The Suction Test: A Novel Technique to Identify and Verify Successful Repair of Peripheral Triangular Fibrocartilage Complex Tears

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Abstract

Keywords

- ▶ peripheral triangular fibrocartilage complex tears
- ▶ TFCC
- ▶ suction test
- ▶ wrist

Background The diagnoses of peripheral triangular fibrocartilage complex (TFCC) tears continue to be the subject of numerous investigations.

Case Description We describe a novel arthroscopic technique that may be used as an adjunct with other arthroscopic maneuvers to diagnose and confirm repair of peripheral sided TFCC injuries.

Literature Review The hook and trampoline tests are intraoperative techniques to diagnose TFCC tears.

Clinical Relevance The suction test provides a means to detect peripheral tears and to confirm restoration of its tension post repair.

Traditionally, peripheral triangular fibrocartilage complex (TFCC) tears have been diagnosed arthroscopically. This can be through the loss of its tension as highlighted by the loss of the “trampoline” effect.¹ Ruch and colleagues² reported on the “hook” test, whereby a probe is placed under the peripheral TFCC tear to test the integrity of the foveal insertion. As noted by Atzei et al,³ a positive “hook” test signifies disruption of the foveal fibers as the ulnar margin of the articular disk displaces toward the center of the radiocarpal joint.³ Confirmation of foveal disruption can be confirmed with a distal radioulnar joint (DRUJ) arthroscopy.⁴

Where the tension of the TFCC has been lost secondary to a peripheral tear that has subsequently scarred down, the diagnosis of a peripheral tear may be difficult. We describe a technique that helps to identify peripheral TFCC tear using the suction effect through the shaver device. This can be used to validate the repair and restoration of TFCC tension also.

The Suction Test: Case Report and Procedural Technique

A 26-year-old right-hand dominant female manual laborer presented following a work-related injury to her left wrist. She was lifting a heavy object when she experienced the

development of left ulnar-sided wrist pain accompanied by a “clicking” sensation. Her ulnar wrist pain was exacerbated by lifting and twisting. Upon examination, she had decreased range of motion (ROM) of her wrist secondary to pain and a loss of grip strength compared with the contralateral side (▶ **Table 1**). She was tender over the TFCC, fovea, and extensor carpi ulnaris (ECU) tendon with ulnar deviation. Her DRUJ was examined in neutral, pronation, and supination and did not demonstrate any instability compared with the uninjured side. There was no acute injury noted on plain radiographs. Magnetic resonance images were significant for tendinopathy and a split tear in the ECU tendon (▶ **Fig. 1**), as well as irregularity of the central portion of the TFCC without distinct perforation. The patient was initially treated conservatively with an ultrasound guided injection of 0.5 mL of 1% lidocaine and 0.5 mL of betamethasone 6 mg/mL (betamethasone acetate 3 mg/mL + betamethasone sodium phosphate 3 mg/mL) to the TFCC and ECU tendon sheath. A Munster cast was applied for 6 weeks followed by a course of hand therapy. Despite this, the patient continued to have refractory symptoms and proceeded with surgical intervention.

Prior to arthroscopic evaluation, the DRUJ was examined under anesthesia in neutral, pronation, and supination and was found to be stable and similar to the contralateral side. Arthroscopy of the radiocarpal joint revealed that there was

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Table 1 Patient pre- and postoperative ROM measurements and visual analog scores

ROM preoperative (left hand/right hand)		ROM postoperative (left hand/ right hand)
Dorsiflexion (degrees)	50/70	70/80
Ulnar deviation (degrees)	40/60	30/40
Grip strength (kg)	20/32	28/30
	Preoperative	Postoperative
Pain score (VAS)	8	0

Abbreviations: ROM, range of motion; VAS, visual analog score.

Fig. 1 Axial T2 magnetic resonance imaging of patient left wrist with increased signal associated with ECU longitudinal split tear (arrow).

loss of the trampoline effect of the TFCC. The patient appeared to have a peripheral Palmer 1B TFCC tear that had scarred in and so it was difficult to demonstrate a positive “hook test” with the probe. A 2.5-mm shaver was introduced through the 6R portal and, using periodic suction, was able to demonstrate loss of tension of the TFCC (►Video 1). The shaver was then used to perform a synovectomy and debride the peripheral TFCC tear. The peripheral TFCC tear was repaired using an outside-in technique placing three 2–0 polydioxanone sutures in a vertical mattress technique (►Video 2). There was restoration of the “trampoline” effect, as demonstrated by the probe, as well as less restoration of the tension in the TFCC using the “suction test” (►Video 2). The ECU tendon was explored and tenosynovectomy was performed.

Video 1

Peripheral-sided triangular fibrocartilage complex tear following debridement demonstrating loss of tension when the “suction test” is performed. Online content including video sequences viewable at: www.thieme-connect.com/ejournals/html/doi/10.1055/s-0037-1599125.

Video 2

Restoration of tension of the triangular fibrocartilage complex after peripheral outside-in when the “suction test” is performed. Online content including video sequences viewable at: www.thieme-connect.com/ejournals/html/doi/10.1055/s-0037-1599125.

Postoperatively, a Munster cast was applied for 6 weeks followed by hand therapy. At 9 months postoperatively, she had a visual analog pain score of 0, improved ROM, and grip strength of 94% of the contralateral side (►Table 1). The modified Mayo Wrist Score⁵ improved from 40 to 80 preoperatively.

Discussion

Wrist arthroscopy remains the gold standard for the diagnosis of TFCC injuries in symptomatic patients. The use of an arthroscopic probe to detail the loss of tension in the TFCC (trampoline test¹) and to delineate the tear (the hook test³) is common. In chronic tears, however, it may be difficult to delineate the peripheral tear due to scar formation on the torn site. In this perspective, we describe the use of a suction test not only to delineate the laxity of the TFCC after injury but also to confirm restoration of its tension after repair.

As one can appreciate from intraoperative video examples provided, determination of the TFCC injury can be visualized when the suction test is performed by its laxity and lack of TFCC tension associated with injury. This is not appreciated when the suction test is again performed following repair. We feel that this is a simple technique that surgeons can use when treating TFCC pathology.

Conflict of Interest

None.

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