

Management of Osteoarthritis of the Thumb Joints

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We present current concepts and evidence to optimize diagnosis and management of osteoarthritis in the thumb joints. Numerous options and controversies exist for surgical treatment of carpometacarpal joint arthritis. Fewer options exist for metacarpophalangeal joint arthritis. Surgical treatment for interphalangeal arthritis is mainly arthrodesis. (*J Hand Surg Am.* 2015;40(4):843–850. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Thumb, arthritis, arthrodesis, implant, arthroplasty.

BECAUSE THE THUMB PROVIDES approximately 40% of hand function and nearly one-fourth of overall bodily function,¹ injuries and arthritis have serious implications for patients' overall well-being. This review provides insight into recent publications and their relevance for treatment of osteoarthritis of the thumb joints.

EPIDEMIOLOGY

Primary osteoarthritis of the thumb joints is most commonly encountered in the trapeziometacarpal (TMC) joint and less commonly in the interphalangeal (IP) and metacarpophalangeal (MCP) joints. The prevalence of primary osteoarthritis in the TMC joint is reported to be as high as 15% in adults over age 30, and as many as one-third of postmenopausal women are affected by the condition.^{2–4}

Little information is available regarding the prevalence of primary osteoarthritis occurring in the IP and MCP joints of the thumb. Reports have suggested that chronic repetitive trauma in patients with heavy

labor occupations may contribute to the development of MCP joint osteoarthritis.⁵ Mechanical stress is also implicated in the development of thumb IP joint osteoarthritis, and chopstick use has been implicated in IP joint arthritis in China.⁶

RELEVANT ANATOMY

The thumb lacks a middle phalanx and possesses a unique carpometacarpal joint configuration. Based at the TMC joint, the thumb is pronated and flexed relative to the other metacarpals, with the trapezium and scaphoid longitudinal axis oriented at a 45° angle relative to the index metacarpal and the carpus.⁷ This position, unique to humans, allows opposition and prehension but hastens the development of basal joint arthritis.

Factors characterizing arthritis in the thumb joints include joint surface shape changes and ligament deterioration, followed by cartilage eburnation and bone spur formation. The TMC joint is classified as a sellar joint, with articular surfaces that are convex in one plane and concave in the second plane, with the planes oriented perpendicular to each other.⁷ Although primary movements may occur in 2 orthogonal planes (flexion-extension and abduction-adduction), the articular shape also allows axial rotation (pronation-supination), which is especially important for pulp-to-pulp pinch between the thumb and adjacent digits.

The MCP joint of the thumb is classified as an ellipsoid joint characterized by an oval convex surface proximally that is opposed to an elliptical concavity distally. It is slightly different in architecture from the MCP joints of the other fingers in that its curvature in

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the anteroposterior plane is flatter; its dorsal side is slightly wider than its palmar side; its articular surface is divided into 2 zones, one that articulates with the proximal phalanx and the other, more palmar, with the sesamoids in the palmar plate; and the radial condyle of the metacarpal head has greater dorsal-palmar height than the ulnar condyle, which allows some pronation of the proximal and distal phalanges during flexion.⁷

The IP joint of the thumb, much like the IP joints of the other digits, is a uniaxial bicondylar hinge joint. It is typically stable in all positions owing to a strong supporting ligamentous architecture and symmetric side-by-side condyles.

CLINICAL PICTURE

Thumb TMC arthritis

The history (typically pain with forceful pinch), physical examination, and x-rays guide diagnosis of TMC arthritis. Tenderness is at the TMC joint most easily accessible dorsally where it is not covered with muscle. Modification of activity, placement of an orthosis, and use of nonsteroidal anti-inflammatory medication and steroid injections may suffice. If not, surgery may help.

Thumb MCP arthritis

Thumb MCP joint osteoarthritis may develop after collateral ligament injuries or result from TMC joint arthritis.⁵ Here, basal joint flexion with dorsal and radial subluxation of metacarpal base causes MCP joint hyperextension before arthritis.

Thumb IP arthritis

Mechanical stress causes degenerative changes at all IP joints including the thumb; osteophyte formation with mucous cysts is common.

DIAGNOSIS

Insidious onset and progression of pain are typically the presenting symptoms for osteoarthritis, whereas symptoms of gout, rheumatoid arthritis, and infections tend to develop rapidly.

Passive joint motion under axial load is a sensitive test for diagnostic confirmation along with assessment of static and dynamic deformities. A Finkelstein test would likely cause pain at an arthritic TMC joint, and a positive Finkelstein test would have to be carefully interpreted. If there is tenderness at the TMC and none at the first dorsal compartment and if there is no thickening at the first dorsal compartment, pain on

positive Finkelstein testing suggests TMC osteoarthritis. An x-ray would help confirm this diagnosis.

The Eaton–Glickel⁸ classification system is most commonly used for radiographic staging of TMC arthritis. It is summarized below:

- Stage 1. Slight joint widening.
- Stage 2. Slight joint narrowing, minimal subchondral sclerosis, and joint debris (osteophytes or loose bodies) less than 2 mm.
- Stage 3. Marked narrowing or obliteration of joint space, cystic changes, sclerotic bone, varying degrees of dorsal subluxation, and joint debris greater than 2 mm.
- Stage 4. Stage 3 deterioration plus scaphotrapezial joint narrowing with sclerosis and cystic changes.

TREATMENT

Treatment starts with modification of activity, placement of an orthosis, and use of nonsteroidal anti-inflammatory medication and steroid injections followed with surgery if necessary.

Surgical treatment options for thumb TMC arthritis

Root treatment for TMC joint arthritis is most often trapeziectomy performed alone, combined with tendon interposition (TI), ligament reconstruction (LR), or both (LRTI). Other procedures include volar ligament reconstruction, metacarpal osteotomy, carpometacarpal arthrodesis, and joint replacement. No study has conclusively demonstrated the superiority of one procedure in terms of patient outcome measures.

A systematic literature review through 2001, which included 8 reviews and 18 comparative studies, demonstrated that each technique (arthrodesis, trapeziectomy with or without biological or synthetic interposition, metacarpal osteotomy, and joint replacement) had unique benefits and risks. The review suggested LRTI superiority, but most included studies had methodological flaws precluding conclusive recommendations. Studied comparative studies (randomized or nonrandomized) indicated that LRTI provided no benefit over TMC joint arthrodesis or trapeziectomy with or without TI.⁹

A Cochrane Collaboration systematic review in 2009 included 9 randomized or quasi-randomized trials (477 patients). The study compared trapeziectomy alone, trapeziectomy with TI, trapeziectomy with LR, trapeziectomy with LRTI, Artelon joint resurfacing, TMC arthrodesis, and joint replacement. Patients had stage II to IV osteoarthritis and wide-ranging improvement in pain and function. No procedure demonstrated superiority regarding pain, physical function, patient

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