Chronic Conditions of the Hand and Wrist

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Introduction

Chronic conditions that lead to hand pain are often distressing as they can limit the full range of movement necessary for fine motor tasks [1, 2]. Functional limitations by these conditions can be secondary to structural deficits involved or hindrance by the pain itself. Because hands are required for precise movement and dexterity, they require significant nervous and vascular input to energize a sophisticated system of musculoskeletal units. Therefore, the abundance of anatomical structures located in a confined space like the hand can lead to a host of musculoskeletal conditions that result in deficits in joint movement and chronic pain.

Consequently, the management for these conditions necessitates the appropriate diagnosis as disorders of the hand can involve numerous structures. Diagnosing conditions of the hand is heavily reliant on the history and physical examination to reveal the type and extent of joint, sensory, motor, or other involvements. Imaging may be utilized to exclude pathology from nearby structures. Ultrasonography and magnetic resonance imaging (MRI) are the commonly utilized modalities for soft tissue visualization and x-ray imaging is often used to evaluate for bony deficits.

Joint Diseases

Osteoarthritis (OA)

Pathophysiology: Caused by breakdown of articular cartilage and the underlying bones after chronic mechanical stresses, OA in the hand is largely prevalent in older persons [1–3]. Nodular disease patterns, which include Heberden's nodes in the distal interphalangeal (DIP) joints and less commonly Bouchard's nodes in the proximal interphalangeal (PIP) joints, are resultant of chronic osteophyte organization in and around the articular cartilage. OA in the trapeziometacarpal joint at the thumb base is also commonly involved and may be precipitated in younger persons with focal ligament damage.

Symptoms: Regardless of the location, OA in the hand involves a subacute phase of pain and synovial inflammation. In the chronic phase of nodular disease, joint stiffness, skewed fingertips, and less commonly, pain, develop and produce deficits in fine motor dexterity. In the chronic phase of trapeziometacarpal involvement, thumb deviation, basal joint subluxation, thenar weakness and focal pain may be present, which collectively limit opposition.

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Diagnosis: physical examination and x-ray imaging are paramount in diagnosing OA of the hand.

Treatment: conservative measures; local steroid injections; surgical intervention is rarely warranted [1–4].

Rheumatoid Arthritis (RA)

Pathophysiology: RA is a systemic inflammatory arthopathy with a particular disposition for wrist, metacarpophalangeal (MCP), and proximal interphalangeal (PIP) joints [1, 2, 4, 5]. Synovial inflammation in persons with RA leads to pannus formation and the subsequent destruction of affected joint capsules and ligaments. In the later stages of RA, chronic synovial inflammation in a joint already weakened by articular cartilage destruction and periarticular osteopenia leads to joint deformities. These deformities greatly alter the structural integrity of the joints and extensively disrupt the appropriate joint vectors necessary to mediate movement.

Symptoms: focal tenderness and synovitis of affected joints in the early, middle phases; a host of overt joint irregularities present in latter stages including Swan-neck, Boutonneire, and ulnar deviation of MCP deformities. Swan-neck deformity is characterized by the chronic flexion of the DIP and extension of the PIP, thought to resemble a swan neck. Boutonniere's deformity commonly affects the thumb and is characterized by the chronic flexion of the MCP and extension of the interphalangeal joint. Ulnar deviation of the MCP is characterized by the ulnar displacement of the 2nd through 5th fingers.

Diagnosis: history and physical examination; per the American College of Rheumatology, joint distribution, symptom duration, acute phase reactants, and serological studies; synovial fluid analysis may also be useful to exclude other etiologies [1, 2, 4].

Treatment: conservative management, notably splinting; disease modifying anti-rheumatic drugs, biologic therapies; a more extensive discussion involving RA treatment is located in the RA chapter; severe cases of chronic joint deformities may warrant orthopedic reconstruction.

Tendinopathies

De Quervain's tenosynovitis

Pathophysiology: De Quervain's tenosynovitis is the painful swelling of the first doral compartment of the wrist that occurs secondary to thickening of the extensor pollicis brevis and abductor pollicis longus tendon sheaths as they pass under the overlying extensor retinaculum [1, 2]. Tendon thickening is though to be secondary to repetitive and overexertive radial and ulnar deviating with gripping as with "wringing a towel".

Symptoms: focal tenderness, and sometimes swelling, at or immediately adjacent to radial styloid process; provoked pain with thumb extension or abduction with radial or ulnar deviation of wrist.

Diagnosis: physical examination, provoked pain with Finkelstein's test.

Treatment: conservative; phonophoresis; local anesthetic, steroid injections; surgery in rare settings of nodule formation; surgical release of extensor retinaculum in severe situations.

Trigger finger

Pathophysiology: A trigger finger is a presentation caused by locking or resistance to extension of a flexed finger [1, 2]. This resistance is caused by the lack of smooth movement by thickened flexor digitorum produfus and superficialis tendons through the A1 annular pulley at the MCP joint. Thickening of the flexor digitorum produfus and superficialis tendons can be secondary to friction or tendinosis by way of repetitive DIP and PIP overexertion and overuse. Trigger fingers have also been associated with inflammatory arthropathies like gout and RA.

Symptoms: painless or painful clicking with assisted finger extension; contractures in chronic trigger disease that may be unamenable to assisted finger extension.

Diagnosis: history and physical examination, with appreciable click during assisted extension of affected joint.

Treatment: conservative measures, notably with splinting; surgery in cases of avulsion.

Mallet finger

Pathophysiology: Mallet finger usually presents following disruption of the attachment of the terminal extensor digitorum tendon onto the distal phalanx [1,2,8,9]. Disruptions, usually via tendon rupture or avulsion, commonly follow traumatic injuries.

Symptoms: lack of extensor input in the affected joint results in a DIP with persistent flexion and diminished active extension; commonly painless.

Diagnosis: physical findings; x-ray imaging to exclude distal phalangeal avulsion.

Treatment: conservative measures, notably with splinting; local steroid injections; surgical division of the A1 pulley.

Flexor and extensor tenosynovitis

Pathophysiology: Flexor and extensor tenosynovitis involve the localized inflammation of the tendon-synovium interface in areas of repetitive wrist or finger movements or inflammatory arthropathy [1,2,8,9]. The implicated repetitive hand movements often include playing the piano or excessive typing and the associated inflammatory arthropathies include gout, RA, and septic arthritis.

Symptoms: localized swelling, stiffness, and pain along the course of the affected tendon sheath, notably with movement of affected structures.

Diagnosis: physical examination; ultrasonography may provide confirmational evidence; synovial fluid analysis may be indicated to reveal etiology of disease.

Treatment: conservative approaches; injection of local anesthetic or steroid; steroid injections should be avoided in infectious etiologies or RA associated tenosynovitis where the affected tendons are predisposed to rupture; decompressive surgery in severe circumstances.

Other Disorders

Dupuytren's contracture

Pathophysiology: Dupuytren's contracture is the bilateral fibrosis of subpalmar connective tissues that results in MCP flexion and, in cases of rare and severe progression, PIP flexion [1]. It is associated with European ancestry, strong genetic predisposition, smoking, diabetes; exact pathophysiology remains unknown.

Symptoms: difficulty in flattening affected MCPs and palmar areas resulting in deficits of finger flexion and grip strength; sometimes a palpable cord can be observed; most often painless.

Diagnosis: physical exam, table top test; ultrasonography in uncertain situations.

Treatment: conservative; local steroid injection may reduce nodularity before overt contracture develops; local collagenase injections may prevent contracture formation and improve MCP range of motion; needle aponeurotomy, fasciotomy, fasciectomy interventions are indicated in setting of PIP involvement or severe MCP flexion, but all carry high recurrence rates.

Ganglion Cyst

Pathophysiology: Ganglion cysts are mucin-containing cysts that arise from weakened segments of the adjacent joint capsule or tendon sheaths [1]. Although ganglion cysts in some cases are associated with traumatic injury, they are often idiopathic in nature.

Symptoms: superficial cystic swelling most commonly on the dorsal aspect of the wrist; often painless; large cysts may limit associated joint movement.

Diagnosis: physical findings; x-ray imaging to exclude other etiologies of mass effect; ultrasonography may be warranted in uncommon presentations.

Treatment: conservative measures; high recurrent rates exist with aspiration; surgical excision in refractory cases.

High Yield Points

- Chronic musculoskeletal conditions affecting the hand can affect fine motor dexterity via structural disturbances or pain.
- Different arthropathic diseases produce different manifestations of joint involvement and deformities in the hand, that

can commonly be appreciated on physical examination.
- The varying tendinopathies can be localized and diagnosed by appreciating the motor and joint deficits on physical examination.

Questions

1. A 14 year old patient presents with a painless, well circumscribed cystic mass on the dorsal aspect of the wrist. Following physical examination and x-ray imaging, the diagnosis for a ganglion cyst is confirmed. Which of the following may be appropriate for the initial management of this lesion?
   A. Surgical excision of cyst
   B. Needle aspiration
   C. Conservative measures
   D. B and C
   Answer: D
2. Which of the following scenarios are most likely to result in a mallet finger presentation?
   A. Baseball injury to the fingertips
   B. Dorsal laceration injury along the DIP
   C. Nodular involvement of all 4 DIP joints bilaterally in a patient with OA
   D. A and B
   Answer: D
3. A 44 year old Scandinavian patient presents with bilateral hand deformities. On physical examination, a palpable band can be appreciated at the palmar aspect through the 3rd MCP joint bilaterally. He exhibits mild MCP flexion deformity of 10° bilaterally and no anomalies are appreciated in the PIP joints. Which of the following may be appropriate for the initial management?
   A. Local steroid injections
   B. Fasciotomy
   C. Needle aponeurotomy
   D. Oral prednisone
   Answer: A

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