

CONTINUING EDUCATION for Occupational Therapists

OSTEOARTHRITIS IN THE HANDS: AN INTRODUCTION TO REHABILITATIVE EVALUATION AND TREATMENT

PDH Academy Course #OT-1703 | 2.5 CE HOURS



This course is offered for 0.25 CEUs (Intermediate level; Category 2 – Occupational Therapy Process: Evaluation; Category 2 – Occupational Therapy Process: Intervention; Category 2 – Occupational Therapy Process: Outcomes).

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Course Abstract

This course focuses on new research surrounding the epidemiology of osteoarthritis (OA), relating it to treatment rationale in patients diagnosed with OA of the hand. It discusses applicable definitions and terminology; the normal joint anatomy and functional position of the CMC joint of the thumb, the PIP joints, and the DIP joints; the etiology and pathology of OA; the medical diagnosis and treatment of OA; and the role of therapy as it pertains to OA.

Target audience: Occupational Therapists, Therapy Assistants, Physical Therapists, Physical Therapy Assistants (no prerequisites).

NOTE: Links provided within the course material are for informational purposes only. No endorsement of processes or products is intended or implied.

Learning Objectives

By the end of this course, learners will be able to:

- Recognize definitions and terminology pertaining to osteoarthritis (OA) of the hand
- Recognize the normal joint anatomy and functional position of the hand
- Recall the etiology and pathology of OA
- Identify elements of medical diagnosis and treatment of OA
- Identify roles of therapy as it pertains to OA

Timed Topic Outline

- I. Introduction, Definitions and Terminology (5 minutes)
- II. Normal Joint Anatomy and Functional Position of the Hand (5 minutes)
- III. Etiology and Pathology (5 minutes)
- IV. Medical Diagnosis and Treatment (30 minutes)
- V. The Role of Therapy (90 minutes)
History, Differential Diagnosis, Evaluation and Provocative Testing, Treatment, Post-operative Treatment
- VI. Conclusion, Additional Resources, References, and Exam (15 minutes)

Delivery & Instructional Method

Distance Learning – Independent. Correspondence/internet text-based self-study, including a provider-graded multiple choice final exam. *To earn continuing education credit for this course, you must achieve a passing score of 80% on the final exam.*

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Course Author Bio & Disclosure

Amy L. Paulson OTR, CHT is a certified hand therapist with over 19 years of experience in outpatient upper extremity care. She has been a licensed occupational therapist for 20 years, has experience in home health, skilled nursing, and acute care, and is a member of the American Society of Hand Therapists.

Amy has led multiple community-based classes on arthritis care, energy conservation and work simplification, and she taught as an adjunct professor at Palm Beach Community College in the OTA program. She designs and instructs hands-on continuing education courses in splinting and upper extremity treatment, and enjoys providing clinical instruction to students interested in specializing in hand therapy. She is also involved in coordinating and overseeing therapy programs in Gulu, Uganda by volunteering with the Medical Missions Foundation of Overland Park, KS.

Amy currently owns and operates her private practice in outpatient hands, where she provides patient care, clinical instruction to Level II students, community education, marketing, and insurance billing.

DISCLOSURES: Financial – Amy Paulson received a stipend as the author of this course. Nonfinancial – No relevant nonfinancial relationship exists.

Introduction

For decades, the common belief about osteoarthritis (OA) is that it is a “wear and tear disease:” the older you are, the more stress you’ve put on the joints, the more likely you will be to have joint breakdown. But over the past 5-10 years, scientists and researchers are discovering that OA is much more complex than simply a “grinding away” of particular joint surfaces of the body.

This course will focus on the new research surrounding the epidemiology of OA, and how this relates to our treatment rationale specifically in patients diagnosed with OA of the hands. As with any other topic, if we don’t challenge what we think we already know, we will stagnate as professionals.

PLEASE NOTE: it is not within the scope of occupational therapy to prescribe. The information presented in this course is not intended nor is it implied to be a substitute for professional medical advice.

During our discussion, we will be focusing primarily on the three joints in the hand – the CMC joint of the thumb, the PIP joints, and the DIP joints – that are most commonly affected by OA. (Of course OA can occur at any synovial joint, but our evaluation and treatment techniques described here will be geared towards those joints.)

Amy’s note: My primary goal for readers of this course is to help them keep up with the latest research while learning practical information that they can use immediately in a clinic setting. In addition, occasionally I will toss in more personal musings, indicated by italicized writing. Text in italicized print is based in large part on my opinions, generated by 21 years of practical experience as a hand therapist – not solely science and research. This is what I like to call “evidence-based practice with a side dish of clinical experience (or old age).” For as we all know, and Albert Einstein so aptly stated, “In theory, theory and practice are the same. In practice, they are not.”

Definitions and Terminology

Crucial components of treating arthritis effectively include understanding the disease process, potential deformities, and the effects on a person's activities of daily living. A conscientious therapist will not only understand these components and provide hands-on care, but will also be able to educate their patients on all three of these areas in a comprehensible way.

Osteoarthritis: Commonly referred to as OA, osteoarthritis is the most common of the joint diseases diagnosed in the United States (Arthritis Foundation). It is also known as degenerative joint disease (DJD). The most common areas in the hand to have OA are the CMC joint of the thumb, the DIP joints of the fingers, and the PIP joints of the fingers, in that order.

Articular cartilage: The lining of cartilage at the end of each bone in a synovial joint. Articular cartilage is the smooth surface that allows gliding against another bone during movement. It is this cartilage that breaks down with OA.

Bone spurs: See Osteophytes.

Bouchard's nodes: Bony outgrowths specifically found on the PIP joints of the fingers. A common occurrence in patients with OA, Bouchard's nodes cause the joints to look enlarged and are often a source of concern for patients regardless of associated pain.

Crepitus: A common symptom of arthritis, crepitus is the "clicking" or "crunching" noise or sensation that a patient with OA will often report with active range of motion or activity. Crepitus can also be appreciated by the therapist using an Axial Grind Test or joint mobilizations of the joints of the fingers.

DIP joint: The distal interphalangeal joints of the fingers, also referred to as the "small knuckle" by patients. This is a hinge joint (only allowing flexion and extension) and is a common site for OA. Heberden's nodes are found at the DIP joints of patients with OA.

Degenerative joint disease: Another term for Osteoarthritis. This term is not exclusively used to describe the hand, but can describe OA in any joint of the body.

Diarthrosis: An alternate term for a synovial (or moving) joint.

Heberden's nodes: Bony outgrowths specifically found on the DIP joints of the fingers. A common occurrence in patients with OA, Heberden's nodes cause the joints to look enlarged and are often a source of concern for patients regardless of associated pain.

Hinge joint: The PIP and DIP joints of the fingers are considered hinge joints, meaning that articular surfaces move along only one axis to flex and extend a joint. Another example of a hinge joint would be the knee joint.

Inflammation: A cardinal sign (along with stiffness) of OA. Due to the breakdown of the cartilage in the joint, the synovium and/or synovial fluid responds by becoming irritated and swollen. This causes people to complain of stiffness, particularly in the morning. Inflammation is common during flare-ups of the disease process, but is not necessarily a day-to-day complaint with OA.

Joint capsule: Also known as the fibrous capsule, the joint capsule is dense connective tissue that surrounds and covers the joint directly. It is lined with the synovial membrane on the inside of the joint, and has ligaments and tendons running over the outer surface of the capsule.

NSAIDs: An acronym for Non-steroidal Anti-inflammatory Drugs. NSAIDs are the most common over-the-counter, and prescribed, medication for osteoarthritis. The most frequently used NSAIDs for OA of the hands are ibuprofen (like Motrin or Advil) and naproxen (Aleve). Stronger NSAIDs are available through physicians; however many of them have side effects that discourage long-term use.

Osteophytes: Also known as bone spurs, these are bony projections that grow in the joint as a result of the degeneration of the cartilage protecting the bones of the joint. They arise from the friction caused by bone rubbing on bone, and are very commonly associated with OA.

PIP joint: The proximal interphalangeal joints of the fingers are the "middle knuckle" of each finger. This is a hinge joint (only allowing flexion and extension) and is a common site for hand OA. Bouchard's nodes are found at the PIP joint of patients with OA.

Saddle joint: The carpometacarpal (CMC) joint of the thumb is a saddle joint, meaning that articular surfaces are convex in one direction and concave in another, which permits movements in all directions except axial rotation. This allows the thumb to flex and extend, abduct and adduct, and oppose across the palm.

Stiffness: A cardinal sign (along with inflammation) of OA. Stiffness, or the inability to move the joint freely without pain, is most commonly reported in the morning; patients with OA also complain of stiffness after activity. Stiffness subsides typically with movement, and sometimes heat or neutral warmth (depending on the patient).

Synovial fluid: The viscous fluid that fills a synovial joint and acts as a shock absorber and reduces friction between the articular surfaces of the joint. It is produced by the synovial lining of the joint.

Synovial joint: Also known as a diarthrosis, a synovial joint is any joint in the body where two bones meet, the ends are covered in cartilage, the joint is connected by a fibrous capsule, and the area is filled with synovial fluid for ease in movement. Some amount of movement is possible at all synovial joints.

Synovial membrane: The inside lining of the fibrous capsule of a synovial joint. This combines with the fibrous capsule to form the articular capsule. The synovial membrane produces synovial fluid.

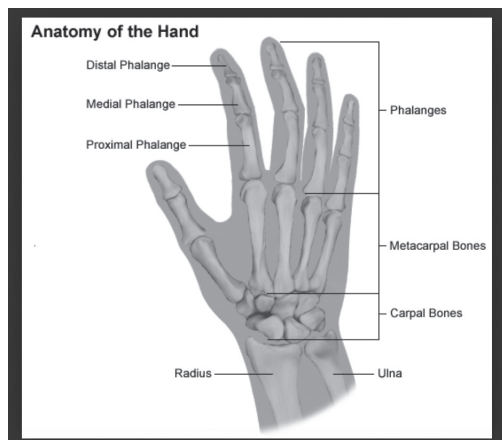
Thumb CMC joint: Thumb carpometacarpal joint or “basal joint” of the thumb, also known as the TMC, or trapezio-metacarpal joint. The CMC joint is a saddle joint connecting the first metacarpal bone to the trapezium, and is the second most mobile joint in the body (behind the glenohumeral joint of the shoulder). The CMC joint can flex, extend, abduct, adduct, circumduct and oppose across the palm. With increased mobility comes decreased stability, which makes this joint a common source of pain and inflammation with overuse. It is the most common joint in the hand to develop osteoarthritis.

Normal Joint Anatomy and Functional Position of the Hand

Joint Anatomy

There are 29 major and minor bones in the hand, and 29 joints to allow movement (some people even have a couple more). All joints in the hand are considered synovial joints.

The “normal” joint anatomy of all synovial joints is the same: two bones meet, and each has a cartilaginous layer on the portion that articulates with the other bone. The cartilage is a smooth layer that is meant to easily glide along the surface of the opposite bone.



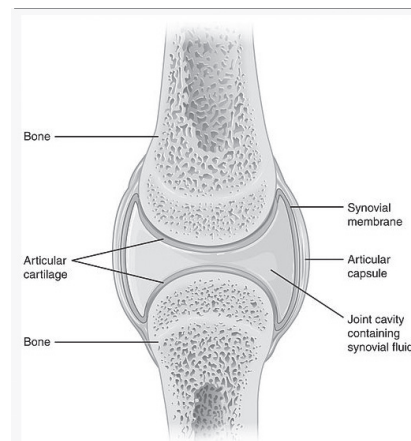
Bony Anatomy of the Hand



Ligamentous Anatomy of the Hand

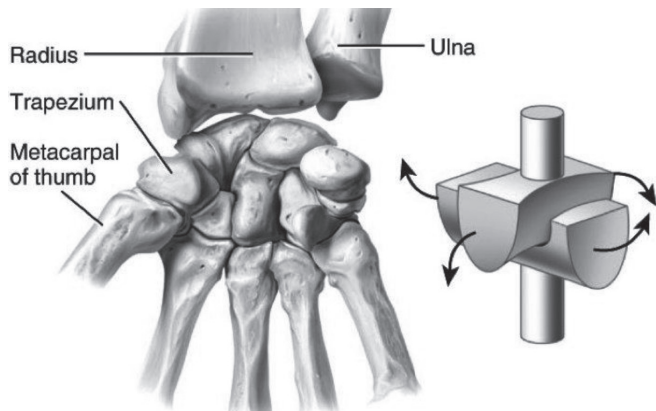
Surrounding this area is the joint capsule: a fibrous capsule, lined with a synovial membrane that connects the two bones to create a synovial joint. The synovial membrane produces the synovial fluid (commonly referred to as “joint fluid”), which is the viscous fluid inside the joint that acts as a shock absorber for the joint during compression (use) of the joint during activity.

Outside of the capsule are the ligaments that surround the joint and provide it with stability during movement and at rest. There are actually 123 named ligaments just in the hand and wrist!



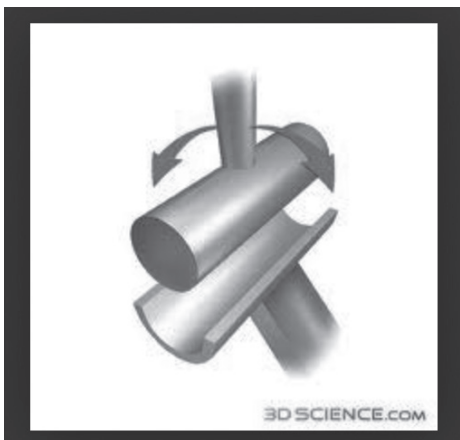
Synovial Joint

The CMC joint, or basal joint, is a diarthrodial saddle joint. If you imagine a rider sitting in a saddle, you can easily picture the design of the CMC joint. The base of the first metacarpal “straddles” the trapezium bone. This shape allows the movements of flexion/extension of the thumb, and abduction/adduction.



Saddle Joint

The PIP and DIP joints of the fingers are all hinge joints, meaning they only move in flexion and extension. In both the PIP and DIP joints, the concave base of the distal bone moves along the convex head of the proximal bone. For example, in the DIP joint, the concave base of the distal phalanx moves along the convex head of the middle phalanx. And at the PIP joint, the concave base of the middle phalanx moves along the convex head of the proximal phalanx.



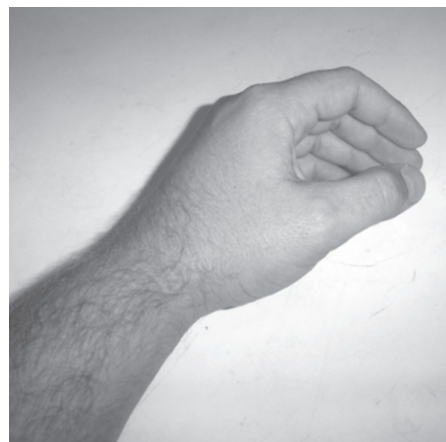
Hinge Joint

Due to the shape of the joint, there is very little accessory motion to the lateral aspects of the DIP and PIP, making them very stable joints in comparison to the CMC joint.

Ligamentous and Fibrous Support

All joints have a “close-packed” position and a “loose-packed” position, which refers to the position of the joint at rest due to ligamentous stability and the joint capsule surrounding it. Close-packed positions are the positions of most stability with the most joint congruity because the ligaments and joint capsule are on full stretch, essentially tightening around the joint. Loose-packed positions provide the most play in the joint, as the ligaments (and capsule) are in their most relaxed position.

The loose packed position is the “resting hand position.” Relax your hand. Observe the angle of your finger joints and the position of your thumb. Your hand will naturally relax into a loose-packed position at all joints. In general, the hand rests with the MP joints in a neutral position of (almost) full extension, and the IP joints rest in slight flexion. The thumb sits in a neutral position between flexion and extension, with the MP in extension and the thumb IP in slight flexion. Understanding and observing “normal” resting hand position is the basis for understanding and effectively treating deformity (or potential deformity).

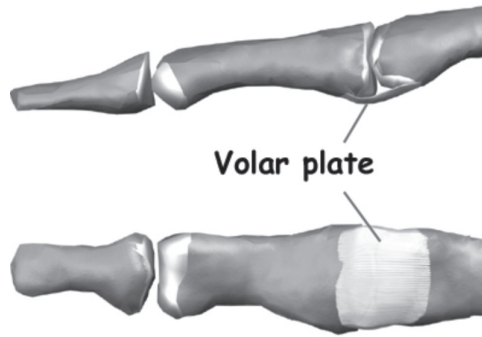


Resting Hand

The CMC joint of the thumb is close-packed in full opposition, meaning that in a position of opposition, the CMC joint ligaments are on their fullest stretch, which tightens up the joint and does not allow for accessory motion at the CMC joint. Full opposition allows for the most joint congruity at the CMC joint. The loose-packed position for the CMC is midway between flexion and extension. This position allows for the most amount of “joint play” because the surrounding ligaments are on slack.

The close-packed position for both the PIP and DIP joints of the fingers is full extension. The loose-packed position for the DIP is 10 degrees of flexion, and for the PIP is 30-35 degrees of flexion. This is important to note as it will become useful during the therapist’s evaluation of the affected joints. This information also helps the therapist determine the best position to place the patient during manual joint mobilizations, or conversely when immobilizing or supporting with splinting.

It should also be noted that the PIP joint has a thickening on the volar aspect, referred to as the volar plate. When the PIP is allowed to sit in a loose-packed position for a prolonged period of time (due to pain avoidance, stiffness, or swelling), the volar plate is also in a slightly contracted position. If not addressed, the volar plate can contract, causing extensor lag in the PIP joint.



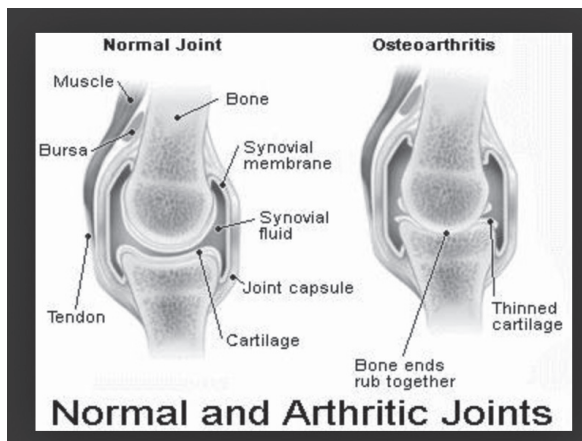
Volar Plate

Etiology and Pathology

Occurrence

According to the Arthritis Foundation there are over 100 different types of joint disease that can be detected and diagnosed. Their current statistics show that over 50 million people have arthritis of one form or another, with osteoarthritis being the most common form of arthritis among Americans. It is estimated that around 23 million people living with arthritis are limited on a daily basis by their joint pain. People with osteoarthritis and rheumatoid arthritis – just two kinds of arthritis – miss a combined of 172 million workdays every year.

Osteoarthritis occurs when the cartilage that cushions the ends of bones in synovial joints gradually deteriorates and becomes rough. As the cartilage starts to deteriorate, movement/activity causes increased friction on the two ends of the bones, which irritates the cartilage even more, causing the “wear and tear” to the joint surfaces. Eventually, if the cartilage wears down completely, the patient has bone rubbing against bone, which is typically (but not always) painful.



Cartilage Deterioration

As mentioned previously, although osteoarthritis has long been believed to be caused primarily by the mechanical “wear and tear” of joints over time due to overuse, scientists now consider it a pathology in the joint (Banks & Lindau 2013; Doherty 2000; Cooley et al. 2003; Grotle et al. 2008; Yusuf et al. 2010). These researchers suggest that chemical changes and hormonal imbalances in the body can put the joints at higher risk for breakdown. Chemical changes cause the chondrocytes to produce degradative enzymes which then affect the subchondral bone and articular cartilage. As the cellular matrix in these areas begins to change, the articular cartilage loses its ability to act as a shock absorber, and breakdown occurs. When we add this “at risk” status to our longstanding knowledge of mechanical “wear and tear,” we see that some people are much more likely to have osteoarthritic breakdown. This helps the therapist not only understand the mechanism of injury, but allows the therapist to explain this process to the patient as well.

Risk Factors

Genetics: Occasionally a person can have genetic risk factors that contribute to the development of OA. Any disease that affects collagen production is a serious indicator of the increased potential for joint breakdown and can cause OA in patients as young as their twenties. Also, researchers have found that a gene called FAAH, previously linked to increased pain sensitivity, is higher in people with OA than in people who don’t have the disease (Schlosburg et al., 2009). A family history of OA increases your likelihood of developing it as well.

Age: As people age, their risk of developing osteoarthritis increases, with over 90% of those over 80 years of age being afflicted. For patients over the age of 60 years, the rate at which osteoarthritis progresses also increases (Arthritis Foundation): this is because as joints age they have less water and fewer chondrocytes (cartilage building cells), decreasing the capacity of the joint to restore and maintain cartilage.

Sex: Women are more likely to develop osteoarthritis, though it isn’t clear why. While some research suggests that the hormones that cause more women than men to develop joint laxity may explain this difference, joint laxity doesn’t appear to be the culprit - at least no more so in women than in men. The thought is emerging that – since not only do these hormones cause joint laxity, but they also cause the joint fluid to stop producing chondrocytes to regenerate the cartilage – the cartilaginous ends of the bones get “dry” quicker in women than in men, resulting in the increased prevalence of OA (Banks & Lindau 2013; Doherty 2000; Cooley et al. 2003; Grotle et al. 2008; Yusuf et al. 2010). The prevalence of OA at the base of the thumb has also been shown to increase more rapidly in women than in men (94% versus 85% in

over 80 years of age) and is more likely to lead to “complete joint destruction” in the female population. Women typically begin showing signs of joint breakdown in their middle 60s compared to mid-70s for men.

Weight: Obesity is defined by the World Health Organization as a BMI of 30 kg/m or greater. Although it is common (and has come to be expected) to see OA at higher rates in the hip and knee in overweight individuals, research also has shown a link between being overweight and having an increased risk of OA in the hands due to metabolic abnormalities (Banks & Lindau, 2013). These studies suggest that excess fat tissue produces chemicals (cytokines) that can lead to synovitis (swelling of the joints) and to joint effusion (swelling of the synovial fluid).

In addition, a large Turkish research study (Kalichman et al., 2005) found that females with severe obesity (BMI greater than 35 kg/m) had a higher risk of developing hand OA than their counterparts with normal BMI. While this is just one study of many, this information should give the therapist pause to reflect on strategies for prevention and further progression of the disease process in their patients. Weight may only be one factor in a multitude of factors affecting the disease process, but it is one of the only factors that we as individuals can control and manipulate.

Another component of OA with regards to weight is the use of assistive devices for ambulation. When a person with lower extremity arthritis uses an assistive device for walking, s/he puts additional strain on her/his upper extremities to hold the device, and bears weight over the hands with each step to move without pain. This is true for normal weight individuals as well; however, overweight individuals will obviously have even more strain on their hands to compensate for lower extremity pain.

Overuse: Repetitive movements or soft tissue injuries to joints have long been blamed for the breakdown of cartilage tissue. Not only can damage to the actual cartilage occur, but injury to the surrounding structures can lead to an imbalance in the joint, causing undue friction on one part of the joint more than another. Any soft tissue damage such as a ligament tear or tendon misalignment can lead to OA after years of repetitive motion (in fact, if there is an outpatient therapist out there that has been treating patients for more than 20 years that isn't complaining of basal joint thumb pain, I haven't met them). Our hand patients commonly report long histories of repetitive use such as knitting, gardening, and working on cars. Likewise, retired athletes (both professional and amateur) and military veterans with histories of soft tissue injuries and healed fractures commonly develop osteoarthritis later in life.

The frustrating component of overuse is the vicious cycle that it creates. Tendon/muscle/ligamentous

misalignment causes undue friction and breakdown of the joint. The joint is now unstable and more out of alignment, which allows the soft tissue surrounding it to contract on one side and lengthen on the other, causing further soft tissue imbalances, which leads to more joint breakdown.

Other Diseases: Having diabetes or other rheumatic diseases such as gout and rheumatoid arthritis can increase your risk of osteoarthritis (Burns et al., 2013).

Secondary Arthritis Due to Fracture

Although this doesn't necessarily lead to CMC arthritis, it is worthy to note that distal radius and carpal fractures predispose individuals to secondary OA.

It is known that the presence of subchondral hematomas due to wrist fractures can lead to early onset of mild (radiographic) OA of the wrist and worse outcomes for patients. Interestingly, this is the case not only for intra-articular fractures, but for extra-articular fractures of the distal radius as well.

Finger fractures do not appear to develop OA as much as is reported with wrist fractures, but there is little research and long-term follow-up with patients following finger fractures. Upon x-ray, phalanx fractures do show osteophytic and cystic changes, but they do not typically translate into increased pain, crepitus, and stiffness of the joints (Waris et al., 2012).

Amy's note: Patients with hand fractures will often ask me if they are going to develop arthritis later in life. My common response is that they may develop joint changes on x-ray, but that doesn't necessarily translate to problems (pain or difficulty with activities) with the joint. So I answer the question without giving them a license to sit around and wait for joint pain to develop.

Medical Diagnosis and Treatment

Overview

Arthritis diagnosis often begins with a primary care physician, who performs a physical exam and may do blood tests and imaging scans to help determine the type of arthritis. The most common diagnostic performed if arthritis is suspected is an x-ray. X-rays can reveal bony changes such as narrowing of the joint space, bone spurs, periarticular changes, and abnormal joint alignment, which all suggest osteoarthritis.



X-ray Showing Arthritic Changes



Finkelstein's Maneuver

Primary care physicians often diagnose arthritis and will begin treatment with medication. They will refer a patient on to a rheumatologist or an orthopedic surgeon as needed if they feel that specialized care is necessary. A rheumatologist should be involved if the diagnosis is uncertain or if the arthritis may be inflammatory or systemic: rheumatologists typically manage ongoing treatment for inflammatory arthritis, gout and other complicated cases. PCPs will typically refer a patient out to a surgeon if they feel that injections or surgery may be indicated.

Ideally, the PCP will also refer the newly diagnosed patient to physical or occupational therapy to discuss joint protection, energy conservation techniques, and adaptive equipment needs.

Amy's note: This is a HUGE opportunity for therapy clinicians to educate physicians as to the services we provide. Educating a patient prior to joint degradation could potentially save millions of dollars in lost wages and surgery expenses, and countless hours of undue suffering for our patients. Don't be afraid to tell those primary care physicians to send you their patients with hand arthritis – even for an evaluation and home programming!

Differential Diagnosis (Physician)

After reviewing the history of symptoms, the doctor will perform some clinical provocative tests to rule out differential diagnoses (particularly for CMC joint arthritis).

The most common differential diagnoses for the thumb are as follows:

deQuervain's tenosynovitis: Tenosynovitis at the first dorsal compartment of the extensor retinaculum. Provocative testing for this is Finkelstein's maneuver which involves tucking the thumb inside the fist and ulnarly deviating. If the patient reports pain, this is considered a positive Finkelstein's and indicates irritation at the first dorsal compartment. (Therapists also commonly use this test during their evaluation to rule out tendon involvement even if osteoarthritis has been confirmed.)

FCR tendinitis: Acute flare-up of tendon irritation of the flexor carpi radialis. This can be appreciated by palpating the tendon insertion at the base of the second and third metacarpal bones on the volar aspect of the wrist.

Stenosing tenosynovitis of the FPL: "Trigger finger" of the thumb, that can be appreciated by palpating the FPL at the A-1 pulley of the thumb (just proximal to the MP crease on the volar aspect of the thumb) which will reproduce point tenderness or exacerbate a triggering effect at the thumb IP joint with AROM.

Fracture on the radial aspect of the wrist: If a patient reports a recent fall, the physician will most certainly want to rule out a fracture of the distal radius, the carpal bones, or the base of the metacarpals through x-rays.

Differential diagnosis for PIP and DIP joint arthritis is as follows:

Acute or recent injury to the joint: Recent high velocity injury to the digit could result in a fracture at the joint, a bony avulsion due to ligamentous injury, subluxation, or dislocation of the joint. This can lead to acute swelling and if left untreated can lead to bony outgrowths which mimic Bouchard's or Heberden's nodes.

Hand tumor: Although the term "tumor" immediately evokes panic in a patient, any abnormal bump in the hand or fingers is classified as a tumor. They can be caused by cell proliferation after a small cut or a ganglion cyst (often found at the DIP joint), but very rarely are tumors of the hand malignant, and they can usually be excised without complication by a hand surgeon. Treatment depends on the patient's preference and can include surgical excision or doing nothing at all.

Medical Work-up

A thorough medical examination can include some or all of the following: x-rays, MRI, and lab tests.

X-ray classification

It is CRUCIAL to understand that many people have X-ray evidence of osteoarthritis before they experience any symptoms. In fact, research reveals that only about 28% of woman and 55% of men with radiographic evidence of joint erosion complain of pain (O'Rourke et al., 1989).

Radiographic changes such as joint space narrowing (due to cartilage loss – while cartilage doesn't show up on X-ray images, cartilage loss is revealed by a narrowing of the space between the bones in the joint), osteophytes (bone spurs), cyst formation, swelling, and sclerosis (or hardening) of periarticular structures are indicative of osteoarthritis. Advanced (or late stage) OA will show bone erosion, subluxation of the joint, and fibrotic ankylosis (or fusion) of the joint spaces – these individuals have most likely been experiencing pain, stiffness, and crepitus for quite some time. (To better understand the most common progression of radiographic changes and the physician's guideline for treatment, please refer to the Eaton-Littler classification system below.)

There are two well-known classification systems used by physicians to stage a patient's osteoarthritis of the thumb CMC joint: Burton's system uses clinical signs, patients' symptomatic complaints, and x-rays for classification; the Eaton-Littler classification system relies only on x-rays in order to stage a patient's progression through the disease process. Both systems are based on a four-stage model with stage one being the least severe, and stage four being the most severe.

It is important to clarify with physicians which system they are using to stage the disease.

Burton Classification System for Trapeziometacarpal (CMC) Arthritis

| Staging | Characteristics |
|-----------|---|
| Stage I | Pain Positive grind test Ligamentous laxity Dorsoradial subluxation of the trapeziometacarpal joint |
| Stage II | Instability Chronic subluxation Radiographic degenerative changes |
| Stage III | Involvement of the scaphotrapezial joint or less commonly the trapeziotrapezoid or trapeziometacarpal joint to the index finger |
| Stage IV | Stage II or III with degenerative changes at the metacarpophalangeal joint |

Eaton-Littler Classification of CMC Joint Arthritis

Stage I

- mild joint narrowing or subchondral sclerosis
- mild joint effusion or ligament laxity
- no subluxation and no osteophyte formation are present

Treatment recommendations: NSAIDs and immobilization – splinting the thumb in abduction

Stage II

- narrowing of CMC joint & sclerotic changes of subchondral bone
- there may be osteophyte formation at the ulnar side of the distal trapezoidal articular surface
- mild to moderate subluxation may be present (w/ the base of the first metacarpal subluxed radially and dorsally)

Treatment recommendations: ligament reconstruction and tendon interposition

Stage III

- further joint space narrowing w/cystic changes and sclerotic bone
- prominent osteophytes are present at the ulnar border of the distal trapezium
- moderate subluxation is present w/the base of the first metacarpal subluxed radially and dorsally
- passive reduction may not be present
- ST joint may show arthrosis, and possibly a hyper-extension deformity of the MTP joint

Treatment recommendations: ligament reconstruction and tendon interposition

Stage IV:

- there is similar destruction as in stage III w/respect to CMC
- scapho-trapezoidal joint has evidence of destruction
- CMC joint is usually immobile and often patients have little pain

Treatment recommendations: total joint arthroplasty or arthrodesis

The rationale behind the creation of both models was to provide physicians with guidelines to choosing treatment options; however, research studies (Wolock et al., 1989) show only a fair amount of consistency between physicians' staging and subsequent treatment recommendations. (Regardless of this finding, it is prudent for the therapist to be aware of both models, and the treatment guidelines that are associated with each of their stages, in order to properly educate our patients.)

Magnetic resonance imaging (MRI)

Magnetic resonance imaging is very effective in picking up signs of osteoarthritis. MRI uses radio waves and a strong magnetic field to produce detailed images of bone and soft tissues, including cartilage. Due to expense, MRI isn't commonly used to diagnose osteoarthritis but may help provide more information in complex cases such as following injury or if there is co-committing soft tissue disruption. If a person receives a diagnosis of OA following an MRI, it is usually because they were having the test done for an unrelated complaint and the doctor noted arthritis in the scan. Very rarely is MRI used exclusively to diagnose bony joint changes.

Lab tests

Blood tests – These may help rule out other causes of joint pain, such as rheumatoid arthritis. They can also rule out genetic factors that may be considered as increasing risk for OA.

Joint fluid analysis – The physician may aspirate joint fluid from a “hot spot” to examine if s/he suspects an infection or gout. This is not common, but can occur if a patient has a sudden onset of inflammation, pain, or stiffness to one or a few joints.

Treatment Plan

A treatment plan created by the physician can include some or all of the following: oral/topical medication, injections, splinting, physical or occupational therapy prescription, and surgical intervention.

Medications

Osteoarthritis symptoms may be helped by certain medications, including:

Acetaminophen – Acetaminophen (Tylenol, others) can relieve pain, but it doesn't reduce inflammation. It is widely prescribed, and has been shown to be effective for people with osteoarthritis who have mild to moderate pain. Taking more than the recommended dosage of acetaminophen can cause liver damage.

Non-steroidal anti-inflammatory drugs (NSAIDs) – NSAIDs may reduce inflammation and relieve pain. Over-the-counter NSAIDs include ibuprofen (Advil, Motrin, aspirin) and naproxen (Aleve). Stronger NSAIDs are available by prescription only (Mobic, Relafin, Celebrex, Lodine). NSAIDs, whether over-the-counter or by prescription, can cause stomach upset, ringing in the ears, cardiovascular problems, bleeding problems, and liver and kidney damage, so should only be taken on a long-term basis when actively under a physician's care. They should not be used by people over 65 years of age and those who have stomach bleeding.

Topical creams – Topical Capsaicin NSAIDS (Theragen, Capzasin, Zostrix) have fewer side effects and may

relieve pain just as well. Individuals can apply them directly to the painful joints, as opposed to taking an oral medication that moves throughout their system. Creams are often prescribed in addition to oral medications. Salicylate creams such as Bengay and Aspercreme are not typically helpful with arthritis, although many patients report using them.

Glucosamine-Chondroitin supplements – Although GC supplements are not typically prescribed to relieve pain, research is promising that these supplements can slow the deterioration of the joint breakdown. They have been prescribed by physicians more commonly over the past five years (Arthritis Foundation), while patients have been self-prescribing GC supplements and reporting satisfactory results for almost two decades.

Pain relievers – Occasionally the physician will prescribe narcotic pain relievers such as Lortab, Oxycontin, or Vicodin to reduce pain. It should be noted that these do not provide any anti-inflammatory effect; they act on the pain receptors only, but are stronger and more effective than over the counter medications. Again, these medications should only be taken under the strict care of a physician as they can cause liver and kidney damage, stomach bleeding, ulcers, and addiction.

Injections

Cortisone injections – Either provided by the PCP or a specialist, glucocorticoid injections have been used for many years to relieve pain and inflammation in arthritic joints. They are usually used after oral medication has failed to provide relief or when the patient complains of severe pain. Corticosteroid injections should be used with caution in patients with early stage disease due to their potential to accelerate arthritic degeneration. The general rule of thumb for glucocorticoid injections is no more than three per year per joint as necessary to reduce pain. According to widespread research (Ayhen et al., 2014) patients report about a 40% reduction in their symptoms with cortisone injections (and splinting combined). Therefore, patients must be educated to the fact that total elimination of symptoms with injections is rare.

Hyaluronan injections – Hyaluronic acid is a substance found in normal joint fluid. Modern medicine has developed a synthetic form of hyaluronic acid to inject into the joint space to provide increased mobility and therefore decreased pain. Ayhen et al. question if this technique is any more effective than placebo, so more research is obviously needed in this area.

Amy's note: Clinically I've seen many patients that swear by their hyaluronan injections. They report immediate pain relief, and long-lasting relief for 1-2 months, in my experience. The same can be said for glucosamine chondroitin. Sometimes our patients and their complaints can't keep up with our research data. :-)

Splinting

Physicians commonly issue static orthoses to patients complaining of thumb pain who have radiographic evidence of OA. The most widely accepted protocol is a forearm-based thumb spica splint with the thumb in abduction worn continuously for 3-4 weeks to see if this will reduce the patient's complaints of pain. This is used not only to reduce symptoms, but also to determine if the patient is a candidate for further medical options such as injections or surgery. Physicians may also recommend a hand-based splint CMC support for use during the day to reduce pain during activity if the patient will not wear a forearm-based thumb spica because it is too restrictive.

Therapy

Physicians will prescribe conservative and/or post-operative therapy intervention as appropriate. The primary goal of therapy is to reduce patient discomfort and slow the progression of joint deformity with therapeutic modalities, exercises, and education. (We will be discussing this at length in the next section.)

Surgical options

Surgery is not a common treatment approach for arthritis found at the DIP and PIP joints until it has advanced enough to cause instability of the fingers during activity and severe pain. A physician will most likely not perform surgery based solely on the presence of Bouchard's or Heberden's nodes. When surgery is indicated, it usually involves removal of the bony growths, joint reconstruction, joint replacement (in the case of PIP joint arthritis) or joint fusion (at the DIP or PIP joints).

PIP JOINTS

Joint arthroplasty or arthrodesis is employed in the case of unremitting pain at the joint with activity, decreased motion that affects ADLs, or joint deformity (typically ulnar deviation) that is affecting ADLs. Note that the presence of any of these complaints without difficulty with ADL tasks is not considered reason enough to perform surgical intervention.

Arthroplasties of the PIP joints are more commonly used in the ulnar three digits (middle, ring and small fingers) than in the index finger due to the amount of lateral stress that is put on the index finger during pinching activities. There are two types of implants that can be used to replace a PIP joint. The first is a Swanson silicone-elastomer (flexible) interpositional one-component implant which is used in replacement of the head of the proximal phalanx and base of the middle phalanx after both arthritic ends have been squared off and removed. In order to perform this procedure, the collateral ligaments must be excised, which results in poor lateral stability after arthroplasty. The second is a surface replacement arthroplasty, or two-component pyrocarbon prosthesis that is fitted in the same manner as the one-component implant

by replacing the surfaces of the head of the proximal phalanx and the base of the middle phalanx. This design provides less play with lateral motion but is more commonly used at the MCP than at the PIP joint. Silicone joint replacements are much more commonly used than pyrocarbon and show the best long-term results to date, as the surface replacement prostheses have a higher implant revision rate (Vitale et al., 2015).

Due to the excision of the collateral ligaments and subsequent lateral instability, arthrodesis is used more commonly in the index finger (and sometimes the middle finger depending on health of the index) in order to be able to tolerate the lateral stress applied by the thumb during pinching activities such as turning a key or opening a package. The index finger PIP joint is fixed in about 25 degrees of flexion using Kirschner wires, tension band wiring, or screw fixation depending on the surgeon's preference. These patients typically recover well post-operatively and do not require therapy (other than edema control and scar management as needed).

Amy's note: Following a PIP joint arthroplasty and extensive therapy, flexion and extension normally return to functional ranges; however, strength can be somewhat limited. Since joint replacements at the PIP are used primarily to eliminate pain, and patients with chronic severe hand pain usually have had severe changes in their strength already, post-operative strength is typically higher than it was prior to surgery. I've found that most patients are so relieved to be out of pain that any strength at all is considered a "bonus" feature. Don't expect "normal" strength after a PIP joint arthroplasty. Set your treatment goals according to the patient's functional goals.

DIP JOINTS

Joint arthroplasty is very rare because arthrodesis at the DIP joint usually results in excellent reduction in pain and provides stability for functional use of the distal ends of the digits. Fusion at about 10-15 degrees of flexion allows for lateral and volar stress to the joints during activities that most likely have been the source of the patient's pain, and is performed using the same techniques described for PIP joint arthrodesis. Adequate functional use after DIP joint fusion is considered predictable and provides a much quicker recovery than joint replacement.

CMC JOINTS

Surgery is much more commonly used with regards to CMC joint arthritis than it is with OA of the digits. Physicians recommend surgical intervention when conservative treatments (medicine and therapy) fail, and patients continue to complain of persistent pain, decreased function, and instability. Physicians will choose the surgical technique based on the severity of the disease (see classification and recommended surgical treatment in Eaton-Littler Classification table above) and whether or not the OA is due to a traumatic event. In early stages, ligament reconstruction or

arthroplasty are typically good options. For severe or late-stage disease, arthroplasty and even arthodesis at the CMC can sometimes be indicated. Although more evidence-based research is needed in the area of surgical strategies used at certain stages in order to determine the best course of action for each particular stage of arthritis, following is a brief discussion of each surgical option/procedure.

There are several joint arthroplasty options to relieve pain to the CMC joint of the thumb. Various types of prosthetics have been used over the past 30-40 years with success in reducing pain, but limited long-term reliability. The most widely accepted joint arthroplasty currently being used is ligament reconstruction and tendon interposition (LRTI). It is important for the treating therapist to know which type of arthroplasty was performed in order to treat it correctly post-operatively. These surgeries are ideally performed by board-certified hand surgeons, but are commonly performed by general orthopedic surgeons as well.

Ligament reconstruction and tendon interposition (LRTI) – Although there are several types of LRTI procedures described in the literature, basically this involves excision of all or part of the trapezium, and a splitting of the distal portion of the flexor carpi radialis (FCR) tendon which is then used to fill and stabilize the space created by removing the carpal bone. The tendon can be folded several times (called an “anchovy” technique), or can be passed through a hole created in the base of the first metacarpal and then wrapped back around the portion of the tendon that is still attached to the base of the second metacarpal to provide stability. This is a technically difficulty procedure to perform, so is used primarily by board-certified hand surgeons. This tends to be the treatment of choice in patients who plan to return to normal levels of activity and recreation, such as gardeners, mechanics, and dental hygienists.

Silicone-elastomer implants – Used since the 70s, this surgery involves cutting down (squaring off) the surface of the base of the metacarpal, excising the trapezium, and placing a silicone (flexible) prosthesis in the space created. While this results in a quick reduction in pain and increased grip and pinch initially, the long-term studies have shown complications of silicone wear, high incidences of subluxation, bony erosion, and silicone synovitis resulting in cyst formation. Still, patients report a high satisfaction rate with the Swanson technique (84% satisfied with results) in a long-term study, and this technique is still in use today (Vitale et al., 2015).

Titanium and polyethylene implants – Similar to the silicone procedure described above, these have been used to avoid the complication of silicone synovitis. Unfortunately these also have the highest rate of revision due to loosening of the implant and subluxation of the prosthesis.

Ceramic balls – Either part or all of the trapezium is excised (as well as the base of the metacarpal), and a ceramic ball is placed in the open area to act as a spacer. After the spacer is put in place, the surgeon uses surrounding tendons to stabilize the new prosthesis. Patients report a reduction in pain with this procedure, but they also have a higher rate of subluxation than some other techniques such as ligamentous reconstruction and tendon interposition. This procedure is typically used primarily to relieve pain and isn't usually the surgery of choice for younger, more active patients.

All of these techniques are in use today, and will require post-operative evaluation and treatment by a therapist. Surgeons typically have post-operative protocols following a CMC arthroplasty that should be followed carefully (a brief description of a common protocol can be found under “Post-operative Treatment”). In addition to specific protocols, the therapist will need to address standard post-operative needs such as edema control, scar management, and soft tissue mobilization of surrounding tissues. The average patient will require between 3-5 months of therapy following a CMC joint arthroplasty depending on their physician's protocol, any complications that arise, and their return to activity goals.

Fusing of the CMC joint is not commonly used as a treatment of choice unless the disease process is so advanced that other surgical options are not feasible. Typically arthrodesis is used only in cases of advanced rheumatoid arthritis of the CMC joint or when the joint has been crushed due to traumatic injury; another indication would be for a patient that is very active or must be able to use his/her hand for heavy lifting such as a manual laborer. Arthrodesis is not appropriate if the patient must be able to flatten his/her hand (like to lean on a table), or extend the thumb for activity, as the joint is fused in 40-45 degrees of palmar abduction, 20-25 degrees of extension, and 10-15 degrees of pronation. Arthrodesis usually results in a very stable, strong hand compared to prior to surgery, and patient satisfaction rates are high. The primary complication following arthrodesis of the CMC joint is increased wear and tear on surrounding mobile joints (such as the scaphotrapezium joint), causing arthritis in this area.

The Role of Therapy

As therapists, we commonly treat patients with osteoarthritis and/or osteoarthritic changes in their hands. Whether it is the primary diagnosis that led them to our clinic, or a secondary clinical symptom that we are noticing, our understanding of how OA affects hand function is paramount in proper exercise dosing and appropriate manual techniques. Thorough evaluation of the joint health of the hands begins on day one of treatment.

History

Some questions to consider and review during our interview with the patient can include:

- Which joints are hurting the most? Are any other joints bothersome as well?
- How long has the patient been experiencing pain in the joint?
- Have they recently had an accident which has exacerbated symptoms?
- Is the pain sharp/dull/throbbing/aching/zinging, etc? (Describe in their words)
- Are they noticing any crepitus in the joints?
- What activities irritate the symptoms?
- Are the symptoms worse with rest or activity?
- Does the patient wake up with stiffness in the affected joint?
- What relieves the pain?
- Have they tried heat or ice to eliminate symptoms?
- Has the patient had a medical workup including x-rays?
- Have they been started on any anti-inflammatory medications by their physician?
- Are they taking any over-the-counter supplements?
- Have they tried any splinting or immobilization devices? Were those helpful?
- Have they used any alternative remedies such as acupuncture, copper bracelets, magnet therapy, or chiropractic to reduce pain? Has any of this been helpful?
- Has the patient had any other hand or wrist surgeries to date?
- Does the patient have any other pertinent medical history such as auto-immune deficiencies, carpal tunnel syndrome, tendinitis?
- Does the patient have any history of sports injuries to the hands?
- Does the patient engage in activities that require excessive or repetitive gripping or weight-bearing to the hands? (such as gardening, knitting, working on cars)
- Does the patient exercise regularly? Is the patient at a healthy weight?
- Is there a history of arthritis in the family?
- Do they have a history of arthritis in their back, hips, knees?
- Have they been diagnosed with arthritis in their cervical spine?

Typically by the time a patient reaches us for evaluation, they have had symptoms for quite some time – several months to even a couple of years. They are having difficulty doing activities such as opening jars, turning keys to open a door or start the car, gardening, and mechanic work. They may even complain of difficulties with self care such as buttoning, zipping, or pulling up their pants without pain.

Patients will typically state that they felt stiffness for several months, followed by increased pain and difficulty with activities. Patients with Heberden's and Bouchard's nodes tend to report increased tenderness to the joints, swelling, and then development of the node. These nodes don't always translate to decreased activity tolerance or pain, but are bothersome to a patient who is concerned that the condition may worsen without intervention.

It is very important to know whether or not the patient has a history of cervical spinal arthritis. Bone spurs in the cervical spine can cause numbness and tingling to the upper extremities which can be misdiagnosed as carpal tunnel syndrome or any other nerve compression syndrome. True osteoarthritis of the hands does not cause numbness and tingling, so if your patients report those complaints, further workup should be considered. If they did not mention these symptoms to the physician, s/he would have no reason to perform x-rays at the c-spine.

Defining morning stiffness is hard, although people with arthritis describe it as an ache combined with difficulty moving. Stiffness following exercise is usually a feature of osteoarthritis; it is a sign that the joints are starting to fail. Patients may also feel stiff when they rest, such as sitting down after a walk or relaxing in the evening. Joint stiffness may occur with or without joint pain. When taking a history, it is important to know the patient's complaints regarding joint stiffness. This will assist the therapist in setting goals and following up with as treatment progresses. When or why the joint stiffens is not as important as being able to identify that the joint stiffness has lessened with therapeutic intervention.

Amy's note: As we age, a certain amount of joint stiffness is normal. Imagine when you go to the movies and you sit on your foot for two hours. When you go to stand up your knee feels like it's going to explode. This is normal in most people. Joint stiffness is not normal when it occurs after relaxing on the couch for 10 minutes. Be sure to use therapeutic judgment when discussing this with patients.

A complaint of crepitus or clicking sensation to the joint does not necessarily translate to joint pain: many people have crepitus in joints that are completely asymptomatic, so if a patient complains of crepitus in a particular joint, be sure to clarify whether or not that it is painful at the same time. Crepitus is a common complaint with arthritis, but is not a definitive factor

in determining whether or not a joint is painful or will become painful.

It is also important to get an understanding of what the patient has tried to do prior to coming to therapy to relieve their pain. This includes splinting, resting, use of heat or ice to reduce pain, or even alternative remedies and treatments such as copper bracelets, magnet therapy, acupuncture, or chiropractic. This gives the therapist an idea of how proactive the patient has been in reducing their symptoms, and also a more thorough understanding of the patient's history – has the patient previously been able to manage symptoms, and now that has changed?

Differential Diagnosis (Therapist)

With regards to CMC arthritis, there are several other differential diagnoses to consider and rule out.

Carpal tunnel syndrome: The most common complaints for carpal tunnel syndrome are night pain, pain with repetitive activities, decreased strength (dropping things spontaneously) and numbness and tingling. Patients will often complain of “thumb pain” with carpal tunnel syndrome, which can lead the health care provider to consider OA, especially if the patient is in his or her 60's or beyond. Again, numbness and tingling are NOT symptoms of OA, and should be further investigated. A quick screening using Tinel's and Phalen's tests can give the therapist a working idea if the median nerve is under strain. Obviously, a patient can present with both problems (OA and CTS), and often a “flared-up” OA of the CMC will cause swelling and compression at the carpal tunnel. But as stated, numbness is not typically a complaint associated with OA alone.

Patients may also present with point tenderness to the thenar eminence with both CTS and OA. A thorough investigation of the type of pain elicited with palpation usually allows the therapist to determine if the pain is coming from the irritation in the joint or coming from compression of the median nerve. Pain that causes localized burning or sharp pain at the anatomical snuffbox is more indicative of OA vs. a burning or throbbing sensation in the middle of the wrist with CTS.

deQuervain's tenosynovitis: deQuervain's tenosynovitis is an inflammation of the APL and EPB tendons that run through the first dorsal compartment of the extensor retinaculum. An easy way to rule out this problem is with a Finklestein's maneuver (as described above in the physician's evaluation). Just as with CTS, a person suffering from an acute flare-up of OA at the CMC joint may show slight signs of inflammation and irritation at the first dorsal compartment, but if the provocative Finklestein's is positive, the patient should also be treated for deQuervain's tenosynovitis. Addressing soft tissue

irritation surrounding the joint will decrease a patient's pain level even in the presence of OA.

Wrist tendinitis: Patients who complain of a sudden onset of thumb pain (or radial-sided wrist pain) should be evaluated for wrist tendinitis of the flexor carpi radialis. This is achieved by palpating the tendon insertion (volar base of the second and third metacarpals) while the patient is performing isometric wrist flexion. Point tenderness at the tendon insertion should be addressed accordingly, and may also be seen in conjunction with CMC joint osteoarthritis.

Ganglion cysts: With regards to Bouchard's and Heberden's nodes specifically, one differential diagnosis for this would be ganglion cysts in the same areas. This has most likely already been addressed by the physician; however, it is prudent to ask the patient how long they have had the “bump,” as osteoarthritis develops over many months, and ganglion cysts can sometimes pop up very quickly. Also, cysts tend to be “movable” – that is to say the therapist can almost palpate and adjust the cyst – whereas Bouchard's and Heberden's nodes are thickened ends of the bone and will not move with palpation. Occasionally a patient will develop a ganglion cyst in the wrist that radiates pain to the CMC area and may mimic symptoms of osteoarthritis.

Carpal fracture or carpal instability: An undetected carpal bone fracture or carpal ligament disassociation can also radiate pain to the radial aspect of the wrist. Be sure to take a thorough history and ask the patient if they have had any recent falls or if the pain developed following an impact of any kind.

Amy's note: Understanding these differential diagnosis not only helps the therapist decide what treatment to start, but it gives the therapist an understanding of what to look for in the patient that comes to you for something else and says, “Hey, I have XYZ complaints. Is that arthritis?” Of course we all know that we are not in the business of diagnosing anyone, but if we understand the common complaints, we can give the patient a working understanding of what might be going on, and we give them the right tools and questions to take to their physician. We are going to get the questions. We might as well be prepared for them.

Evaluation and Provocative Testing - CMC Joints

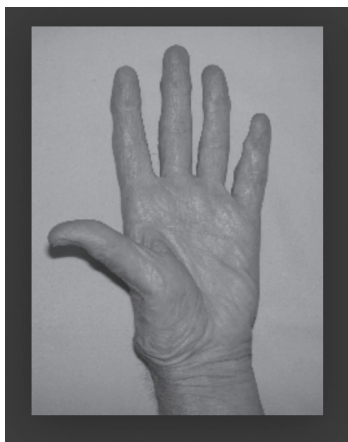
Observation: Of course patients come in with all levels of joint breakdown, but the first evaluation procedure should be observation of the thumb resting position in relation to the rest of the hand. In order to get a good understanding of what a typical thumb looks like, observe your own hand and the hands of people around you. In a normal resting position, the thumb should sit in about 10-15 degrees of radial abduction at the CMC, and half way between volar (or palmar) abduction and thumb radial abduction. The joint is not typically “visible” to the naked eye, as the base of

the first metacarpal is securely seated in the trapezium. With the joint in normal alignment, the tendons will rest in such a way that the MP joint sits comfortably in about 30 degrees of flexion, and the IP is fairly neutral.



Normal CMC Joint Position

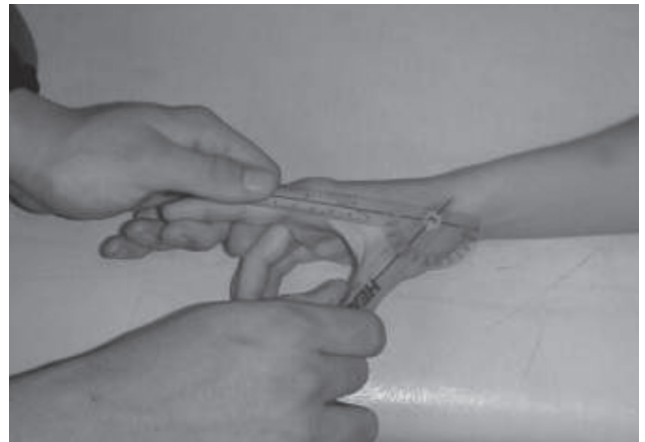
With advanced joint breakdown, we begin to see the first metacarpal shift volarly in the joint space, resulting in a “sag” (which is MP hyperextension), which changes the line of pull of the surrounding tendons, resulting in an increase in MP joint flexion at rest, and subsequent IP hyper-extension. This zig zag affect will worsen over time if not corrected through splinting and strengthening.



CMC Deformity

Compare your patient’s affected thumb to their unaffected one (if they are complaining of unilateral symptoms). How does the resting position compare to the unaffected side?

Active range of motion: Evaluate the AROM of the CMC, MP, and IP joints of the affected thumb. Carpometacarpal radial abduction and adduction, palmar abduction and adduction, opposition, MP joint flexion and extension, and IP joint flexion, extension, and hyper-extension should all be measured and compared to the non-affected side or normative data as available.

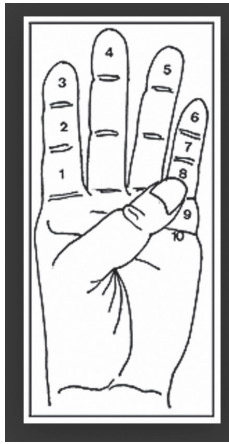


Measuring Thumb Palmar Abduction



Measuring Thumb Radial Abduction

The “Gold Standard” for testing thumb opposition according to the American Society of Hand Therapists is to measure the amount of distance between the volar IP crease of the thumb to the third metacarpal. A functional evaluation of opposition is the use of the Kapandji score, described by Kapandji (1986). Various parts of the hand are numbered, and the patient is asked to progress from one to ten, with the goal being to reach the distal palmar crease at the fifth metacarpal (if the patient can reach that far with the unaffected thumb). This test has not been approved by the American Society of Hand Therapists (ASHT) for widespread use as it has poor sensitivity when researched, but it is widely accepted by therapists and doctors, and it seems to be an excellent patient motivator. Make sure to document any abnormal joint compensatory movements as the patient attempts to reach progressively across the palm, as this is the primary reason the Kapandji score has not been accepted by ASHT (Casanova, 2015).



Kapandji Score

Passive range of motion: PROM is typically contra-indicated in arthritic joints and should only be evaluated if the therapist has extenuating circumstances such as strict orders from the physician to measure the joints passively or in the case of a joint that has a significant amount of collapse which does not allow AROM because of tendon mal-alignment. Use PROM very carefully. Do not push through to a painful end-feel on an arthritic joint unless you have a sound therapeutic reason to do so. You may need to document PROM measurements in order to provide appropriate splinting, but the PROM should always remain pain-free. When in doubt, err on the side of caution. Pushing aggressively on arthritic joints typically exacerbates symptoms and can even cause more joint damage.

Grip and pinch strength: Using a dynamometer, test the patient's grip and pinch in normal fashion: seated with arm adducted comfortably to the side, elbow at 90 degrees, forearm and wrist in neutral. Compare to the unaffected side. Document any complaints related to testing such as a sharp pain, difficulty with grasp, or inability to hold the testing equipment comfortably. Performing a pinch test will typically accentuate any deformities that might be forming in a collapsing CMC joint. Normative data can be found online and in many text books but should be used with caution. Compare both sides and discuss patients' expectations for strength in relation to their ADLs, job duties, and recreational goals.



Grip Strength Using Jamar Dynamometer



Pinch Strength Showing Increased Deformity

Amy's note: I like to perform this test in addition to the standard grip/pinch for more subjective information. (It's a small test that I've developed over the years that I believe has high clinical value, but has not been researched or standardized in any way – so please take that under advisement if you choose to use it.) Without cuing her on a specific way to grasp, have your patient hold a deck of cards with both hands and try to pull away with both hands in opposite directions, essentially pinching the deck so as not to let go. Evaluate the position of the thumb during this test. Does the CMC joint hyperextend more than noted on rest? Does the patient compensate by rotating her wrist? Have her change to various positions (forearm positions, key vs three jaw chuck) and repeat the test. Does she have less/more pain with the forearms in neutral/pronation/supination? Does the CMC joint "shift" and if so, in what direction? How do the MP joint and thumb IP joint respond to the stress? Does the patient complain of pain during testing? How do her signs and symptoms change with 100% effort? 50% effort? 10% effort? I feel like I learn more information that translates to function from this test than most of the "standardized testing" that I have been using for years. It also helps the patient understand what positions work best for her symptoms AND can be used when you are evaluating any splinting or support you've recommended. Win, win, win!

Grind test: The most common provocative test for OA of the CMC joint is the Grind test. While stabilizing

the patient's wrist in neutral, hold the first metacarpal in a "loose packed position" and provide an axial load into the joint. Now move the bone in a slight circular motion. If the patient complains of pain, the test is positive. You may also notice crepitus in the joint. This is a positive sign for synovitis and arthrosis as well.



Grind Test

Evaluation and Provocative Testing – IP Joints

Observation: As noted previously, evaluate for the presence of Bouchard's or Heberden's nodes on the joints. Besides actual nodules, thickened joints are also a sign of osteoarthritis. At rest, what positions do the fingers lie in? When the hands are placed in a relaxed position on the table, do all the fingernails line up and face the same direction? Is one arthritic finger over-supinated or over-pronated?



Heberden's And Bouchard's Nodes

Active range of motion: Measurement of the affected joints in comparison to unaffected joints is a great starting point to determine how limited a patient's full fist may be for functional activities. Ideally a flat metal finger goniometer can be placed dorsally over the joint, but if too much joint deformity is not allowing an accurate measurement, then placing a small plastic goniometer on the lateral aspect of the finger is a nice alternative. Measuring the joint on the lateral aspect is considered a deviation from standardized testing, so

this should be noted on the evaluation form. Measure the flexion of the MCP, PIP, and DIP joints of each finger separately, measure and subtract for any extensor lag, and then add all the numbers together. A normal Total Active Motion (TAM) is 250-270 degrees of each digit. TAM of 200 degrees is considered functional. Anyone with less than 200 degrees of TAM of all digits would be an excellent candidate for built-up utensils. Please refer to the chart below for normative data on all joints of the hand.

| Typical Range of Motion | | |
|---------------------------|----------------------------|------------|
| Elbow | Extension/Flexion | 0/145 |
| Forearm | Pronation/Supination | 70/85 |
| Wrist | Extension/Flexion | 70/75 |
| | Radial/Ulnar | 20/35 |
| Thumb basal joint | Palmar Adduction/Abduction | Contact/45 |
| | Radial Adduction/Abduction | Contact/60 |
| Thumb Interphalangeal | Hyperextension/Flexion | 15H/80 |
| Thumb Metacarpophalangeal | Hyperextension/Flexion | 10/55 |
| Finger DIP joints | Extension/Flexion | 0/80 |
| Finger PIP joints | Extension/Flexion | 0/100 |
| Finger MCP joints | Hyperextension/Flexion | (0-45H)/90 |

Normative ROM data

Passive range of motion: Again, PROM of arthritic joints is unnecessary and painful in many cases. Gently assessing each joint for crepitus, laxity of the ligaments, and end-feel can be performed but should be done so with great care. PROM should be considered in cases where a patient has an obvious discrepancy between active and passive range, as this could be a sign of tendon or ligamentous disruption.

Edema/Volume: Circumferential measurements of the joints can be performed with a standard retractable tape measure or volumeter if available. Volumeters give very accurate measurement readings but there is no normative data for this. The therapist must rely on measurements between treatments to get feedback with regards to the treatment's effect on edema levels.

Grip and pinch strength: Grip strength can be measured as noted previously using a dynamometer, and testing lateral or key pinch, 3-jaw chuck, and tip-to-tip pinch. A trial of three reps can give the therapist an average strength number to document, as well as feedback as to pain levels with grasping in different patterns.

Treatment

There are three main components to therapy for patients with osteoarthritis whether it is conservative or post-operative treatment: Education, Splinting, and Exercise. Of course these three things are supplemented by oral medication prescribed by physicians and modality use to reduce discomfort as needed. (If a patient is being seen post-operatively, then wound

care, edema, education to surgical procedure performed, and scar management will also need to be addressed.)

EDUCATION

Many people believe that the effects of osteoarthritis are inevitable, so they don't think there is anything they can do to manage it. Patients will often state that their doctor has given them the same prognosis: "Sorry, this is normal at your age. There's really nothing we can do." Osteoarthritis symptoms can hinder work, social life and family life if steps are not taken to prevent further joint damage, manage pain and increase flexibility. So while we will be discussing patient education, this is a prime opportunity to also educate your referring physicians to the benefits of referring patients to therapy for energy conservation and work simplification techniques, and to familiarize them with adaptive equipment that is readily available.

Amy's note: After extensively reviewing the research to write this course, and reviewing physician protocols surrounding osteoarthritis in the hand, it has come to my attention that most physicians are instructed to give their patients joint protection education when they diagnose the patient with OA. In fact, most protocols instruct the physician to give joint protection education and a splint for 3 to 4 weeks. If this doesn't work, they should refer the patient therapy. However, in my 21 years of clinical experience, I don't think I've met a patient yet that was instructed by her physician on how to protect her joints during ADLs. Honestly, physicians don't have that kind of time to spend with their patients, and it is my belief that physicians really haven't been trained in what joint protection techniques even look like. When given the opportunity, they will gladly turn that instruction over to the therapist, but it's up to you to offer the services.

Energy conservation and work simplification:

Discussing your patient's daily lifestyle is imperative to understanding what they are requiring of their body and particularly of their hands. If your patient is an avid cook, seamstress, woodworker, or fly fisherman, the demands on his or her hands is going to be very different than someone who watches television and walks around the mall every day. Spend some time getting to know your patient's favorite activities so you can teach them appropriate energy conservation and work simplification techniques.

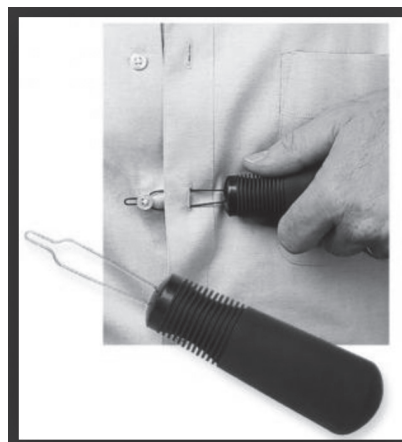
Some things to consider in context to their activities:

- Could timed rest breaks be beneficial?
- Can frequently used items be left in a convenient place for retrieval?
- Can a family member or neighbor take over a difficult task?
- Can tools be adapted for ease in gripping or opening?

- Are there electric tools that can replace commonly used hand-held tools?
- Can some steps of a task be eliminated to avoid provocative movements?

Strategize with your patient to see what new ideas you can come up with in regards to energy conservation and work simplification. Sometimes just stepping away from the activity and problem solving with them will help them see that there are more efficient or less painful ways to move, but still be able to participate in their normal activities of daily living. Nothing is more satisfying than having a patient say, "That's a great idea! I never thought of doing it that way!"

Adaptive equipment: Adapting tools to decrease stress on the hands is a basic strategy that most therapists were taught in school. Built-up handles, easy closing/opening devices for clothing, food packages, key holders, and electric tools are some basic ideas for adapting an environment and are much more readily available than they once were. Even large discount retailers offers built-up food prepping tools such as large-handled potato peelers and large-handled knives.



Adaptive Equipment Examples

NorthCoast medical company has an entire magazine dedicated to adaptive equipment needs for cooking, self-care, and recreational activities such as reading and playing cards. NorthCoast will send a therapist those magazines for free upon request, and they also have the same magazine available online: go to www.ncmedical.com, and on the home page in the bottom left hand corner you will see a button to order catalogs for free, or shop the catalog online.

The NorthCoast magazine or online search is a great starting point of discussion with patients, as they can flip through the pages (either in the clinic or online) and get ideas of what is available that may be beneficial to them. Alternatively, a simple search on the computer for “adaptive equipment for the hand” will reveal many products and solutions that patients (and therapists) might never have thought of.

All products don't need to be purchased – many solutions can be crafted at home with supplies they already own. Educating patients as to cost-effective solutions is time well spent, as it increases the “buy-in” of the patient to the techniques and the likelihood that he or she will try an adaptive device. For example: using pipe insulation that they can buy for pennies at the home improvement store works just as good as the custom foam tubing that can be purchased through rehab suppliers for \$15. And a package of key rings can be purchased for \$1 for ten, when one “zipper pull” in the catalog is \$4.95. The catalog and/or other searches are really a jumping off point for the therapist and patient to engage in a discussion about adaptive equipment strategies.

Amy's note: Two things: If time in the clinic is an issue, the catalog can be sent home with the patient and they can review it at their leisure, and return to the clinic to problem-solve how to access the tools without breaking the bank. Secondly, don't forget to address your patient as a whole person. If she also has back/hip/knee pain from arthritis, educate her to adaptive equipment available to relieve those stresses as well. It's the nice thing to do.

Fall prevention: While we often don't consider the fall risk for our hand patients, it is prudent to do so. Most hand patients with osteoarthritis are having symptoms of breakdown in other joints besides their hands. Many complain of hip, knee, and back symptoms as well. People with osteoarthritis experience as much as 30 percent more falls and have a 20 percent greater risk of fracture than those without OA. People with OA have risk factors such as decreased function, muscle weakness and impaired balance that make them more likely to fall. Side effects from medications (such as narcotics) used for pain relief can also contribute to falls because a patient may feel dizzy and unbalanced. Discuss your patient's environment with them. Removing throw rugs, timing pain medication with food, using an assistive device for walking long distances, and taking rest breaks are a good starting point.

Weight-related issues: Although this is a delicate subject, it should not go un-discussed – particularly in light of the latest research discussed previously, we owe it to our patients to educate them to the increased risk of joint breakdown when a patient has a BMI over 30.

If you suspect that your patient has a BMI over 30 (which can be determined using BMI weight tables online), even just discussing the research with them can be the talking point that encourages them to work towards a healthier weight and lower BMI. You never know if controlling their symptoms is just the motivation they needed to lose weight and be healthier. Let them know that being overweight or obese changes the chemical make-up of the joint surfaces, and although science has not found a way to reverse the affects of osteoarthritis, they may be close to a breakthrough on slowing down the effects of it (especially in non weight-bearing joints). This is achieved by maintaining a healthy weight and active lifestyle. If the patients are receptive to your discussion, encourage them to talk to their doctor or nutritionist about how to safely lose weight. Combined with your home exercise program, patients will be well-informed on how to hopefully prevent or retard further joint breakdown.

Available community support: The Arthritis Foundation and some medical centers have classes for people with osteoarthritis and chronic pain. These classes teach skills that help manage osteoarthritis pain, such as breathing techniques, mindfulness, and energy conservation techniques. Learning to live with chronic pain can be very lonely. Establishing a bond with like-minded individuals can help reduce the pain through community. As a therapist, be aware that these resources exist so that you can pass them on to your patients.

SPLINTING

There are two primary uses for splinting someone with osteoarthritis: to correct mild deformities to reduce pain and improve function, and to prevent further deformity. Understanding what the goal of the patient is will help the therapist determine what type of splint is best.

To correct a deviation at the IP joints, a cost-effective option is an Oval-8 splint. Oval-8 splints are fabricated in 14 different sizes, and each one can be worn two ways to accommodate for half-sizing. Many patients prefer to have a couple splints to account for fluctuations in swelling. A sizing chart is available to therapists, but patients are able to order Oval-8 splints directly if needed. Oval-8's are a three point product, and can reduce any ulnar or radial deviation, or flexion deformity.



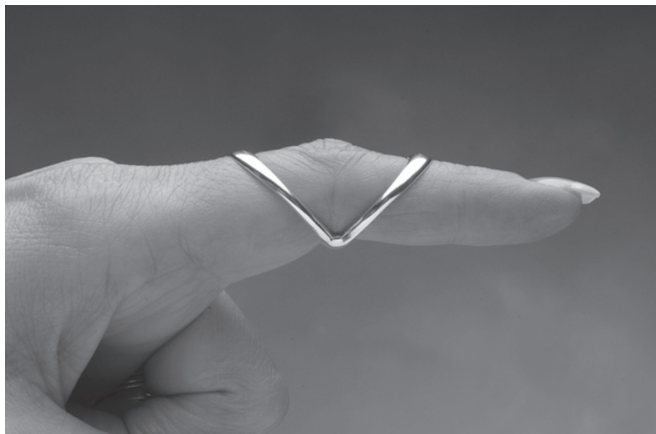
Oval-8 Splint

Silver Ring splints (or SIRIS) are another type of three-point product that looks more like jewelry if a patient wants a more permanent solution that is aesthetically pleasing. They are much more expensive, and are not covered by insurance, but are a great alternative to wearing a traditional splint. They can be ordered through the NorthCoast website; alternately, to look at all of the options available, visit www.silverringsplint.com.



Thermoskin Gloves

Two of the most commonly used pre-fabricated splints for CMC arthritis are the Comfort Cool thumb spica and the Push Metagrip splint. The Comfort Cool is made of neoprene and gives elastic support to the CMC joint, specifically for functional activities such as gardening or sewing. The pros to the Comfort Cool are the elastic fit and the variable support, but the cons are that the splint is bulky and tends to be hot in summer months. It can be washed and air-dried, but many patients order two of them so that they can have a “work” splint and a “nice” splint. The Push Metagrip splint is a low-profile semi-plastic splint that can be custom fitted to the thenar eminence to fit perfectly. This is a more expensive option (around \$75-85 compared to \$25 for the Comfort Cool), but can be easily washed in the washing machine and worn as much as needed. This splint is resistant to heat and is low-profile enough to fit under a surgical glove. It is extremely comfortable to wear and provides more support than traditional custom splinting.



Silver Ring Splint

Another patient favorite are Thermoskin gloves. These gloves have the patented Thermoskin lining that helps hold in the neutral warmth created from body heat, which can be soothing to arthritic joints.



Comfort Cool Thumb Spica



Push Metagrip

Of course the therapist always has the option to provide custom splinting using traditional thermoplastic splinting material and velcro strapping. Hand-based custom orthotics are typically covered by insurance companies (where pre-fabricated orthoses usually aren't), and can obviously be highly customized to your patient if they have bony prominences or deformities that do not tolerate pre-fabricated splinting.



Kinesiotape

Amy's note: I personally have CMC arthritis in my right thumb due to 20+ years of manual treatment and my choice in CMC support is kinesiotape. I've tried everything, and what I find to be the most comfortable is taping during activities. If I know I'm going to do a lot of manual therapy on a particular day, I might wear my Push Metagrip for a few hours, but day-to-day I tend to prefer tape. It's unassuming and gives me immediate relief. The other nice thing about tape is that you can try it on a patient for a few days and if they aren't getting relief, they aren't out the \$25 that it will cost them to try a more traditional splint.

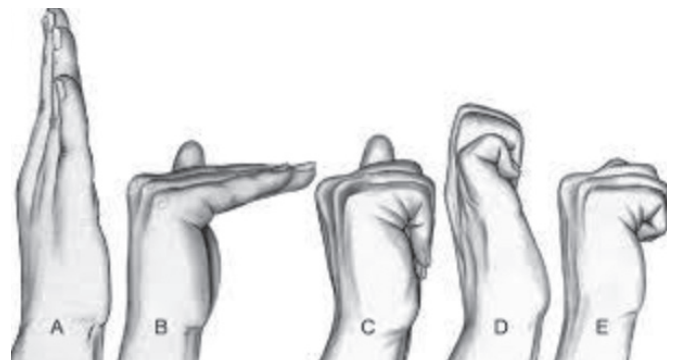
EXERCISE

Pain free active range of motion exercises are indicated in the case of OA of the hands. As stated when discussing evaluation, passive range of motion is not necessary and is typically contra-indicated to joints that have cartilaginous breakdown. Depending on the joints involved, standard tendon gliding exercises, joint blocking exercises, and reverse joint blocking are appropriate in circumstances where a patient is avoiding motion due to pain. Keeping non-arthritis joints healthy and moving in spite of painful affected joints is a balancing act. The goal is to maintain as much ROM as possible without exacerbating symptoms.



Custom Hand-Based Splint

Another supportive option either in addition to, or in replacement of, splinting is supportive kinesiotaping. Kinesiotaping methods vary widely and are beyond the scope of this course. However, if a therapist is comfortable with functional taping, supportive taping can be an excellent alternative to splinting. It is very low-profile, provides immediate support, and is fairly inexpensive (although it can only be used once). The negative side of tape is that the skin does need to take a break from the tape every few days so that it doesn't get irritated. Several brands of kinesiotape are latex free.



Tendon Gliding



Joint Blocking

Isometric exercises are very helpful in reducing pain and adduction deformity at the CMC joint. Teaching patients how to perform isometric wrist and thumb strengthening goes a long way to reducing symptoms of CMC arthritis, especially for patients that are showing signs of subluxation and tendon imbalance. Performing isometrics helps support the CMC joint by building up the muscles surrounding the CMC. These include wrist flexors, extensors, radial and ulnar deviators, thumb flexors, extensors, abductors and adductors, and index finger abductors.

When teaching a patient how to perform isometric exercises, ensure that they understand that they should only “resist” to the point of slight discomfort. Isometrics can aggravate symptoms if they are performed too aggressively, so explain to patients that they should stay “under the pain.” They will know they are getting stronger over several weeks of performing their exercises diligently when they can tolerate more resistance without pain.

- Perform all exercises at mid-range of the joint.
- Perform all resistance “under the pain” threshold.
- Any discomfort from exercises should subside in less than 20 minutes.
- Begin with 10-15 repetitions twice per day, work up to 30-40 reps twice per day.

- When joints are pain free (between 6-8 weeks of exercises), can reduce to once per day.
- Nine exercises are performed:
 - Wrist flexion, extension, radial deviation, ulnar deviation





- Thumb flexion, extension, abduction, adduction (resistance placed at MP joint)



- Index finger abduction (resistance placed at PIP joint)



MODALITIES

Heat increases blood flow and helps to increase flexibility of tissues. Heat modalities that are commonly used in the clinic are continuous ultrasound, moist heat packs, diathermy, and paraffin. Patients typically report temporary relief with heat treatments, and tend to tolerate exercise better following heat modalities.

Cold laser (low level laser therapy, or LLLT) also reduces pain in arthritic joints. Cold laser is reported to reduce inflammation of surrounding tissue, thereby reducing pain. Minimal research has been completed on LLLT compared to other modalities, but patient satisfaction is very high.

Amy's note: Electrical stimulation can also temporarily relieve pain in some patients, although I've found this is most helpful in patients that are having soft tissue complaints such as muscle spasms due to compensatory movements to avoid pain (at the joint). For this reason, when I use e-stim to reduce pain related to arthritis, it is typically to the flexor or extensor wad in the forearm to reduce muscle pain. I've found that joint pain doesn't respond favorably to e-stim as the modality of choice.

Heat vs. ice: the great debate

This topic is a common one discussed among therapists and researchers alike. Which modality is more beneficial in relieving pain in the arthritic hand?

There is really not one simple answer. Both heat and cold can relieve pain in your joints. Heat typically relieves stiffness, and cold can relieve muscle spasms and pain which exacerbate joint irritation. So when choosing a modality, it really depends on the patient's comfort level:

- Has the patient tried both modalities?
- Which one brings more pain relief?
- Do the patient's joints feel better after a hot shower or doing the dishes?
- Has the patient noticed that his/her hands feel stiff but don't hurt in cold weather?

Every patient is slightly different. And while we as therapists tend to lean towards moist heat as the modality of choice for arthritic hands, it does not necessarily mean that will be best tolerated by a specific patient. Doing trials of both will help determine what is best for each individual patient.

If patients report that they like moist heat better than ice, a common recommendation would be to purchase a paraffin unit for use at home. Home paraffin units are typically easy to find, particularly around the holidays: they are available at most discount stores (like Wal-Mart or Target), at pharmacies, at specialty stores (like Bed, Bath and Beyond), and at salon wholesale stores. If a patient is tech-savvy, paraffin units can be easily

found online and shipped right to the patient's door. Patients typically use these in the morning after they get out of bed: moist heat tends to decrease stiffness from lack of motion at night, and prepares a patient for their daily routine. This is especially helpful for people who like to take their showers in the evening (people who take showers in the morning tend to get a nice moist heat from bathing).

Another simple alternative that is very popular with patients is to take a bath towel, wet it down, and place it in the microwave for about two minutes, checking on it every 30 seconds to see if it is warm enough. Patients can heat up the towel and place their hands in that moist heat for several minutes before it cools down. Wrapping the wet towel in a dry towel will also hold the heat in for a little bit longer (and keep the mess to a minimum).

As far as cold treatments are concerned, there are commercially available cold packs that are quite comfortable: Elastogel.com is an excellent source for a commercial cold pack; they can also be purchased on Amazon and other therapy websites. Patients who really enjoy cold as their treatment of choice may choose to invest in a gel pack – there are even mitt-shaped gel packs that will surround the hand with cold treatment. Otherwise, a bag of frozen peas works very well and is readily available; it's also a much cheaper treatment option since Elastogel packs cost somewhere between \$30 and \$50 each.



Elastogel Cold Pac

ALTERNATIVE OPTIONS

Most therapists are unwilling to discuss alternative treatments beyond what is proven through evidence-based medical practice. This is a wise choice when providing any patient education, as we need to be aware of our state practices and the limits of our therapeutic domain. However, therapists should be aware of alternative methods available to patients so that they can discuss these treatments if the patient brings them up. Common treatments that have shown some promise for osteoarthritis include:

Acupuncture: In a large landmark study by Brian Berman, MD (2004), Dr. Berman indicated that acupuncture can relieve pain and improve function in people who have osteoarthritis. During acupuncture, hair-thin needles are inserted into your skin at precise spots on your body. Risks include infection, bruising and some pain where needles are inserted into your skin. This treatment must be performed by a licensed acupuncturist.

Glucosamine and chondroitin: Studies have been mixed on these nutritional supplements. A few have found benefits for people with osteoarthritis, while most indicate that these supplements work no better than placebo (Clegg et al., 2006). People should not use glucosamine if they are allergic to shellfish. Glucosamine and chondroitin may interact with blood thinners such as warfarin and cause bleeding problems as well. Any patient considering this option should be urged to discuss it with a physician first.

Avocado-soybean unsaponifiables: This nutritional supplement – a mixture of avocado and soybean oils – is widely used in Europe to treat knee and hip osteoarthritis. It acts as an anti-inflammatory, and some early studies have shown it may slow down or even prevent joint damage (Christiansen et al., 2015). Patients should discuss this option with their physician to make sure it doesn't interact with any of their medications.

Tai chi and yoga: These movement therapies involve gentle exercises and stretches combined with deep breathing. Many people use these therapies to reduce stress in their lives, though ongoing studies being performed at Tufts medical center in Boston, MA have found that tai chi and yoga may reduce osteoarthritis pain. When led by a knowledgeable instructor, these therapies are safe. Patients should be encouraged to only take these classes under a certified instructor. In fact, many cities provide classes taught specifically for people with chronic pain.

Chiropractic: Although most people think of spinal manipulation when they think of chiropractic, chiropractors can also perform gentle manipulations of the hand, which, according to the American Chiropractic Association, have been shown to decrease hand pain over time. Chiropractors also use modalities such as ultrasound, cold laser, electrical stimulation, and neuromuscular techniques to reduce pain due to arthritis.

Over-the-counter pain creams: Creams and gels available at drugstores, such as Aspercreme, Ben-Gay, and SalonPas, may provide temporary relief from osteoarthritis pain. Some creams numb the pain by creating a hot or cool sensation. Other creams contain medications, such as aspirin-like compounds, that are absorbed into the skin. Gels available to clinicians such as BioFreeze and Sombra also contain menthol which provides temporary relief of joint and muscle pain. Although research doesn't support the efficacy of these creams (Mayo Clinic), many patients state that they feel mild relief when using them.

Post-operative Treatment

In addition to all of the treatment ideas listed above, the therapist will also need to address edema concerns, scar management, and follow a post-operative protocol after joint replacement has taken place. Every surgeon's protocol is slightly different and should be verified with the physician, but two examples of post-operative protocols following LRTI are given below, taken from an excellent reference book for any therapist working with post-operative hand patients, *Rehabilitation of the Hand and Upper Extremity* by Skirven, Osterman, and Fedorcyk.

| | |
|-------------|--|
| 0-4 weeks | - Thumb Spica Cast |
| 4-8 weeks | - Thumb Spica Splint (removed for AROM only) - AROM all except thumb CMC - PROM thumb CMC into abduction and extension |
| week 8 | - Add active thumb abduction, opposition and circumduction - Thenar isometrics (palmar abduction) |
| week 12 | - Non-isometric thumb strengthening (inc pinch) - Splint off light ADLs |
| 13-16 weeks | - Cease Splint - RTW light duties, moderate duties elsewhere |
| 16-24 weeks | - Resume unrestricted ADLs and work |

| Approximate Timetable | Therapeutic Intervention |
|-------------------------------------|--|
| • Postoperative d 1 through wk 4 | <ul style="list-style-type: none"> Apply thumb spica cast Instruct in continuous elevation of upper extremity Perform active range of motion (ROM) to nonimmobilized digits |
| • Postoperative wk 4 through wk 8 | <ul style="list-style-type: none"> Remove cast, fabricate wrist-carpometacarpal (CMC) immobilization splint; to be worn at all times except during exercise Perform active ROM to all joints of the wrist and hand, except the thumb CMC joint Perform passive ROM to the CMC joint; include abduction and extension only Flexion and adduction must be avoided to protect the surgically incised dorsal side of the capsule |
| • Postoperative wk 8 | <ul style="list-style-type: none"> Progress exercise to include active thumb palmar abduction, opposition, and circumduction Perform isometric thenar strengthening in the direction of palmar abduction |
| • Postoperative wk 12 | <ul style="list-style-type: none"> Progress strengthening exercise to include nonisometric thenar abduction and lateral pinch Remove splint for light activities only |
| • Postoperative wk 13 through wk 16 | <ul style="list-style-type: none"> Discontinue wrist-CMC immobilization splint as indicated Continue thenar abduction and key pinch strengthening exercises Return to work with light duty restrictions Engage in moderate functional activities |
| • Postoperative wk 16 through wk 24 | <ul style="list-style-type: none"> Resume vocational or avocational activities |

Conclusion

Therapists have a unique advantage in the treatment of patients with OA, in that we can provide strategies for pain reduction and increased functional use of the hands in both conservative and post-operative management of arthritis. We are the health care providers that spend the most quality time with our patients and we are the providers that combine a thorough knowledge of anatomy and pathology with an appreciation for getting our patients back to their activities of daily living. It is our responsibility to incorporate the latest information into our one-on-one work with our patients to meet their personal goals.

Additional Thoughts & Resources

Banks & Lindau (2013) et al made an excellent point when they concluded “One problem with studying epidemiology of OA of the hand and wrist is the fact that most of the published studies examine radiological data rather than clinical data and do not necessarily include symptomatic individuals. This is due to the fact that radiography is the only diagnostic method we can control. There is no absolute clinical, radiological, or pathological standard against which epidemiological definitions of hand OA can be tested. Further research examining gene–gene and gene–environment interaction (especially looking at hormones, obesity, occupation) studies may give further insights into the pathogenesis of hand OA.”

We cannot assume that just because an x-ray shows joint changes means that the patient is symptomatic or will become symptomatic.

Additional research areas that could potentially change the face of current treatment are exploring the dynamics of OA specifically in women, with subsets in obese vs. normal weight, and by age group. Adaptive equipment needs, ADL demands, and other considerations could be explored by the student or therapist interested in further specializing this type of treatment.

In the meantime, some excellent online resources for therapists and patients include:

American Society for Surgery of the Hand (ASSH): www.assh.org

American Society of Hand Therapists (ASHT): www.asht.org

Arthritis Foundation: www.arthritis.org

E-Hand.Com: www.eatonhand.com

Mayo Clinic: www.mayoclinic.org

National Board for Certification in Occupational Therapy (NBCOT): www.nbcot.org

North Coast: www.northcoastmedical.com

Orthobullets: www.orthobullets.com

World Health Organization: www.who.int

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Osteoarthritis in the Hands: An Introduction to Rehabilitative Evaluation and Treatment

(2.5 CE Hours)

- Also known as bone spurs, these are bony projections that grow in the joint as a result of the degeneration of the cartilage protecting the bones of the joint. They arise from the friction caused by bone rubbing on bone, and are very commonly associated with OA.
 - Bouchard's nodes
 - Heberden's nodes
 - Inflammation
 - Osteophytes
- Examples of hinge joints include all of the below EXCEPT the _____.
 - CMC joint of the thumb
 - DIP joints of the fingers
 - Knee joint
 - PIP joints of the fingers
- Your hand will naturally relax into a _____ at all joints.
 - Close-packed position
 - Loose-packed position
 - Position of full extension
 - Position of full flexion
- The loose-packed position for the CMC joint of the thumb is _____.
 - At full extension
 - At full flexion
 - In full opposition
 - Midway between flexion and extension
- As people age, their risk of developing osteoarthritis increases, with over 90% of those _____ being afflicted.
 - Over 65 years of age
 - Over 70 years of age
 - Over 75 years of age
 - Over 80 years of age
- A large Turkish research study (Kalichman et al.) found that _____ had a higher risk of developing hand OA than their counterparts with normal BMI.
 - Females with obesity (BMI greater than 30 kg/m)
 - Females with severe obesity (BMI greater than 35 kg/m)
 - Males with obesity (BMI greater than 30 kg/m)
 - Males with severe obesity (BMI greater than 35 kg/m)
- Differential diagnoses for PIP and DIP joint arthritis include _____.
 - Acute or recent injury to the joint
 - deQuervain's tenosynovitis
 - FCR tendinitis
 - Fracture on the radial aspect of the wrist
- Per the Eaton-Littler Classification System, treatment recommendations for _____ include NSAIDs and immobilization – splinting the thumb in abduction.
 - Stage I
 - Stage 2
 - Stage 3
 - Stage 4
- Arthroplasties of the PIP joints are more commonly used in _____.
 - The index finger
 - The index and middle fingers
 - The index, middle, and ring fingers
 - The middle, ring, and small fingers
- Typically arthrodesis of the CMC joint is NOT indicated _____.
 - In cases of advanced rheumatoid arthritis
 - If the patient must be able to flatten his/her hand
 - If the patient must be able to use his/her hand for heavy lifting
 - When the joint has been crushed due to traumatic injury

11. True osteoarthritis of the hands does not cause _____; if this symptom is reported during patient interviews, ascertain whether or not the patient has a history of cervical spinal arthritis.
- Crepitus or clicking sensation
 - Difficulties with self care
 - Joint stiffness
 - Numbness and tingling
12. Crepitus is _____.
- A common complaint with arthritis
 - A definitive factor in determining whether or not a joint is painful
 - A definitive factor in determining whether or not a joint will become painful
 - None of the above
13. In contrast to Bouchard's and Heberden's nodes, ganglion cysts _____.
- Always develop slowly, over many months
 - Do not radiate pain to the CMC area
 - Sometimes pop up very quickly
 - Will not move with palpation
14. Considering the IP joints, a normal Total Active Motion (TAM) is _____ degrees of each digit.
- 190-210
 - 220-240
 - 250-270
 - 280-300
15. Depending on the joints involved, _____ are appropriate in circumstances where a patient is avoiding motion due to pain.
- Joint blocking exercises
 - Tendon gliding exercises
 - Both of the above
 - Neither of the above
16. The two primary uses for splinting someone with osteoarthritis are _____.
- To correct mild deformities to reduce pain and improve function; to prevent further deformity.
 - To prevent falls; to enable weight loss
 - To simplify lifting activities; to reduce dependence on adaptive equipment
 - None of the above
17. When teaching a patient how to perform isometric exercises in support of the CMC joint, which of the following does NOT apply?
- Begin with 10-15 repetitions twice per day, work up to 30-40 reps twice per day
 - Discomfort from exercises may take up to 24 hours to subside
 - Perform all exercises at mid-range of the joint
 - Perform all resistance "under the pain" threshold
18. Regarding alternative treatment options, _____ is a nutritional supplement widely used in Europe to treat knee and hip osteoarthritis. It acts as an anti-inflammatory, and some early studies have shown it may slow down or even prevent joint damage (Christiansen et al.).
- Avocado-soybean unsaponifiables
 - Elastogal
 - Glucosamine and chondroitin
 - Sombra

ANSWER SHEET

First Name: _____ Last Name: _____ Date: _____

Address: _____ City: _____

State: _____ ZIP: _____ Country: _____

Phone: _____ Email: _____

NCBOT #: _____

Other: License/certification # and issuing state/organization _____

Clinical Fellow: Supervisor name and NCBOT account # _____

Graduate Student: University name and expected graduation date _____

** See instructions on the cover page to submit your exams and pay for your course.

By submitting this final exam for grading, I hereby certify that I have spent the required time to study this course material and that I have personally completed each module/session of instruction.

Osteoarthritis in the Hands: An Introduction to Rehabilitative Evaluation and Treatment Final Exam

- | | | | | |
|--------------------|--------------------|---------------------|---------------------|---------------------|
| 1. (A) (B) (C) (D) | 5. (A) (B) (C) (D) | 9. (A) (B) (C) (D) | 13. (A) (B) (C) (D) | 17. (A) (B) (C) (D) |
| 2. (A) (B) (C) (D) | 6. (A) (B) (C) (D) | 10. (A) (B) (C) (D) | 14. (A) (B) (C) (D) | 18. (A) (B) (C) (D) |
| 3. (A) (B) (C) (D) | 7. (A) (B) (C) (D) | 11. (A) (B) (C) (D) | 15. (A) (B) (C) (D) | |
| 4. (A) (B) (C) (D) | 8. (A) (B) (C) (D) | 12. (A) (B) (C) (D) | 16. (A) (B) (C) (D) | |

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OSTEOARTHRITIS IN THE HANDS: AN INTRODUCTION TO REHABILITATIVE EVALUATION AND TREATMENT

(2.5 CE HOURS) COURSE EVALUATION

Learner Name: _____ Completion Date: _____

PT PTA OT OTA SLP SLPA Other: _____

| | Disagree | | | | Agree | |
|---|----------|---|---|---|-------|-----|
| | 1 | 2 | 3 | 4 | 5 | |
| Orientation was thorough and clear | 1 | 2 | 3 | 4 | 5 | |
| Instructional personnel disclosures were readily available and clearly stated | 1 | 2 | 3 | 4 | 5 | |
| Learning objectives were clearly stated | 1 | 2 | 3 | 4 | 5 | |
| Completion requirements were clearly stated | 1 | 2 | 3 | 4 | 5 | |
| Content was well-organized | 1 | 2 | 3 | 4 | 5 | |
| Content was informative | 1 | 2 | 3 | 4 | 5 | |
| Content reflected stated learning objectives | 1 | 2 | 3 | 4 | 5 | |
| Exam assessed stated learning objectives | 1 | 2 | 3 | 4 | 5 | |
| Exam was graded promptly | 1 | 2 | 3 | 4 | 5 | |
| Satisfied with learning experience | 1 | 2 | 3 | 4 | 5 | |
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What suggestions do you have to improve this program, if any?

What educational needs do you currently have?

What other courses or topics are of interest to you?
