Boutonnière Deformity of the Finger

Indexing Metadata/Description

› **Title/condition:** Boutonnière Deformity of the Finger
› **Synonyms:** Finger deformity, boutonnière; buttonhole deformity; central slip injury; deformity of the finger, boutonnière; finger deformity, boutonnière
› **Anatomical location/body part affected:** Any of the fingers on either hand might be affected. In the thumb, boutonnière deformity (BD) occurs at the metacarpophalangeal (MCP) joint, whereas in the remaining fingers BD occurs at the proximal interphalangeal (PIP) joint
› **Area(s) of specialty:** Hand Therapy, Orthopedic Rehabilitation
› **Description:** A rupture of the central slip causing a deformity characterized by flexion of the PIP joint and extension or hyperextension of the distal interphalangeal (DIP) joint. In some cases, MCP joint extension might also be present. This is usually a result of trauma or secondary to inflammatory arthritis (e.g., rheumatoid arthritis [RA])
› **ICD-10 codes**
  • M20.021 boutonnière deformity of right finger(s)
  • M20.022 boutonnière deformity of left finger(s)
  • M20.029 boutonnière deformity of unspecified finger(s)

(ICD codes are provided for the reader’s reference, not for billing purposes)
› **Reimbursement:** No specific issues or information regarding reimbursement has been identified
› **Presentation/signs and symptoms**
  • The classic presentation is PIP joint flexion with DIP joint hyperextension. There is damage to the central slip that limits the extensor function of the affected digit

Causes, Pathogenesis, & Risk Factors

› **Causes**
  • Etiology can be nontraumatic or traumatic
  • A common nontraumatic cause of BD is RA. Approximately 50% of individuals with RA will develop a BD

  • Injury to the extensor tendon
  • Traumatic causes of BD include injury to the finger (might be open or closed) and full-thickness burns

› **Pathogenesis:** The progression begins with injury to the central slip, which runs along the dorsum of the digit over the PIP joint and is where the extensor tendon attaches to the middle phalanx. Whether the central slip ruptures, is lacerated, or is avulsed from the base of the middle phalanx, the result is the same. After the central slip injury occurs, the PIP joint “buttonholes” through the defect in the central slip, which causes stretching or tearing of the triangular ligament. This results in the volar migration of the lateral bands, which causes PIP flexion. As a result of the contractures of the ligaments, hyperextension deformity of the joint will be present

› **Risk factors**
  • Injury to the finger, especially the PIP joint
• RA or Dupuytren’s disease
• Infection of the finger

Overall Contraindications/Precautions
› If the deformity is not recognized and addressed early, correcting the deformity becomes more difficult if left untreated for more than 3 weeks\(^1\)
› See specific Contraindications/precautions to examination and Contraindications/precautions under Assessment/Plan of Care

Examination
› Contraindications/precautions to examination: Extreme pain and edema might limit examination in the acute stage. Physician might perform digital block to decrease pain during assessment
› History
  • History of present illness/injury
    – Mechanism of injury or etiology of illness: Direct, forceful flexion or volar dislocation of the PIP joint, resulting in central slip injury.\(^2\) The central slip might also be lacerated in open injury or as a result of an inflammatory disease, such as RA. In Dupuytren’s disease chronic PIP contractures can result in secondary boutonnière deformities
    – Course of treatment
      - Medical management: Variable depending on mechanism of injury and time between injury and presentation
      - Medications for current illness/injury: Patient might be taking analgesics for pain
      - Diagnostic tests completed: X-rays frequently are used to assess for fracture as well as for subluxation of the PIP joint
      - Home remedies/alternative therapies: Document any use of home remedies (e.g., ice or heating pack) or alternative therapies (e.g., acupuncture) and whether they help
      - Previous therapy: Document whether patient has had occupational or physical therapy for this or other conditions and what specific treatments were helpful or not helpful
      – Aggravating/easing factors: Inquire about aggravating or precipitating factors
      – Body chart: Use body chart to document location and nature of symptoms
      – Nature of symptoms: Patients might not present with any visual deformity immediately following injury. These patients might present with pain, edema, and restricted PIP joint ROM. Which digit(s) are involved?
      – Rating of symptoms: Use a visual analog scale (VAS) or 0–10 scale to assess symptoms at their best, at their worst, and at the moment (specifically address if pain is present now and how much)
      – Pattern of symptoms: Document changes in symptoms throughout the day and night, if any (a.m., mid-day, p.m., night); also document changes in symptoms due to weather or other external variables
      – Sleep disturbance: Document number of awakenings/night, if applicable
      – Other symptoms: Document other symptoms patient might be experiencing that could exacerbate the condition and/or symptoms that could be indicative of a need to refer to physician
    – Barriers to learning
      - Are there any barriers to learning? Yes __ No ___
      - If Yes, describe ____________________________
  • Medical history
    – Past medical history
      - Previous history of same/similar diagnosis: Does the patient have RA or any other systemic inflammatory condition?
      - Comorbid diagnoses: Ask patient about other problems, including diabetes, cancer, heart disease, complications of pregnancy, psychiatric disorders, and orthopedic disorders
      - Medications previously prescribed: Obtain a comprehensive list of medications prescribed and/or being taken (including OTC drugs)
      - Other symptoms: Ask patient about other symptoms he or she might be experiencing
  • Social/occupational history
    – Patient’s goals: Document what the patient hopes to accomplish with therapy and in general
    – Vocation/avocation and associated repetitive behaviors, if any: Does the patient participate in recreational or competitive sports? Does the patient engage in hand-intensive activities (e.g., knitting, crocheting)?
Functional limitations/assistance with ADLs/adaptive equipment: Function might be limited, especially if the deformity is in the dominant hand. Does the patient use any adaptive equipment? Does the patient use any ambulation aids in the affected hand?

Living environment: Stairs, number of floors in home, with whom patient lives, caregivers, etc. Identify if there are barriers to independence in the home; any modifications necessary?

Relevant tests and measures: (While tests and measures are listed in alphabetical order, sequencing should be appropriate to patient medical condition, functional status, and setting)

- **Joint integrity and mobility:** PIP joint dislocation might occur. In patients with RA, assess for other deformities of the hand
- **Muscle strength:** Assess grip and pinch strength using dynamometer and pinch meter; compare to contralateral hand. Strength testing might be contraindicated in acute BD
- **Observation/inspection/palpation (including skin assessment)**
  - Following a traumatic injury to the finger, significant edema, increased at the PIP joint, might be present. Edema can be assessed using volumetric or circumferential measurements. Compare to contralateral hand
  - Assess for signs of infection (e.g., erythema, warmth, discharge, odor) in open injury cases. Monitor for appropriate wound healing
  - Observe for visual BD: PIP flexion, DIP hyperextension. MCP joint extension might be noted in some cases
  - Palpate for tenderness (and quantify using VAS) at the PIP joint. Palpate for tenderness of the dorsal surface of the middle phalanx at the insertion of the central slip. Palpate ulnar and radial aspects of the digit for lateral band tenderness
  - Patients with a central slip injury will exhibit significant tenderness over the dorsum of the PIP joint. (1)
  - Assess for MCP joint and DIP joint abnormality as well
- **Range of motion:** Determine active and passive ROM using goniometry. Initially, some ability to actively extend the PIP joint might be noted due to intact lateral bands, but in later stages of the deformity the patient might not be able to do so. (6) Assessing ROM in the involved PIP joint(s) might be contraindicated in acute BD
- **Self-care/activities of daily living:** Assess self-care deficits by patient report or demonstration
- **Special tests specific to diagnosis**
  - Central slip tenodesis test, introduced by Smith and Ross. This test involves placing a finger on the dorsum of the proximal phalanx and exerting a gentle force, flexing the MCP joint. In a finger with an intact central slip, passive extension of the PIP joint occurs by tenodesis effect. A positive indication of a central slip injury is an extensor lag of the PIP joint when the test is performed (2)

Assessment/Plan of Care

- **Contraindications/precautions**
  - Clinicians should follow the guidelines of their clinic/hospital and what is ordered by the patient’s physician. The summary presented below is meant to serve as a guide, not to replace orders from a physician or a clinic’s specific protocols
  - **Cryotherapy** contraindications (2)
    - Raynaud’s syndrome
    - Cryoglobulinemia
    - Cold urticaria
    - Paroxysmal cold hemoglobinuria
    - Impaired circulation
    - Cold intolerance
    - Over area of peripheral vascular disease
  - **Cryotherapy** precautions (2)
    - Hypertension
    - Thermoregulatory disorders
    - Over an open wound
    - Over superficial nerves for extended periods
    - Very young or very old
    - Poor cognition
    - Personal aversion to cold
• **Thermotherapy** contraindications
  - Decreased circulation
  - Decreased sensation
  - Acute/subacute traumatic and inflammatory conditions
  - Skin infections
  - Impaired cognition or language barrier
  - Malignant tumors
  - Tendency for hemorrhage or edema
  - Heat rubs

  › **Diagnosis/need for treatment:** Traumatic injury to the finger, pain and/or edema of the PIP joint, visible BD

  › **Rule out**
    - Pseudo-boutonnière
    - PIP dislocation
    - Avulsion fracture
    - Fracture of the proximal or middle phalanx
    - PIP joint sprain

  › **Prognosis:** Early recognition and treatment of BD results in a more favorable outcome. Acute and chronic cases usually are treated successfully with splinting or serial casting coupled with an exercise program

  › **Referral to other disciplines:** Hand surgeon to determine if surgical intervention is necessary (open injuries, fixed deformities) if referral from primary care or self-referral

  › **Treatment summary:** Splinting and therapeutic exercises are the mainstays of physical or occupational therapy intervention for BD. The goals of therapy are to prevent progression of the deformity in acute cases and to reduce the severity of deformity in more chronic cases. Generally, closed ruptures of the central slip and BD resulting from RA can be treated with physical or occupational therapy. For open injuries (such as laceration of the central slip) and large avulsions of the middle phalanx insertion, surgical repair is required

• Splinting of the PIP joint in extension with the MCP and DIP joints free is appropriate for BD. DIP flexion is encouraged to facilitate centralization of sagittal bands

• The use of a functional thumb orthosis with type I BD (MCP flexion with DIP hyperextension) and type II BD (MCP flexion and adduction with DIP hyperextension) of the thumb in patients with RA might be effective in relieving pain

  – Based on an RCT conducted by researchers from Brazil
  – Forty subjects in whom type I or II boutonnière thumb deformity on the dominant side was diagnosed were included in the study
  – Participants were randomly assigned to an intervention group that used an orthosis daily or a control group that wore an orthosis only during evaluations
  – Subjects were evaluated at baseline, then at 45 and 90 days
  – Tests performed included a VAS for thumb pain, the O’Connor Dexterity Test, Jamar dynamometer, pinch gauge, goniometry, and the Health Assessment Questionnaire
  – VAS pain scores for those in the intervention group were significantly lower in comparison to those in the control group, which saw no change at evaluation times
  – Eighty-five percent and 75% of those in the intervention group rated their results as “better” or “much better” at 45 and 90 days, respectively
  – No statistically significant decrease in strength was observed in the group wearing the thumb orthosis

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<tr>
<th>Problem</th>
<th>Goal</th>
<th>Intervention</th>
<th>Expected Progression</th>
<th>Home Program</th>
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<td>Pain and edema</td>
<td>Eliminate/decrease pain and edema</td>
<td><strong>Edema control</strong></td>
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<td>Use of self-adherent wrap to provide compression</td>
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<td>Retrograde massage</td>
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<td>Cryotherapy/contrast bath</td>
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<td>Elevate extremity</td>
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<td><strong>N/A</strong></td>
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<td>Patient education for pain and edema management</td>
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<td>Reduced MCP, PIP, DIP joint ROM/joint contracture</td>
<td>Improve ROM</td>
<td>Splinting</td>
<td>Therapeutic exercises</td>
<td>Manual therapy</td>
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<td>Improve ROM</td>
<td>The PIP joint should be splinted in full extension with a dorsal padded aluminum splint. Alternatively, thermoplastic figure -8 or “clamshell” style orthoses can be fabricated. The MCP and DIP joint should be left free for active and passive ROM exercises. Continuous splinting for 6 weeks followed by a few more weeks of night splinting or until full active PIP extension and DIP flexion are achieved (1)</td>
<td>After several weeks of constant splinting, PIP joint flexion activities might be introduced gradually. Extension splinting might be continued at night</td>
<td>Passive PIP joint extension stretching to achieve full extension ROM and prevent contracture of the PIP joint</td>
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<td>Impaired hand function/decreased grip and pinch</td>
<td>Restore normal hand function</td>
<td>Functional training</td>
<td>After full PIP joint extension ROM is achieved, grip strengthening, dexterity, and other functional training activities might be initiated to help restore full hand function</td>
<td>Massage might be used to prevent tendon adherence and lateral band adherence</td>
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Desired Outcomes/Outcome Measures
› Eliminated/decreased pain
  • VAS
› Eliminated/decreased edema
  • Volumetric/circumferential measurements
› Improved ROM
  • Goniometric measurements
› Restored normal hand function
  • Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH) (written or verbal version)\(^2\)
› Improved strength
  • Manual muscle testing (MMT)
  • Dynamometer (grip strength)
  • Pinch meter (pinch strength)

Maintenance or Prevention
› Early diagnosis and treatment in acute cases help to prevent severe deformity. Night splinting or intermittent daytime splinting might help maintain ROM

Patient Education

Note
› Recent review of the literature has found no updated research evidence on this topic since previous publication on January 4, 2019

Coding Matrix

References