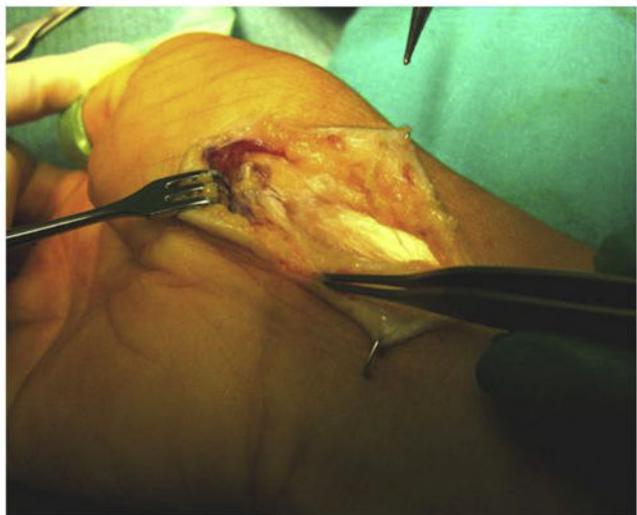
incision at the scaphotrapezium joint centered over the FCR-palpable tendon extending over the proximal thenar eminence. This approach results in a Gedda-Moberg-like incision that is cut back proximally and curved inwards over the thenar eminence.<sup>13</sup> After carefully spreading the tissues with blunt retractors and taking care to avoid the palmar cutaneous branch of the median nerve, the volar face of the trapezium is exposed. The trapezium canal is identified following the course of the FCR tendon. After a careful intraoperative evaluation, a partial 3-mm–4-mm osteotomy is performed with a small osteotome and the prominent medial border of the trapezium is carefully removed, taking care not to damage tendon fibers. This procedure decompresses the FCR at the trapezium canal and removes the conflict between the bone and the tendon that causes pain and functional impairment (Figs. 3, 4). We believe that the simple incision of the tendon sheath at the crest of the trapezium and the mobilization of the tendon from the trapezoidal groove could lead to a relapse of painful symptoms over time if the bony anatomy is not addressed.

### Postoperative Management

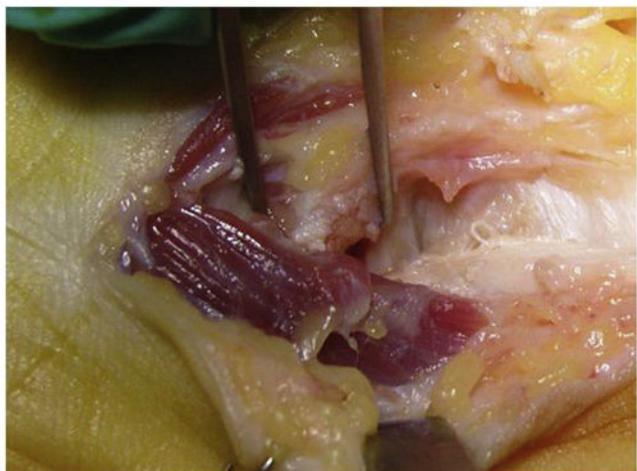
After surgery, a volar orthosis is recommended for 2 weeks. After 2 weeks, physical therapy is started using laser and TECAR



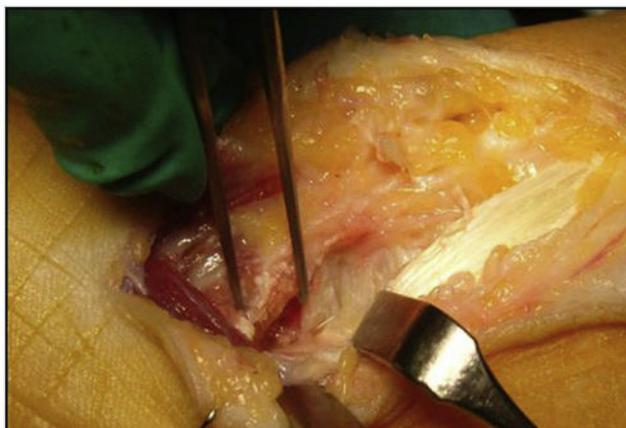
**Figure 5.** X-ray of the affected hand showing the trapezium and the surrounding joint relationships.



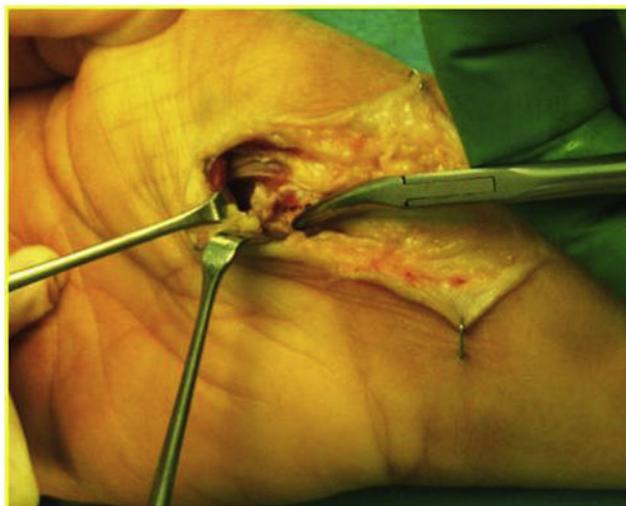
**Figure 6.** Surgical approach to the FCR at the trapezium canal.



**Figure 7.** Intraoperative finding of the prominent medial border of the trapezium compressing the FCR.



**Figure 8.** Partial trapezium osteotomy and FCR decompression.



**Figure 9.** Trapezium canal aspect at the end of the procedure.

(Transfer Energy Capacitive And Resistive) applications combined with assisted active physiotherapy and proprioceptive exercises of gripping and opposition.

### Case Presentation

We describe the case of a 34-year-old man who experienced chronic pain at the volar side of the wrist over the FCR. He had no prior wrist injuries. Pain, functional limitation, weakness, and reduced range of motion in active flexion and extension of the wrist were subjectively graded from 1 to 6 according to the patient's evaluation and clinical examination (1 = excellent outcome and 6 = unacceptable outcome; the mean value was 5 in our specific case). The patient reported severe pain localized at the base of the thenar eminence at the proximal portion of the trapezium, enhanced by resisted flexion of the wrist and radial deviation. Handgrip strength test performed with an isometric dynamometer measured 55 kilograms. The patient underwent x-rays to check carpal bones morphology (Fig. 5). The pain was refractory to conservative treatment for 6 months (physical therapy, wrist orthosis, and anti-inflammatory drugs). He signed written informed consent for the surgical procedure and for data collection. Flexor carpi radialis



**Figure 10.** Clinical examination after surgical repair showing complete range of motion with no pain.

tendon decompression was performed following our surgical procedure (Figs. 6–9). After the surgical procedure, we clinically evaluated the patient at 2, 4, and 8 weeks. All the following parameters were completely restored: wrist pain, swelling, wrist strength in active flexion, range of motion in flexion, and extension of the wrist (Fig. 10) with an increased handgrip strength test to 56

kilograms. At 4 and 8 weeks after surgery, clinical results were comparable.

Flexor carpi radialis tenosynovitis represents a diagnostic and therapeutic challenge for hand surgeons. When we face this condition, it is important to investigate the FCR tendon throughout its course, considering the morphology of the bones that form its osteofibrous canal. When the diagnosis and the surgical plan are correct, a partial osteotomy of the medial border of the trapezium is a simple and safe technique that can lead to rapid relief of painful symptoms.

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