

# Arthroscopic Trapeziectomy Without Traction Tower



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**Abstract:** Osteoarthritis in the thumb carpometacarpal joint causes pain, swelling, deformity, instability, loss of motion, and power, which seriously impairs overall hand function. Surgery is indicated if conservative treatment fails to relieve the pain. Trapeziectomy is the most popular surgical treatment choice and yields good range of motion and relieves pain with the fewest complications. Arthroscopic trapeziectomy is gaining popularity. In general, the arthroscopic procedure is performed under continuous traction with a traction tower. The purpose of this Technical Note is to describe the details of arthroscopic trapeziectomy without traction tower. This eliminates the need of a traction tower and continuous traction and provides a stable platform for the arthroscopic procedure.

Osteoarthritis in the thumb carpometacarpal (CMC) joint causes pain, swelling, deformity, instability, loss of motion, and power, which seriously impairs overall hand function.<sup>1</sup> Pain reduction, as well as preservation and improvement in range of motion, remains the main aim in the treatment of thumb CMC osteoarthritis.<sup>2</sup> Surgery is indicated if conservative treatment fails to relieve the pain. There is no consensus on the best surgical option for thumb CMC osteoarthritis.<sup>3,4</sup> Trapeziectomy is the most popular surgical treatment choice, yielding good range of motion and relieving pain with the fewest complications.<sup>4-7</sup> Partial or total trapeziectomy can be combined with various interpositions and ligament reconstruction or suture-button suspensionplasty and have been demonstrated to have a high rate of satisfactory outcomes.<sup>3,5,8-15</sup> When comparing studies that used techniques with any type of trapeziectomy to

debridement alone, only the trapeziectomy subgroup showed significant improvements in pain.<sup>16</sup>

Partial trapeziectomy is indicated for symptomatic Eaton grade II and III thumb CMC osteoarthritis especially for young patients with significant functional demands because of less metacarpal subsidence and instability as compared to total trapeziectomy.<sup>3,5,7,10-12,15</sup> Denervation, joint lavage and capsular imbrications has been proposed to be an alternative treatment of patients with symptomatic Eaton grade II and III thumb CMC osteoarthritis.<sup>2</sup> However, it is not currently used to treat arthritis in this joint because of the failure of the procedure to yield significant symptomatic relief. The failure of denervation may be due to previous anatomic studies that have overlooked innervation of the thumb CMC joint via the ulnar nerve.<sup>6</sup> Arthrodesis of the thumb CMC joint is another surgical alternative for the treatment of post-traumatic osteoarthritis, especially in high-demand young patients because of the theoretically better stability and strength compared with traditional trapeziectomy.<sup>1,17</sup> However, the patient should accept postoperative loss of motion of the joint, and it is contraindicated in the presence of osteoarthritis of the scaphotrapeziotrapezoidal joint. When the scaphotrapeziotrapezoidal joint is affected, total trapeziectomy is indicated.

Beside tendon interposition, interposition implants (e.g., polylactic acid implant) can be used to avoid the potential complications of tendon harvesting, but it may lead to foreign body reaction.<sup>18,19</sup> Moreover, trapeziectomy can be done without interposition or ligament reconstruction and can be combined with K wire fixation with or without distraction of the joint.<sup>4,7,20</sup>

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**Table 1.** Indications and Contraindications of Arthroscopic Trapeziectomy Without Traction Tower

Indications	
Symptomatic osteoarthritis of the thumb CMC joint that is recalcitrant to conservative treatment. Either partial or total trapeziectomy can be performed according to the staging of the osteoarthritis of the joint.	
Contraindications	
Distorted local anatomy	
Recent infection	
If the pain is due to synovitis of the thumb CMC joint rather than osteoarthritis.	
The presence of unstable or friable skin or an associated ipsilateral upper limb injury that prevents the use of traction tower is <i>not</i> a contraindication of this arthroscopic technique	

CMC, carpometacarpal.

Trapeziectomy can be performed via open or arthroscopic approaches.<sup>3</sup> Recent interest has focused on arthroscopy because of its perceived limited invasive nature allowing early range of motion and quicker recovery while minimizing scarring and reducing the risk of nerve injury.<sup>3,4,10,12,14,21,22</sup> In general, the

arthroscopic procedure is performed under continuous traction with a traction tower. The purpose of this Technical Note is to describe the details of arthroscopic trapeziectomy without traction tower is described. Continuous traction of the thumb CMC joint is not needed. It is indicated in cases of symptomatic osteoarthritis of the thumb CMC joint that is recalcitrant to conservative treatment. Either partial or total trapeziectomy can be performed according to the staging of the osteoarthritis of the joint. It is contraindicated in case of distorted local anatomy or recent infection. It is also contraindicated if the pain is due to synovitis of the thumb CMC joint rather than osteoarthritis. The presence of unstable or friable skin or an associated ipsilateral upper limb injury that prevents the use of traction tower is not a contraindication of this arthroscopic technique (Table 1).

## Surgical Technique

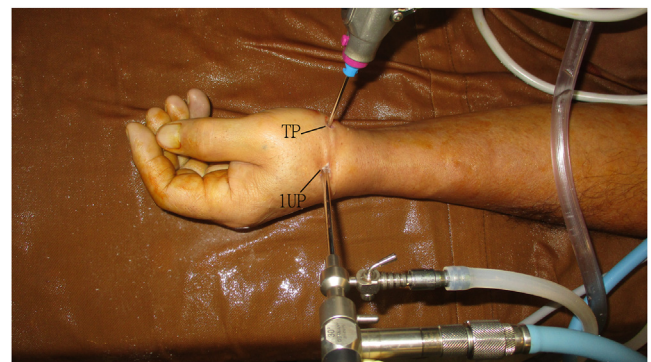
### Preoperative Assessment and Patient Positioning

Local tenderness should be elicited at the thumb CMC joint. The presence of adducted first metacarpal with or without hyperextension of the first metacarpophalangeal joint is checked. Tenderness at the scaphotrapezoidal joint should also be checked. Radiographs of the wrist can grade the degree of degeneration of the thumb CMC joint and scaphotrapezotrapezoidal joint (Fig 1).

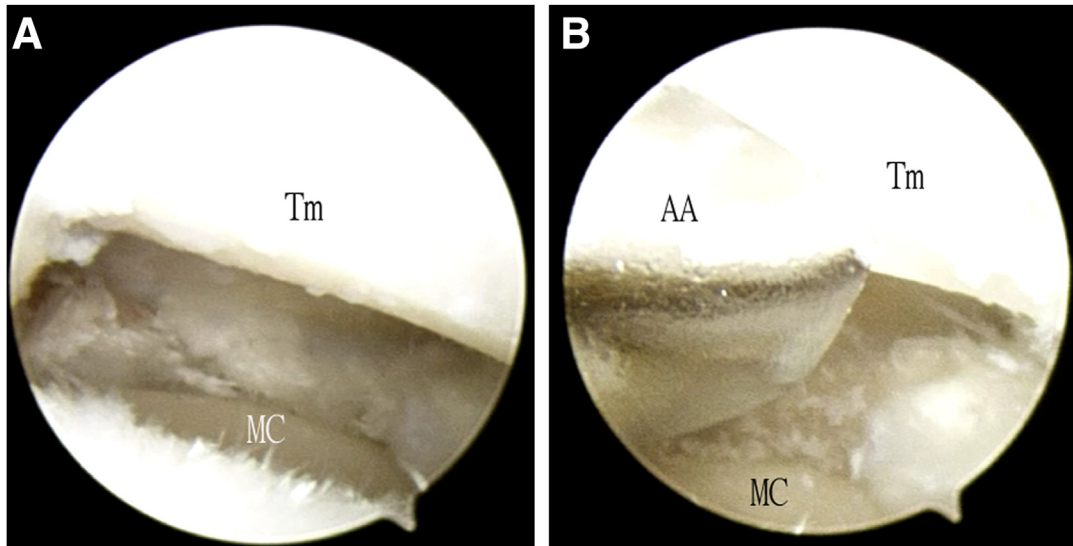
The patient is in the supine position with the hand on the side table. A traction tower or continuous manual traction is not used. An arm tourniquet is applied to provide a bloodless operative field. A 2.7-mm, 30° arthroscope (Henke Sass Wolf GmbH, Tuttlingen, Germany) is used for this procedure. Fluid inflow is driven by gravity, and an Arthropump (Arthrex, Naples, FL) is not used.



**Fig 1.** Arthroscopic trapeziectomy of the left wrist without traction tower. The patient is in supine position with the hand on the side table. In this illustrated case, radiograph shows osteoarthritis of the thumb carpometacarpal joint and scaphotrapezotrapezoid joint. CMCJ, thumb carpometacarpal joint; STTJ, scaphotrapezotrapezoid joint.



**Fig 2.** Arthroscopic trapeziectomy of the left wrist without traction tower. The patient is in supine position with the hand on the side table. The procedure is performed via the 1U portal and the thenar portal of the thumb carpometacarpal joint. 1UP, 1U portal; TP, thenar portal.



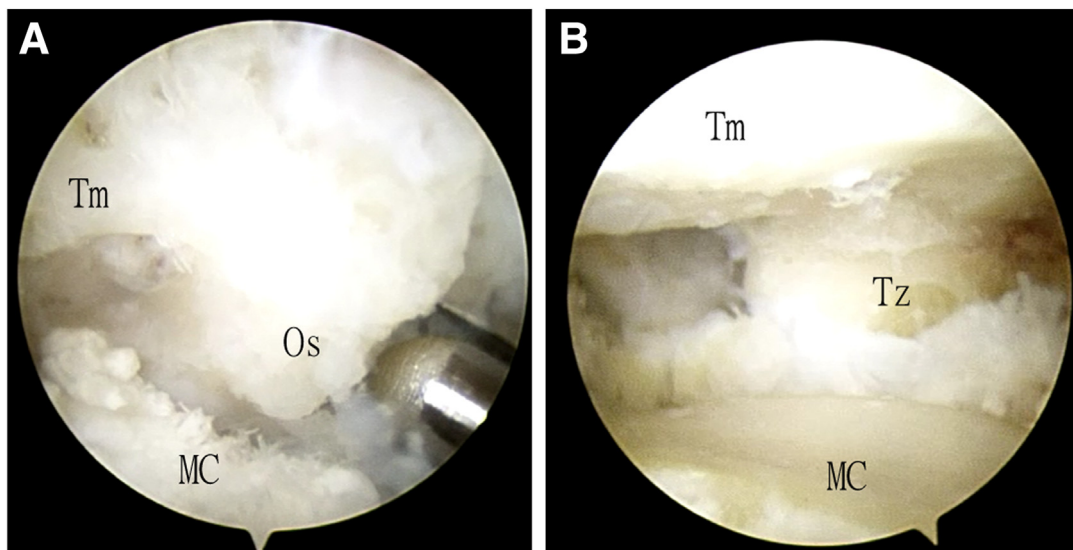
**Fig 3.** Arthroscopic trapeziectomy of the left wrist without traction tower. The patient is in supine position with the hand on the side table. The 1U portal is the viewing portal, and the thenar portal is the working portal. (A) The capsule of the thumb carpometacarpal joint between the portals is resected with an arthroscopic shaver to expose the joint. (B) Trapeziectomy is started at the distal radial edge of the trapezium bone by means of an arthroscopic acromionizer. The bone resection is from outside the joint to inside the joint. Tm, trapezium; MC, first metacarpal; AA, arthroscopic acromionizer.

#### Portal Placement

The procedure is performed via the 1U portal, and the thenar portal of the thumb CMC joint (Fig 2). The 1U portal is at the ulnar side of the extensor pollicis brevis tendon. As the thumb CMC joint is degenerated and joint space is narrowed and may be obscured by osteophytes of the joint, the portal site is better identified by mean of a 22-gauge needle under fluoroscopic

guide. The thenar portal is identified after introduction of the 1U portal, with transillumination, and a 22-gauge needle is placed in the bulk of the thenar muscle at the level of thumb CMC joint, about 90° from the 1U portal.

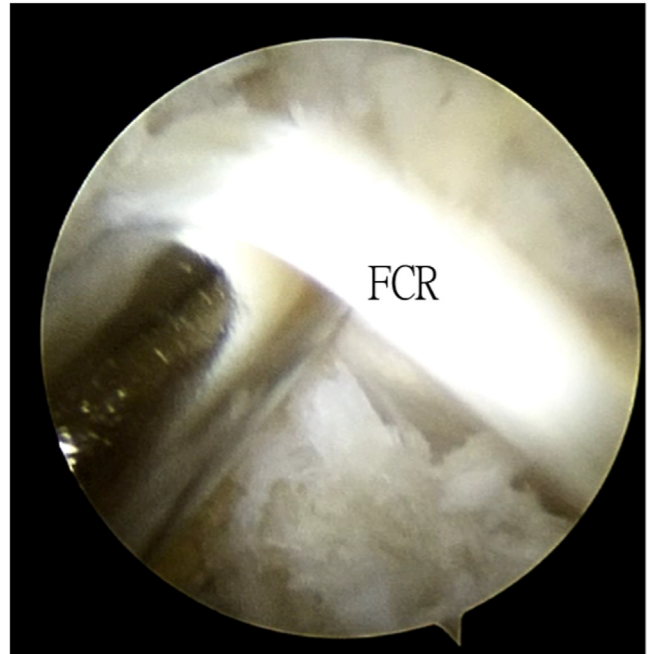
Incisions of 3 to 4 mm are made at the portal sites, and the subcutaneous tissue are bluntly dissected down to the joint capsule by means of a hemostat. The soft



**Fig 4.** Arthroscopic trapeziectomy of the left wrist without traction tower. The patient is in supine position with the hand on the side table. The thenar portal is the viewing portal and the 1U portal is the working portal. (A) The ulnar osteophyte of the trapezium bone is dissected and lifted out from between the first and second metacarpal bases by means of the shaver. (B) The osteophyte and the ulnar half of the trapezium bone are resected till the trapezoid bone is exposed, which represent the ulnar boundary of the bone resection. Tm, trapezium; MC, first metacarpal; Os, ulnar osteophyte of the trapezium; Tz, trapezoid.



**Fig 5.** Arthroscopic trapeziectomy of the left wrist without traction tower. The patient is in supine position with the hand on the side table. The 1U portal is the viewing portal and the thenar portal is the working portal. The bone resection is proceeding proximally with the shaver. When the proximal subchondral bone is reached, the subchondral bone is removed by a Kerrison rougeur to expose the scaphoid bone. This represents the proximal boundary of the bone resection. Tm, trapezium; S, scaphoid.



**Fig 6.** Arthroscopic trapeziectomy of the left wrist without traction tower. The patient is in supine position with the hand on the side table. The 1U portal is the viewing portal and the thenar portal is the working portal. During bone resection of the volar part of the trapezium, the flexor carpi radialis tendon is in view. The bone around the tendon is carefully removed with an arthroscopic punch. FCR, flexor carpi radialis tendon.

tissue between the portals is bluntly dissected from the joint capsule and this creates the initial endoscopic working area. In this illustrated case, the patient has Eaton grade IV thumb CMC osteoarthritis, and arthroscopic total trapeziectomy is performed.

#### **Arthroscopic Resection of Radial Half of the Trapezium**

The 1U portal is the viewing portal, and the thenar portal is the working portal. The capsule of the thumb CMC joint between the portals is resected with an arthroscopic shaver (Dyonics; Smith and Nephew, Andover, MA) to expose the joint. Frequently, the shaver can be slipped into the joint to perform the debridement from inside. Trapeziectomy is started at the distal radial edge of the trapezium bone by means of an arthroscopic acromionizer (Dyonics). The bone resection is from outside the joint to inside the joint (Fig 3).

#### **Arthroscopic Resection of Ulnar Half of the Trapezium and Its Ulnar Osteophyte**

The thenar portal is the viewing portal, and the 1U portal is the working portal. The ulnar osteophyte of the

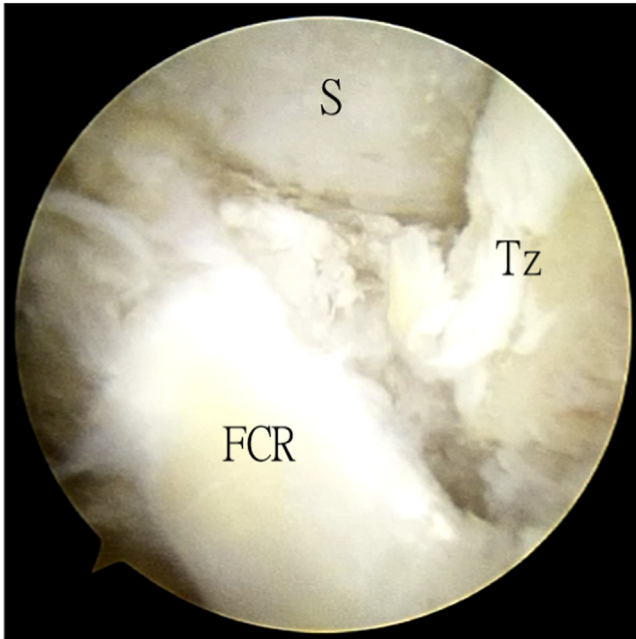
trapezium bone is dissected and lifted out from between the first and second metacarpal bases by means of the shaver and a small periosteal elevator. The osteophyte and the ulnar half of the trapezium bone are resected till the trapezoid bone is exposed, which represent the ulnar boundary of the bone resection (Fig 4).

#### **Arthroscopic Resection of Proximal Part of the Trapezium**

The 1U portal is the viewing portal and the thenar portal is the working portal. The bone resection proceeds proximally with the shaver. When the proximal subchondral bone is reached, the subchondral bone is removed by a Kerrison rougeur to expose the scaphoid bone. This represents the proximal boundary of the bone resection (Fig 5).

#### **Arthroscopic Resection of Volar Part of the Trapezium**

The 1U portal is the viewing portal and the thenar portal is the working portal. During bone resection of the volar part of the trapezium, the flexor carpi radialis tendon is in view. The bone around the tendon is carefully removed with an arthroscopic punch (Arthrex) (Fig 6).



**Fig 7.** Arthroscopic trapeziectomy of the left wrist without traction tower. The patient is in supine position with the hand on the side table. The 1U portal is the viewing portal. After the arthroscopic bone resection, the completeness of trapeziectomy can be assessed arthroscopically. FCR, flexor carpi radialis tendon; Tz, trapezoid; S, scaphoid.

#### Assessment of Completeness of Trapeziectomy

The 1U portal is the viewing portal. After the arthroscopic bone resection, the completeness of trapeziectomy can be assessed arthroscopically (Fig 7).

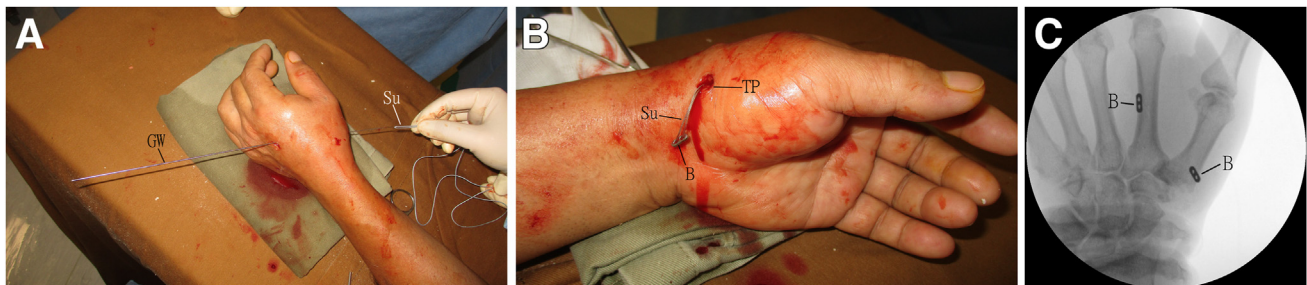
#### Suspensionplasty

After total trapeziectomy, suture-button suspensionplasty stabilizing the first metacarpal base to the second metacarpal is performed with the Mini TightRope (Arthrex). The thenar portal is used for insertion of the guidewire and the suture-button (Fig 8, Table 2, Video 1).

## Discussion

The thumb CMC joint is a small joint, and it is difficult to maintain a stable and clear arthroscopic view during trapeziectomy and to provide a stable platform to rest the arthroscope when the hand is suspended by a traction tower.<sup>8</sup> On this reported technique, the operation can be performed with the hand resting on the side table. This provides a stable platform during the arthroscopic procedure and avoids the complications of continuous skin traction of the thumb (e.g., digital nerve injury or skin laceration). Actually, arthroscopic arthrodesis of the thumb CMC joint can also be performed without the use of a traction tower and continuous traction of the joint.<sup>17</sup> Because the procedure starts from outside the joint proper, a larger-sized arthroscope and arthroscopic instruments can be used from the beginning. The arthroscopic view is “upside down” as compared to that if the hand is suspended with a traction tower because the surgeon sits at the distal end of side table.

Classically, thumb CMC arthroscopy can be performed via 3 portals: the 1U portal, the 1R portal, and the thenar portal. The 1R portal is located radial to the abductor pollicis longus tendon. We prefer the thenar portal rather than the 1R portal in this arthroscopic procedure.<sup>8,15</sup> The thenar portal is approximately 90° to the 1U portal and 1 cm volar to the 1R portal and is located further from the branches of the dorsal radial sensory nerve, and the radial artery and does not put the motor branch of the median nerve at risk.<sup>8,15,23</sup> Moreover, the thenar and 1U portals are perpendicular to each other, which allows easier instrument manipulation.<sup>8,15</sup> An accessory dorsal-distal portal (D-2) can also be used to improve the visualization of the medial aspect of the trapezium and provides access to medial osteophytes during an arthroscopic trapeziectomy.<sup>24</sup> This portal is ulnar to the extensor pollicis longus tendon and 1 cm distal to the V-shaped cleft at the juncture of the index and thumb metacarpal bases.<sup>24</sup>



**Fig 8.** Arthroscopic trapeziectomy of the left wrist without traction tower. The patient is in the supine position with the hand on the side table. (A) After total trapeziectomy, suture-button suspensionplasty stabilizing the first metacarpal base to the second metacarpal is performed with the Mini TightRope (Arthrex, Naples, FL). (B, C) The thenar portal is used for insertion of the guidewire and insertion of suture-button. GW, guide wire; Su, suture; TP, thenar portal; B, button.

**Table 2.** Pearls and Pitfalls of Arthroscopic Trapeziectomy Without Traction Tower

Pearls
The bone resection is started outside the joint and proceeds towards the joint.
Frequent fluoroscopic screening of the degree of bone resection is helpful to avoid injury to the adjacent structures (e.g., trapezoid bone, flexor carpi radialis tendon, and scaphoid bone)
Pitfalls
If the surgeon is not familiar with the “upside-down” arthroscopic view as compared with the “classic” thumb carpometacarpal arthroscopic view, injury to the adjacent structures can occur.
Incomplete resection of the medial osteophyte may block reduction of the first metacarpal base.

**Table 3.** Advantages and Risks of Arthroscopic Trapeziectomy Without Traction Tower

Advantages
Small incisions and better cosmetic outcome
Minimal soft tissue trauma and less postoperative pain
Elimination of need of a traction tower and continuous traction
Providing a stable platform for the arthroscopic procedure
Risks
Injury to the superficial branch of the radial nerve
Fracture of the second metacarpal
Irritation by the suture button

Ligament reconstruction or tendon interposition may not be warranted after partial trapeziectomy because the volar beak ligament and intermetacarpal ligament remain unaffected with excision of only the articular surface of the trapezium.<sup>4</sup> On the other hand, stabilization of the first metacarpal base by ligament reconstruction or suture-button suspensionplasty is beneficial after total trapeziectomy for patients with scaphotrapezotrapezoidal osteoarthritis or with severe subluxation of the thumb CMC joint.<sup>3,16</sup>

The advantages of this technique include small incisions and better cosmetic outcome, minimal soft tissue trauma, and less postoperative pain, eliminating the need for a traction tower and continuous traction and providing a stable platform for the arthroscopic procedure.<sup>4,5</sup> The potential risks of this technique include injury to the superficial branch of the radial nerve, fracture of the second metacarpal, and irritation by the suture button (Table 3).<sup>9</sup> This procedure is not technically difficult and can be managed by the average wrist arthroscopist.

### Disclosures

All authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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