Chapter 2

Management of Disorders of the Metacarpophalangeal Joint in Association with Trapeziometacarpal Joint Osteoarthritis

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The metacarpophalangeal (MP) joint of the thumb is a hinge-like joint capable of motion in flexion, extensión, abduction and adduction. Several studies have documented that there is considerable variation in flexion and extensión between individuals [1].

Some authors [2] concluded that this was owing to differences in the shape of the metacarpal head, differences in capsular laxity, or both.

The natural history of osteoarthritis TM influences neighboring joints especially in the MCP joint [3].

Surgical treatment of trapeziometacarpal osteoarthritis must correct this secondary deformity of MP joint to obtain an optimal result [4].

Techniques to stabilize the MP joint in this setting include temporary transarticular pinning, extensor pollicis brevis tenotomy, sesamoid arthrodesis, volar tenodesis using a free tendon graft, volar capsulodesis, and MP joint arthrodesis. It is not clear what, if any, effect MP joint hyperextension has on function and disability in the setting...
of TM arthrosis. The indications for surgery and the balance of risks and benefits remain unclear.

**Trapeziometacarpal (TM) Natural History of Osteoarthritis**

Initially, as a result of excessive overload synovitis it is developed in the joint. Over time, the joint surfaces subjected to higher pressure and shear forces present osteochondral lesions, especially in the volar surface, although Pellegrini initial injury can be located both in the volar like dorsal area [5].

Osteophytes appear especially in the volar and ulnar and the anterior oblique (or volar beak) ligament becomes increasingly attenuated with subsequent dorsoradial subluxation of the metacarpal on the trapezium.

Sometimes this subluxation is possibly favored in case of dysplastic trapeze, prior laxity of ligaments or repeated micro traumas, although none of these hypotheses has been scientifically proven.

The dorsal-radial subluxation of the base of the first metacarpal, in an attempt to prevent excessive compression of the articular cartilage, is dynamically favored by the pull exerted by the abductor pollicis longus (APL) inserted at that level.

At the same time, and because the thumb adductor (ADDP) attracts the first to the second metacarpal, the thumb is placed in adduction gradually closing the first interdigital commissure. This situation is gradually compromising the overall function of the hand, because the patient cannot properly open the space between the first and second metacarpal in order to pick up objects. Which is offset secondarily with a hyperextension of the metacarpal phalangeal joint in the more advanced stages of the disease [3,6].

Figure 1: Dislocation of MP joint with hiperextensión in the sagital plane and abduction in the frontal plane.
Progressive ankylosis of the TM joint in flexion-adduction with closure of the first interdigital commissure in advance trapeziometacarpal osteoarthritis gradually leads to compensatory dislocation of MP joint with hyperextension in the sagittal plane and abduction in the frontal plane. This deformity of the MP, initially reducible but subsequently irreductible, results in the classical Z deformity of the thumb in the sagittal plane [4]. A less well known Z deformity can also occur in the frontal plane due to dis-tension of the medial collateral ligament [4,7] (Figure 1).

Treatment of Mild MP Hyperextension (Sagital Plane)

Patients with osteoarthritis TM with mild hyperextension MP authors recommend not treat hyperextension [8].

Patients treated by trapeziometacarpal total arthroplasty with MP hyperextension. Not exceeding 20 degrees it is usually corrected by placing arthroplasty, because the thumb earn some length and the joint is balanced.

APL tendon suturing the dorsal level to the metacarpal base decreases the MP hyperextension when we close the wound.

Proper placement of the components of the total TM arthroplasty is important, good alignment stem metacarpal and the trapezium component placement in dorso-radial deviation of 10-15° to prevent subluxation during lateral pinch.

Treatment of Moderate MP Hyperextension (Sagital Plane)

It is generally recommended that thumb MP joint hyperextension in excess of 30° be addressed during TM joint reconstruction surgery. Thumb MP joint hyperextension during lateral pinch can worsen thumb metacarpal adduction and subsequently increase stresses on the surgical reconstruction (Figure 2).

• Pinning the metacarpophalangeal joint in flexion: Davis and Poulter found in a prospective cohort study that those with temporary MP joint pinning of deformities less than 30° had no improvement in their hyperextension deformity or outcome at 1 year [9].

• Extensor pollicis brevis tenotomy: Kesslertenotomized the extensor pollicis brevis at its musculotendinous junction and passed it around the MP
joint in a volar direction and through a hole in the metacarpal neck as a tenodesis. He described the results in 11 patients with rheumatoid, paralytic, and traumatic lesions at an average of 6.5 years after surgery. Two patients with rheumatoid arthritis had recurrent hyperextension [10].

- **Sesamoid arthrodesis**: One of 21 patients followed up for an average of 2 years after sesamoid arthrodesis to treat thumb MP joint hyperextension in conjunction with TM arthroplasty had a recurrence. Thumb MP joint flexion loss averaged 8° [11].

- **Palmaris longus free tendón graft**: Norris et al describe a volar tenodesis of the thumb MP joint using a free palmaris longus tendon graft placed volar to the flexor tendon sheath and through drill holes in the proximal phalanx and metacarpal. Among 12 patients (14 thumbs) who were followed up for an average of 31 months, 1 had a recurrence [12].

- **Volar capsulodesis**: Eaton and Floyd reported the results of volar capsulodesis in 13 patients having thumb TM arthroplasty in 1988. Twelve of 13 patients had good or excellent results at a minimum of 12 months of follow-up [13]. Schuurman and Bos reported no recurrence in 10 thumbs (8 patients) between 6 and 27 months after surgery [14]. Most recently, Davis and Poulter described 11 patients treated with thumb MP joint capsulodesis with a bone anchor, in conjunction with TM arthroplasty. The hyperextension deformity was reduced from a mean of 48° before surgery (range, 35–70°) to 16° (range, 0 –35°) at 1-year follow-up. There were no statistically significant differences in pain levels and key and tip pinch compared to an untreated group with preoperative hyperextension of less than 30 [15].

The incidence of MP hyperextension associated trapezometacarpal osteoarthritis is not known, but recent studies published 18% of MP hyperextension greater than 30 degrees preoperatively in patients treated with trappezioniectomy [9].

In our experience hyperextension passive >20° or hyperextension produced when the clamp MP should be treated by arthrodesis radial sesamoid to the metacarpal head according to the technique Tokin [11].

It consists, after locating radial sesamoid we remove the cartilage (Figure 3) and create a cortical defect between the head and the neck of the metacarpal.

We surround the radial sesamoid a non-absorbable suture with the palmar capsule across the metacarpal and is sutured in the dorsal metacarpal below the extensor tendons (Figure 4) and temporary fixation with Kirschner wire in the MP joint flexion 30 degrees for 6 weeks.
We performed a prospective study in 23 patients MP moderate thumb hyperextension secondary to rizarthrosis in the period 2004-2012. 21 women (91.3%) and 2 men (8.7%) with a mean age 60.1 years (55-67 years) with type III Eaton- rizarthrosis Litler t treated by total arthroplasty or LRTI.

Nineteen patients (82.6%) were treated with arthrodesis of the radial sesamoid to the metacarpal head and 4 patients (17.4%) arthrodesis of the ulnar sesamoid by instability associated in the frontal plane (ulnar collateral ligament).

The 19 patients who underwent arthrodesis of the radial sesamoid have good clinical and functional outcome with a correction of the deformity in hyperextension. Of the 4 patients who underwent arthrodesis of the ulnar sesamoid, 2 of them (50%) had a reproduction of MP hyperextension deformity carried further surgery arthrodesis associating a radial sesamoid arthrodesis ulnar sesamoid.

**Treatment of Chronic Thumb Metacarpophalangeal Joint Ulnar Collateral (Frontal Plane)**

If there ulnar MP laxity is not a contraindication TMarthroplasty, but that should be treated effectively while the prosthesis is placed. It should make a ligamentoplasty with free tendón palmaris longus tendón graft reconstruction (Figures 5,6,7,8).
The existence of ulnar MP laxity often associated with stiffness of the metacarpal in adduction, before the placement of a prosthesis TM consider releasing the metacarpal while trying ligamentous laxity with plasty.

Multiple authors recommend MP arthrodesis when the hyperextension is greater than 40° [16] regarding the most used and with a low rate of complications surgical technique is arthrodesis using cannulated screws 3.00 mm [17,18].

Arthrodesis of the MP relatively contraindicated the placement of a TM prosthesis because TM joint overload favoring the risk of loosening it. In these cases it is preferable to treat TM osteoarthritis by LTRI.

**Conclusion**

Few publications exists treatment of hyperextension of the MP in patients with trapezometacarpal osteoarthritis.

In our extensive experience in placing prosthesis ARPE for treating rhizarthrosis [19], we published a study of the long-term (over 10 years) of 116 arthroplasties consecutive Arpe placed on our service with a probability of survival Kaplan -Meier of 94.1% [95% CI (90.4%, 98.8%)], we see treating MCF instability secondary to rizarthrosis should be treated simultaneously according to the algorithm as detailed in Table 1.

In patients in whom the trapezometacarpal osteoarthritis wants to be treated with TM total arthroplasty it is important to note that:

- In case of osteoarthritis MP, hyperextension not reducible MP or severe medial instability the only solution to solve the problem of the MP joint

**Treatment of MP Osteoarthrosis and Severe MP Instability in the Sagittal Plane and Frontal**

In these cases the only solution would arthrodesis of the MP that usually done with cannulated screws after making the preparation of the joint surfaces according to the cup and cone technique with a flexion between 10°-20°.

**Figures 5-8:** Ligamentoplasty with free tendón palmaris longus tendón graft reconstruction.
would arthrodesis which relatively contraindicated placing a TM total arthroplasty by favoring overload this joint and increase the risk prosthetic loosening; In these cases it is preferable to treat TM osteoarthritis by LTRI.

- If ulnar moderate laxity we have not had good results with ulnar sesamoid arthrodesis with 50% of relapses advising the ligamentoplasty less palmar.
- The slight hyperextension MP should not be treated as most of the time is corrected after the placement of total knee arthroplasty.
- The MP Moderate hyperextension when presented more than 20 degrees or passively by making the clamp thumb hyperextension plays should be treated with arthrodesis of the radial sesamoid.

Table 1: Our Treatment algorithm thumb MCP Hyperextension.

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References


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