

# Endoscopic Resection of Carpometacarpal Boss and Synovectomy of the Second Carpometacarpal Joint



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**Abstract:** Carpometacarpal boss is a symptomatic bony prominence on the dorsal surface of the wrist at the base of the second and/or third metacarpal. Wedge excision of the carpometacarpal boss is indicated if conservative treatment fails to relieve the symptoms. Complications of wedge resection include symptomatic recurrences and carpometacarpal instability. The purpose of this Technical Note is to describe the technical details of endoscopic resection of carpometacarpal boss and synovectomy of the second carpometacarpal joint. This may reduce the amount of bone and joint resection and risk of carpometacarpal instability.

Carpometacarpal boss is a symptomatic bony prominence on the dorsal surface of the wrist at the base of the second and/or third metacarpal.<sup>1</sup> It can be congenital in the form of an accessory ossicle (os styloideum) or acquired from trauma or degenerative osteophytosis.<sup>2-5</sup> The presence of os styloideum at the area of the quadrangular trapezoid-capitate-metacarpal joint causes abnormal biomechanics of wrist joint motion and leads to secondary osteoarthritis with spur formation.<sup>2</sup> The os styloideum may be fused to the adjacent metacarpal as a bony process or separated by a fibrous synchondrosis.<sup>2</sup> Repetitive trauma with transmission of pathologic forces from the metacarpals to the carpometacarpal joints can result in articular subluxation and degeneration and peri-articular hypertrophic bone spur formation.<sup>6</sup> Clinically, carpometacarpal boss presents as a bony protuberance at the dorsal wrist and is often asymptomatic.

Symptoms associated with the boss are attributed to secondary osteoarthritis, bursitis, ganglion formation, or extensor tendon slipping or impingement resulting in tenosynovitis, tendon subluxation, intra-tendinous ganglion formation or tendon rupture.<sup>2,7</sup> Conservative management of symptomatic carpometacarpal boss includes pain relief with nonsteroidal anti-inflammatory drugs, immobilization, corticosteroid injections, and physiotherapy.<sup>2</sup> If conservative treatment fails to relieve the symptoms, surgical treatment is indicated. It encompasses wide wedge excision of the carpometacarpal boss and the associated degenerative articular cartilage and sclerotic bone to the level of normal articular surfaces and normal adjacent cancellous bone.<sup>1,2,5,8</sup> Carpometacarpal arthrodesis has been proposed as an alternative primary treatment or an additional procedure after failure of simple resection.<sup>1,2,9</sup>

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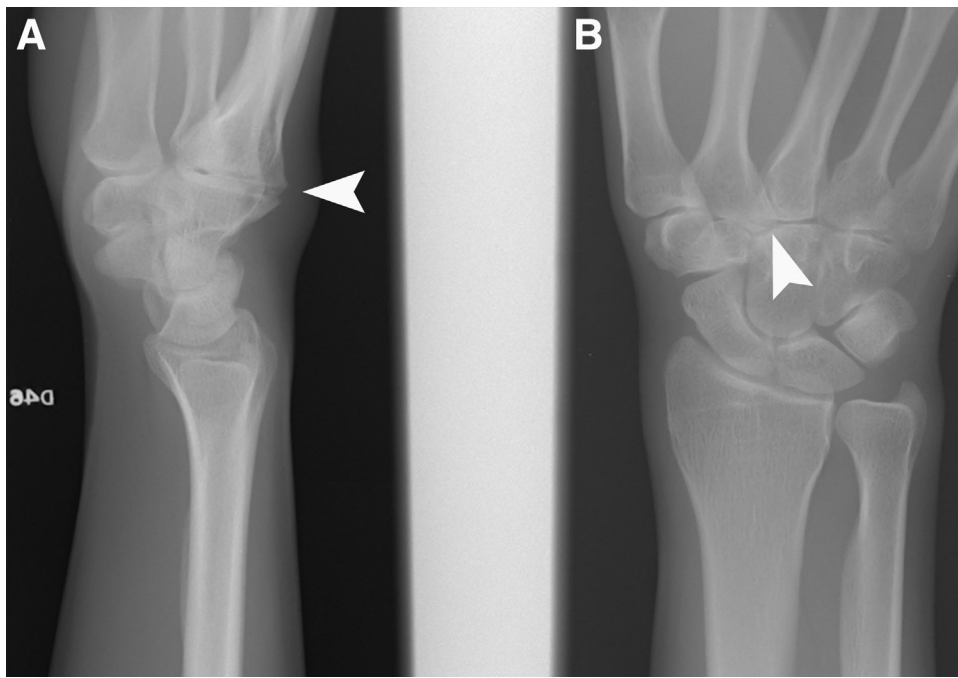
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**Table 1.** Indications and Contraindications of Endoscopic Resection of Carpometacarpal Boss and Synovectomy of the Second Carpometacarpal Joint

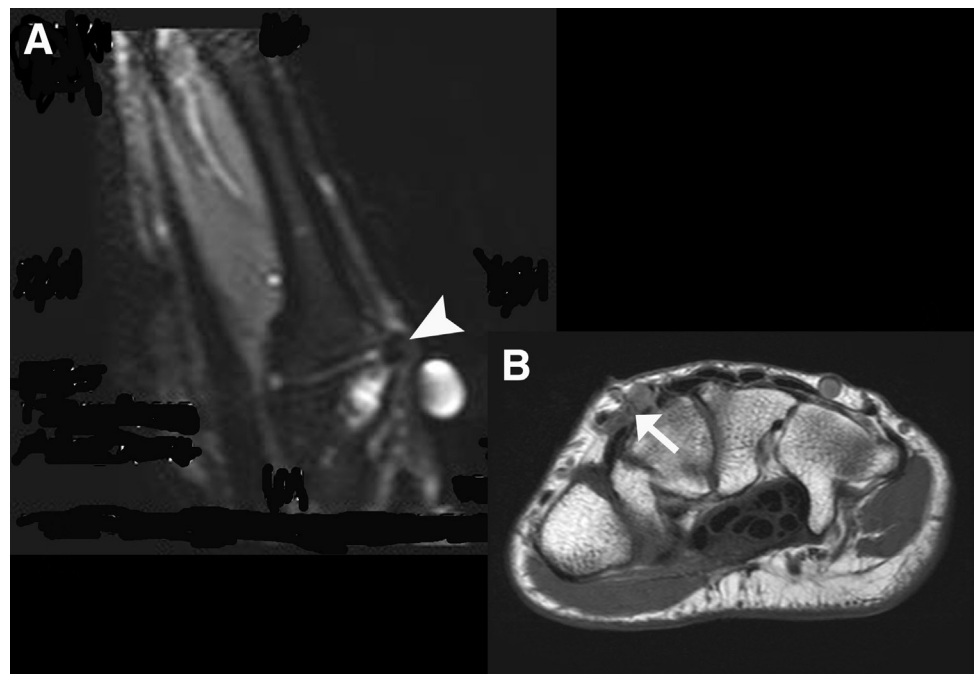
| Indications                                                                                                    | Contraindications                                                                                          |
|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 1. Symptomatic carpometacarpal boss of the second carpometacarpal joint recalcitrant to conservative treatment | 1. Active infection of the operative site                                                                  |
|                                                                                                                | 2. Other causes responsible for the symptoms                                                               |
|                                                                                                                | 3. Ruptured extensor carpi radialis longus tendon requiring open repair                                    |
|                                                                                                                | 4. A carpometacarpal boss associated with carpometacarpal instability or diffuse degeneration of the joint |



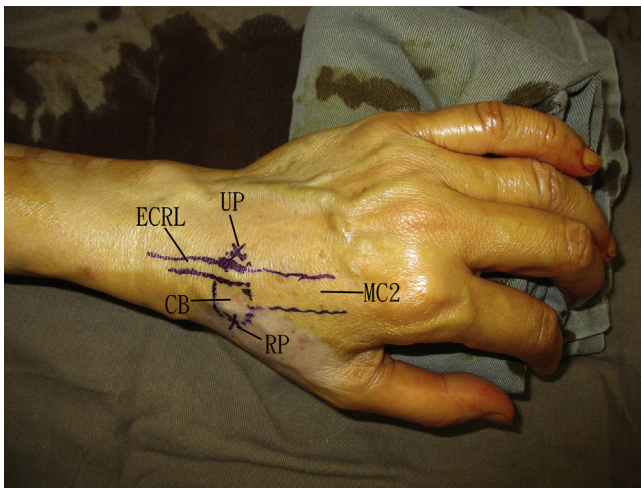
**Fig 1.** Endoscopic resection of carpometacarpal boss and synovectomy of the second carpometacarpal joint of left hand. Lateral (A) and anteroposterior (B) radiographs of the illustrated wrist showing the carpometacarpal boss (arrowhead).

Carpometacarpal arthroscopy has been proposed for treatment of various pathologies of the mobile first and fifth carpometacarpal joints with the advantage of minimally invasive surgery.<sup>10,11</sup> However, use of an arthroscopic technique for dealing with pathology associated with the tight and immobile second and third carpometacarpal joints has not been reported. The purpose of this Technical Note is to describe the technical details of endoscopic resection of carpometacarpal boss

and synovectomy of the second carpometacarpal joint, which is indicated for symptomatic carpometacarpal boss of the second carpometacarpal joint recalcitrant to conservative treatment. It is contraindicated in cases of active infection at the operative site, other causes responsible for the symptoms, or ruptured extensor carpi radialis longus (ECRL) tendon requiring open repair. It is also contraindicated for a carpometacarpal boss associated with carpometacarpal instability or diffuse



**Fig 2.** Endoscopic resection of carpometacarpal boss and synovectomy of the second carpometacarpal joint of left hand. Magnetic resonance imaging of the illustrated wrist. (A) Sagittal T2-weighted image shows bone edema of the carpometacarpal boss (arrowhead). (B) Transverse T1-weighted image shows synovitis of the second carpometacarpal joint (arrow).



**Fig 3.** Endoscopic resection of carpometacarpal boss and synovectomy of the second carpometacarpal joint of left hand. The patient is in the supine position with the hand on the side table. Ulnar and radial portals are located at the respective ulnar and radial ends of the carpometacarpal boss and at the level of the carpometacarpal joint. (CB, carpometacarpal boss; ECRL, extensor carpi radialis longus tendon; MC2, second metacarpal; RP, radial portal; UP, ulnar portal.)

degeneration of the joint; in this case, carpometacarpal fusion is the more appropriate surgical option, although arthroscopic arthrodesis can be performed via the same portals<sup>6</sup> (Table 1).

## Technique

### Preoperative Planning and Patient Positioning

Because most of the carpometacarpal boss is asymptomatic, it is important to confirm that the boss is the source of symptoms before surgery. Plain radiographs represent the first line of investigation (Fig 1). When routine radiographs are nondiagnostic, a carpal boss view may be obtained with a lateral projection, positioning the affected wrist in 30° of supination and ulnar deviation. This view compensates for the obliquity of

the longitudinal axis of the metacarpal-capitate joint and optimizes the profiling of the os styloideum, which projects 30° to 40° dorsoradially.<sup>2</sup> A technetium bone scan may be helpful in differentiating carpometacarpal boss from other, more common, masses of the dorsal aspect of wrist.<sup>5</sup> Magnetic resonance imaging allows for detailed examination of bone and soft tissue abnormalities associated with a carpometacarpal boss, including the extent of degeneration of the involved carpometacarpal joint, the formation of intratendinous ganglion, and the presence of inflammatory bursitis. Local bone marrow edema strongly correlates with a painful boss<sup>12</sup> (Fig 2). Possible associations that may contribute to the symptomatic carpal boss, such as an accessory extensor digitorum brevis manus muscle or accessory capitate, can also be identified by magnetic resonance imaging.<sup>2</sup>

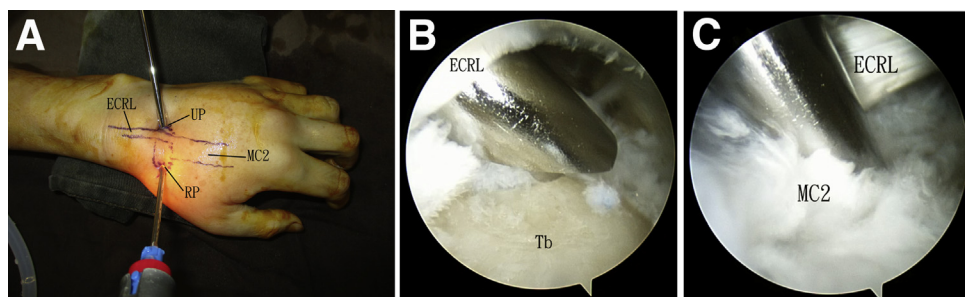
The patient is placed in the supine position with the hand on the side table. An arm tourniquet is applied to provide a bloodless surgical field. Fluid inflow is by gravity, and no arthropump is used. A 2.7-mm 30° arthroscope (Henke Sass Wolf GmbH, Tuttlingen, Germany) is used for this procedure.

### Portal Placement

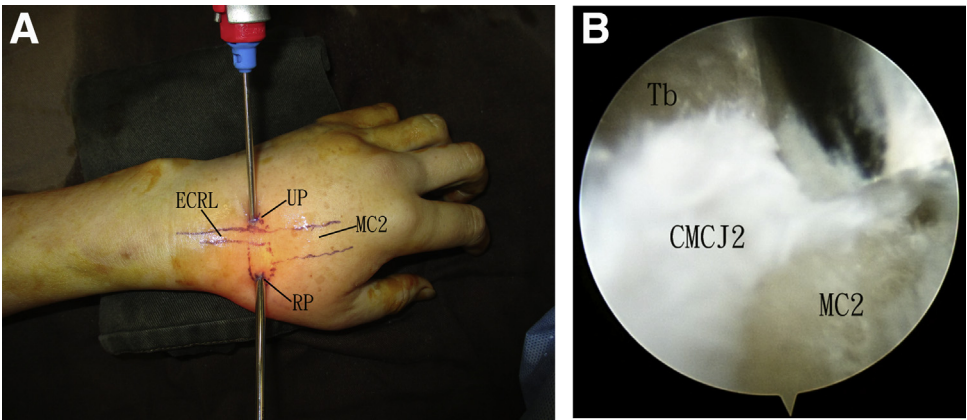
This procedure is performed via the ulnar and radial portals, which are located at the respective ulnar and radial ends of the carpometacarpal boss and at the level of the carpometacarpal joint (Fig 3). Three- to 4-mm longitudinal skin incisions are made at the portal sites. The subcutaneous tissue is bluntly dissected down to the underlying bones with a hemostat. The working space is the dorsal surface of the carpometacarpal boss deep to the ECRL tendon.

### Endoscopic Resection of the Carpometacarpal Boss

The ulnar portal is the viewing portal. The soft tissue covering the carpometacarpal boss is resected with an arthroscopic shaver (Dyonics; Smith & Nephew, Andover, MA) via the radial portal. The “carpal” component



**Fig 4.** Endoscopic resection of carpometacarpal boss and synovectomy of the second carpometacarpal joint of left hand. The patient is in the supine position with the hand on the side table. (A) Ulnar portal is the viewing portal, and radial portal is the working portal. (B) Arthroscopic view shows resection of the “carpal” component of the carpometacarpal boss. (C) Arthroscopic view shows resection of the “metacarpal” component of the carpometacarpal boss. (ECRL, extensor carpi radialis longus tendon; MC2, second metacarpal; RP, radial portal; Tb, trapezoid bone; UP, ulnar portal.)



**Fig 5.** Endoscopic resection of carpometacarpal boss and synovectomy of the second carpometacarpal joint of left hand. The patient is in the supine position with the hand on the side table. (A) Radial portal is the viewing portal, and ulnar portal is the working portal. (B) Arthroscopic view shows resection of the ulnar part of the carpometacarpal boss. (CMCJ2, second carpometacarpal joint; ECRL, extensor carpi radialis longus tendon; MC2, second metacarpal; RP, radial portal; Tb, trapezoid bone; UP, ulnar portal.)

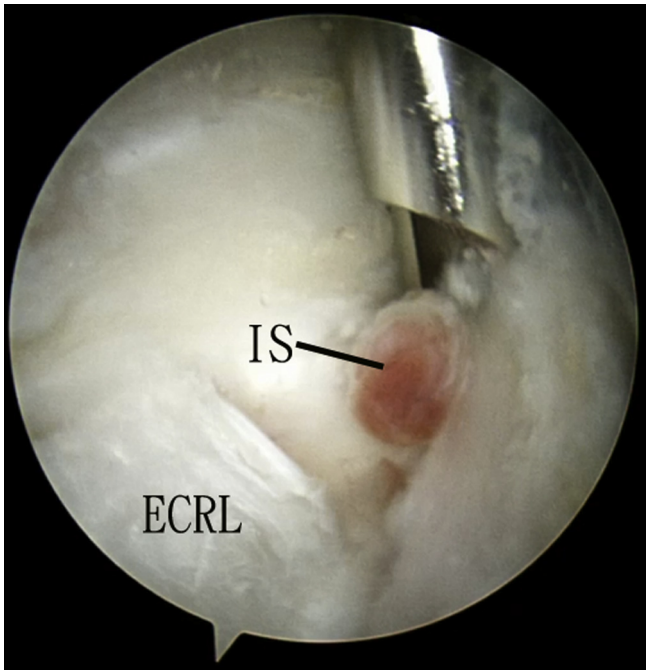
of the carpometacarpal boss is resected with an arthroscopic burr (Dyonics; Smith & Nephew). After that, the ECRL tendon is traced distally to its insertion at the base of the second metacarpal. The tendon insertion is protected, and the “metacarpal” component of the carpometacarpal boss is resected with the burr (Fig 4). During resection of the carpometacarpal boss, the

second carpometacarpal joint can be identified. The extent of resection of the joint is titrated according to the extent of degenerated cartilage. The associated juxta-articular sclerotic bone can be resected under endoscopic guidance.

The arthroscope is switched to the radial portal, and the ulnar portal becomes the working portal. The ulnar part of the carpometacarpal boss is resected with the arthroscopic burr (Fig 5).

**Synovectomy of the Second Carpometacarpal Joint**

The radial portal is the viewing portal, and the ulnar portal is the working portal. During resection of the carpometacarpal boss, the dorsal part of the carpometacarpal joint is exposed. Any inflamed synovium can be resected with an arthroscopic shaver (Fig 6, Video 1, Table 2).



**Fig 6.** Endoscopic resection of carpometacarpal boss and synovectomy of the second carpometacarpal joint of left hand. The patient is in the supine position with the hand on the side table. Radial portal is the viewing portal, and ulnar portal is the working portal. Inflamed synovium is resected with an arthroscopic shaver. (ECRL, extensor carpi radialis longus tendon; IS, inflamed synovium.)

**Discussion**

Complications of wedge resection include symptomatic recurrences and carpometacarpal instability.<sup>2,10</sup> Persistent symptoms are thought to be caused by

**Table 2.** Pearls and Pitfalls of Endoscopic Resection of Carpometacarpal Boss and Synovectomy of the Second Carpometacarpal Joint

| Pearls                                                                                                                                                      | Pitfalls                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 1. The extent of bone and joint resection should be titrated by the extent of sclerotic bone and degenerated cartilage.                                     | 1. Excessive resection of the bone and joint may lead to carpometacarpal instability.                                          |
| 2. The extensor carpi radialis longus tendon should be identified and protected during resection of the “metacarpal” component of the carpometacarpal boss. | 2. Excessive bone resection close to the extensor carpi radialis longus insertion may lead to avulsion fracture of the tendon. |

**Table 3.** Advantages and Risks of Endoscopic Resection of Carpometacarpal Boss and Synovectomy of the Second Carpometacarpal Joint

| Advantages                                                     | Risks                                                           |
|----------------------------------------------------------------|-----------------------------------------------------------------|
| 1. Better cosmesis                                             | 1. Injury to the branches of the radial sensory nerve           |
| 2. Less soft tissue dissection                                 | 2. Injury to those dorsal cutaneous branches of the ulnar nerve |
| 3. Less postoperative pain                                     | 3. Injury to long digital extensor tendons                      |
| 4. Titrated bone and joint resection under endoscopic guidance | 4. Injury to the extensor carpi radialis longus tendon          |
|                                                                | 5. Carpometacarpal instability                                  |

incomplete mass excision, regrowth of the bony prominence, or secondary instability.<sup>3</sup>

Carpometacarpal instability after wedge resection was previously thought to be owing to damage to the dorsal ligaments.<sup>13</sup> However, Vermeulen et al.<sup>8</sup> showed that the instability is not caused only by damage to the dorsal ligament but also depends on the depth of the bony resection. Anatomically, the stability of the second carpometacarpal joint depends on the mortise-and-tenon configuration and the volar, dorsal, radial, and longitudinal interosseous ligaments.<sup>6,8</sup> Excessive bone resection will reduce the amount of intercalated bone surface and detach the interosseous ligaments, leading to carpometacarpal instability.<sup>8</sup> Therefore, in addition to adequate removal of the diseased bone and cartilage, preservation of the normal bone and articular surface and the interosseous and volar ligaments is important.<sup>8</sup> The technique described in this article allows titrated bone and joint resection under endoscopic guidance. This can reduce the risk of postoperative carpometacarpal instability.

The advantages of this arthroscopic technique include better cosmesis, less soft tissue dissection, less postoperative pain, and titrated bone and joint resection under endoscopic guidance. The potential risks of this procedure include injury to the branches of the radial sensory nerve—as well as the dorsal cutaneous branches of the ulna nerve, long digital extensor tendons, and the ECRL tendon—and carpometacarpal instability<sup>6</sup> (Table 3). This is not a technically

demanding procedure and can be attempted by average hand-and-wrist arthroscopists.

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