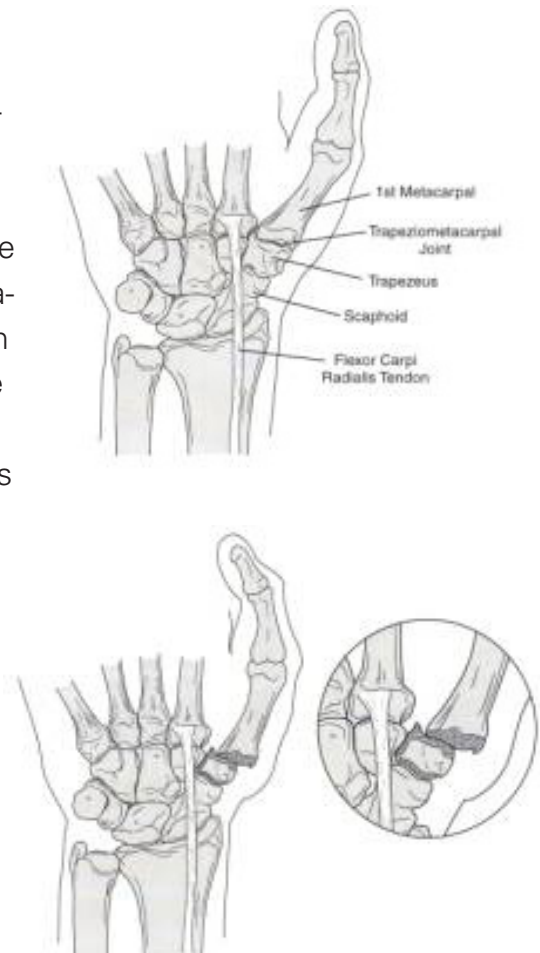


TRAPEZIO-METACARPAL JOINT ARTHRITIS OF THE THUMB

By Bruce Steinberg, M.D.

Hand function requires a thumb with an intrinsic stability, strength, and mobility to resist the forces applied by one or all four fingers during pinch or grasp.¹ The mobility required to place a thumb into the proper position for function is dependent upon the trapezio-metacarpal joint. This complex saddle-shaped joint at the base of the thumb allows for abduction away from the palm, both radially and palmarly, while allowing the rotation (pronation and supination). The forces generated from this joint are extremely high. (In fact, in simple pinch the amount of force within the trapezio-metacarpal joint is twelve times the force applied to the tip of the thumb). Unfortunately, this joint is the second most frequently involved in osteoarthritis of the hand and it is not uncommonly devastated by rheumatoid arthritis.² A painful, stiff, trapezio-metacarpal joint can make even the simplest tasks of daily living (turning a key, grasping a doorknob, opening a car door, buttoning a shirt, etc.) impossible. Osteoarthritis of this joint is most commonly seen in middle-aged or post-menopausal women.³ Female prevalence of this degenerative process is most likely due to greater joint laxity which leads to increased joint incongruity. Combining joint incongruity with high frequent forces leads to an accelerated degenerative process.

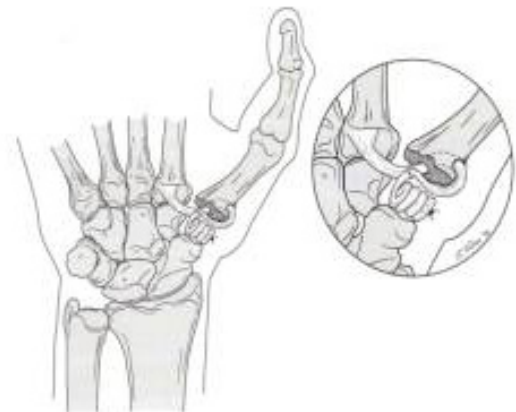
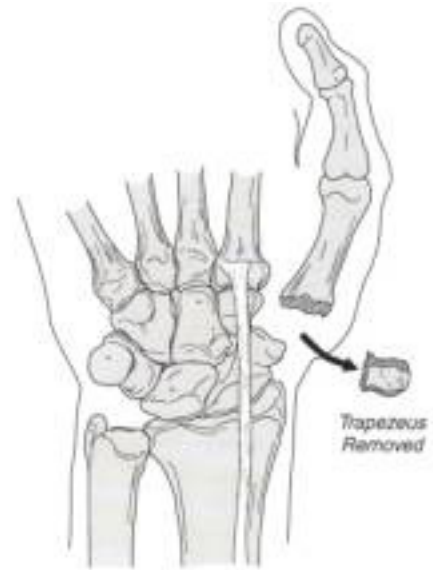


The physical examination of a patient with trapezio-metacarpal joint problems starts with inspection. Subluxation of the trapezio-metacarpal joint is noted by a prominence at the base of the thumb and decreased range of motion. Patients will have increased tenderness to palpation over this area as well as painful, weak, key pinch. Finally, a "Grind Test" is performed where the examiner holds the thumb and applies a compressive force with rotation reproduc-

ing the patient's pain and testing for instability. If any of these tests are positive x-rays are then obtained.

Eaton has described a radiographic classification in which progressive destruction and subluxation of the trapezio-metacarpal joint are staged. Stage 1: This stage precedes any joint degeneration, articular contours are normal. The joint space may be widened if effusion is present. Stage 2: Slight narrowing of the thumb metacarpal trapezoidal joint space is present, but the articular contours are maintained. Osteophyte formation, when present, is less than 2mm in size. Stage 3: Significant thumb metacarpal trapezoidal joint destruction is present. Sclerotic or cystic changes are observed in the subchondral bone. Osteophytes are larger than 2mm in size. Stage 4: In this stage both the trapezio-metacarpal joint as well as the scapho-trapezoidal joint demonstrates significant degenerative changes and debris. The trapezio-metacarpal joint may be markedly subluxed. Cystic changes can be found in the Scaphoid, trapezium, and first metacarpal bones.

Treatment for trapezio-metacarpal joint problems is based on a radiographic stage. Although conservative efforts are attempted for all four stages, they are usually more successful for stages 1 and 2. Rest and non-steroidal anti-inflammatory medications should be the first step. If this fails, the treating physician may wish to try a Medrol DosePak, and have a custom designed splint constructed. An occupational therapist with special splint training is best equipped to make a hand-based, palmar abducted, first CMC joint splint with the thumb interphalangeal joint free. This splint gives support for the trapezoidal-metacarpal joint while allowing for flexion at the interphalangeal joint of the thumb. Unfortunately, most patients have difficulty tolerating this splint since it limits thumb function considerably by limiting mobility of the trapezio-metacarpal joint. If the above maneuvering fails to improve function and pain, the next step is an injection of steroid into the trapezio-metacarpal joint. The author's personal preference is 1cc of Celestone mixed with 1cc of Xylocaine. Traction is applied to the thumb while palpating the base of the first metacarpal. A 25-gauge needle is advanced into the joint and the solution injected. If there is any difficulty encountered an x-rays should be obtained.



The injection will usually resolve the pain due to early stages of arthritis; advanced stages may have no improvement. If there is no improvement in pain despite the above conservative efforts, the next step would be to consider surgical intervention.

There are many different techniques available to address trapezio-metacarpal arthritis. With long-term follow-up there is clearly one superior technique. In the late 1970's and 1980's there was much enthusiasm with silicone implant arthroplasty, resurfacing the base of the first metacarpal while replacing the trapezium. In a follow-up study of 32 patients with an average follow-up at 3.9 years, there was a twenty-five percent failure rate.^{4,5} The high failure rate was due to silicone cold flow and wear, subluxation, and reactive giant cell synovitis. Despite the fact that silicone arthroplasty has been highly successful in the metacarpal phalangeal joints of the index, middle, ring, and small digits, it has failed in the trapezio-metacarpal joint of the thumb. The technique that has proven successful with greater than 10 year follow-up is the flexor carpi radialis ligament reconstruction with tendon interposition arthroplasty.⁶ In this technique part of or all of the trapezius is removed. Then, the flexor carpi radialis tendon is placed through the case of the thumb metacarpal. The tendon is then brought back to itself at the base of the thumb metacarpal. The tendon is then brought back to itself at the base of the trapezium trough, and then folded like an accordion filling the space once occupied by the trapezius. This technique restores stability of the thumb while also constructing an arthroplasty with local tissues. Long-term follow-up outcome study has shown a ninety-five percent excellent relief of pain while also restoring thumb function.

REFERENCES

1. Cooney WP, Chao EY. Biomechanical Analysis of Static Forces in the Thumb During Hand Function. *JBJS*, 1977; 59-A; 27-36.
2. Pellegrini VD, Burton RI. Surgical Management of Basal Joint Arthritis of the Thumb, Part I. Long-term Results of Silicone Implant-Arthroplasty. *JHS*. 1986; 11-A; 301-324.
3. Eaton RG, Lane LB, Littler JW, Keyser JJ. Ligament Reconstruction for the Painful Thumb Carpometacarpal Joint. A Long-term Assessment. *JHS*; 1984; 9-A, 592-699.
4. Pellegrini VD. Osteoarthritis of Trapezio-Metacarpal Joint: The pathophysiology of Articular Cartilage Degeneration I. Anatomy and Pathology of the Aging Joint. *JBJS*. 1991; 16-A; 967-974.
5. Amadio PL, Millinder LH, Smith RJ. Silicone Spacer or Tendon Spacer for Trapezium Resection Arthroplasty-Comparison of Results. *JHS*. 1982; 7:237-244.
6. Tomaino MM, Pellegrini VD, Burton RI. Arthroplasty of the Basal Joint of the Thumb. *JBJS*. 1995; 77A; 346-355.