Proximal Interphalangeal Joint: Flexion Contracture

Indexing Metadata/Description

- **Title/condition:** Proximal Interphalangeal Joint: Flexion Contracture
- **Synonyms:** Flexion contracture: proximal interphalangeal joint; contracture, flexion: proximal interphalangeal joint; interphalangeal joint, proximal: flexion contracture
- **Anatomical location/body part affected:** Proximal interphalangeal (PIP) joint, volar plate, collateral ligaments, flexor and extensor tendons of the digit, proximal and middle phalanges
- **Area(s) of specialty:** Hand Therapy, Orthopedic Rehabilitation
- **Description:** The PIP joint is a simple hinge joint with a total arc of motion of ~90° to 100°. The joint is most stable in full extension. As the PIP joint flexes, stability is maintained primarily by volar capsuloligamentous structures such as the proper and accessory collateral ligaments, retinacular ligaments as well as extensor and flexor tendons. The volar plate is the primary passive restraint against PIP joint hyperextension. The collateral ligaments provide lateral stability against radial or ulnar stress. The accessory collateral ligaments are slack during full flexion, increasing the risk of fibrosis when the joint is immobilized in full flexion. The proper collateral ligament remains taut throughout the PIP joint arc of motion. The dorsal support to the PIP joint is comparatively weak. The superficial central slip and lateral bands of the extensor expansion reinforce a flexible joint capsule that is susceptible to injury. Transverse retinacular ligaments connect the extensor and flexor tendon sheaths.
- **ICD-9 codes**
  - 718.44 contracture of hand joint: carpus, metacarpus, phalanges (fingers)
- **ICD-10 codes**
  - M20.0 deformity of finger(s)
  - M24.5 contracture of joint
- **G-Codes**
  - **Carrying, Moving & Handling Objects G-code set**
    - G8984, Carrying, moving & handling objects functional limitation, current status, at therapy episode outset and at reporting intervals
    - G8985, Carrying, moving & handling objects functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
    - G8986, Carrying, moving & handling objects functional limitation, discharge status, at discharge from therapy or to end reporting
  - **Self Care G-code set**
    - G8987, Self care functional limitation, current status, at therapy episode outset and at reporting intervals
    - G8988, Self care functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
    - G8989, Self care functional limitation, discharge status, at discharge from therapy or to end reporting
  - **Other PT/OT Primary G-code set**
    - G8990, Other physical or occupational primary functional limitation, current status, at therapy episode outset and at reporting intervals
–G8991, Other physical or occupational primary functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
–G8992, Other physical or occupational primary functional limitation, discharge status, at discharge from therapy or to end reporting

• Other PT/OT Subsequent G-code set
–G8993, Other physical or occupational subsequent functional limitation, current status, at therapy episode outset and at reporting intervals
–G8994, Other physical or occupational subsequent functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
–G8995, Other physical or occupational subsequent functional limitation, discharge status, at discharge from therapy or to end reporting

<table>
<thead>
<tr>
<th>G-code Modifier</th>
<th>Impairment Limitation Restriction</th>
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<tbody>
<tr>
<td>CH</td>
<td>0 percent impaired, limited or restricted</td>
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<tr>
<td>CI</td>
<td>At least 1 percent but less than 20 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CJ</td>
<td>At least 20 percent but less than 40 percent impaired, limited or restricted</td>
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<tr>
<td>CK</td>
<td>At least 40 percent but less than 60 percent impaired, limited or restricted</td>
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<tr>
<td>CL</td>
<td>At least 60 percent but less than 80 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CM</td>
<td>At least 80 percent but less than 100 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CN</td>
<td>100 percent impaired, limited or restricted</td>
</tr>
</tbody>
</table>


› Reimbursement: No specific issues or information regarding reimbursement have been identified

› Presentation/signs and symptoms
  • Patients often present following a traumatic injury to the hand/finger or postoperatively
  • There may be significant edema of the digit, with pain and tenderness of the volar aspect of the PIP joint as well as one or both of the collateral ligaments
  • The patient will present with an inability to fully extend the PIP joint
  • Impaired ability to complete ADLs is likely

Causes, Pathogenesis, & Risk Factors

› Causes
  • PIP joint flexion contracture often occurs as a result of trauma to the joint/hand (e.g., fracture, burn, crush, laceration)
  • PIP joint flexion contracture is also a common postoperative complication of surgeries, such as fixation of a fracture or tendon repair
  • Prolonged immobilization, especially with inappropriate (i.e., PIP flexion when it is not clinically indicated) positioning
  • Dupuytren’s disease often leads to PIP joint flexion contractures; please see Clinical Review…Dupuytren’s Contracture; CINAHL Topic ID Number: T708625 and Clinical Review…Dupuytren’s Contracture: Occupational Therapy; CINAHL Topic ID Number: T709225 for more information on this specific condition
  • Flexion contracture secondary to stenosing tenosynovitis (i.e., trigger finger); please see Clinical Review…Finger Flexor Tendon: Conservative Treatment; CINAHL Topic ID Number: T904510 for more information on this specific condition

› Pathogenesis
  • In cases of trauma, edema and hemorrhage expand the soft tissue and distend the capsule, resulting in tightening of the ligaments and damage to the volar plate and the collateral ligaments, causing a flexed posture of the PIP joint. If the joint is
allowed to maintain a flexed posture, shortening, adhesions, and fibrosis of the periarticular structures occur and the tissue loses its ability to glide. Gradually, more adhesions develop, resulting in a stiff flexion contracture of the PIP joint and secondary skin contraction\(^{(14)}\)

- In cases of prolonged immobilization (especially in an anatomically incorrect position), capsular and ligamentous contractures may develop, resulting in PIP joint contracture\(^{(5)}\)

Risk factors
- Individuals participating in occupational or leisure activities requiring the use of machines, tools, fire/hot objects, or other sharp and potentially hazardous equipment are at increased risk of injury to the hand, which may in turn result in a PIP joint contracture
- Individuals participating in sports, especially contact sports, may also be at increased risk for injury to the hand/PIP joint
- Risk of PIP joint stiffness is proportional to the degree of soft tissue injury. Crush injury is associated with poorer outcomes\(^{(14)}\)

Overall Contraindications/Precautions
- Patients with injuries to the hand and finger should only be immobilized if necessary/ordered by physician (excessive joint inflammation, joint instability, fracture). If immobilized, appropriate positioning should be ensured, and, if possible, early active range of motion (AROM) exercises should be initiated to combat joint stiffness
- Obtain all physician reports related to the condition and note any contraindications/precautions/specific treatment orders
- See specific Contraindications/precautions under Assessment/Plan of Care

Examination
- History
  - History of present illness/injury
    - Mechanism of injury or etiology of illness: Patients typically report after trauma or surgery to the affected digit. They are unable to fully extend the PIP joint, and often have difficulty opening their hand enough to grasp large objects. Identify if any other injuries (e.g., fracture, tendon rupture, burn) are present
    - Course of treatment
      - Medical management: May have already received physical/occupational therapy and splint/orthosis application; ultimately surgery may be indicated\(^{(1)}\)
      - Surgery may be indicated when the deformity is interfering with hand function or limits ability to complete ADLs. The most common surgical interventions are percutaneous release; open surgical release; sequential release of the capsule, volar plate, collateral ligaments, and other joint structures; checkrein ligament release; total collateral ligament excision; and distraction correction of joint contracture with external fixation\(^{(14)}\)
      - Arthroplasty of the PIP joint may be indicated when symptoms are not responding to conservative treatment interventions\(^{(13)}\)
      - Medications for current illness/injury: Ask patient what medications he or she is taking, including over-the-counter medications. Medications commonly used for this condition include acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs)
  - Diagnostic tests completed
    - The diagnosis is usually based on clinical examination. However, x-ray and MRI can be used to identify other pathologies and to help determine the contributing factors of the contracture. These tests may also be used to monitor the healing of other injuries, such as fracture
    - In cases of idiopathic trigger finger with flexion contracture, ultrasound evaluation may be utilized to assess the pulleys and flexor tendon(s) of the affected digits\(^{(16)}\)
  - Home remedies/alternative therapies: Document any use of home remedies (e.g., ice or heating pack) or alternative therapies (e.g., acupuncture) and whether or not 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 (and length of time each item is performed before the symptoms come on or are eased): Document any noted aggravating or easing factors
  - Body chart: Use body chart to document location and nature of symptoms
- Nature of symptoms: Document nature of symptoms (e.g., constant vs. intermittent, sharp, dull, aching, burning, numbness, tingling). Pain, swelling, and tenderness are often present both post trauma and postoperatively.
- 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). Patients may have significant posttraumatic or postoperative pain, and may also have significant pain with passive ROM (PROM) during treatment sessions or when completing home exercises. Patient should be cautioned to respect pain and decrease intensity of exercises if he/she has pain lasting longer than 20-30 minutes following exercises.
- 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 wakings/night related to the condition.
- Other symptoms: Document other symptoms patient may be experiencing that could exacerbate the condition and/or symptoms that could be indicative of a need to refer to physician (e.g., significant edema, signs of circulatory impairment).
- 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 a history of hand trauma?
    - Comorbid diagnoses: Ask patient about other problems, including diabetes, cancer, heart disease, complications of pregnancy, psychiatric disorders, orthopedic disorders, etc.
    - Medications previously prescribed: Obtain a comprehensive list of medications prescribed and/or being taken (including over-the-counter drugs).
  - Other symptoms: Ask patient about other symptoms he or she may 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 contact sports? What is the patient’s occupation? What are the job requirements? Does the patient engage in “hand intensive” avocational activities (e.g., gaming, knitting)? Does the patient attend school? If so, grade level?
  - Functional limitations/assistance with ADLs/adaptive equipment: What is the patient’s hand dominance? Is the patient having difficulty with ADLs or functional tasks because of the condition? Does the patient use any assistive or adaptive devices? Is the patient having difficulty with these devices due to the contracture? Does the patient drive?
  - 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.) Complete a general exam as indicated with a focus on the items listed below; modify evaluation as indicated according to underlying condition and physician orders.
  • Arousal, attention, cognition (including memory, problem solving)
    - Assess ability to follow commands. Is the patient alert and oriented x 4?
  • Assistive and adaptive devices: Assess ability to use assistive/adaptive devices if indicated.
  • Circulation: Distal pulses should be normal, but in hand trauma, digital artery damage may have occurred. Take note of increased pallor, bluish color to the finger(s), or coolness of the finger. Capillary refill may also be assessed.
  • Cranial/peripheral nerve integrity: The dermatome scan should be performed thoroughly. Digital nerve injury is common in severe hand trauma, and loss of sensation to the digit may be noted. Assess temperature, light touch (e.g., Semmes-Weinstein monofilament testing), two-point discrimination (static and moving as appropriate), sharp/dull, etc.
  • Edema: There may be significant edema resulting from trauma or surgery that encompasses the digit or the entire hand, depending on the extent of damage. Circumferential or volumetric measurement should be obtained for areas with edema. A comparison to the contralateral hand should be made.
  • Joint integrity and mobility: Assess for instability of the joint (i.e., damage to collateral ligaments). Also, determine if there are any deformities present (i.e., boutonniere deformity-central slip injury).
  • Muscle strength: Dynamometer and pinch gauge testing for grip/pinch strength should be performed, as well as manual muscle testing of the intrinsic (hypothenar, thenar, lumbrical and interossei muscles) and extrinsic muscles of the hand. Compare to contralateral side. In cases in which fracture, tendon injury, or open wounds exist, strength testing should be delayed until appropriate and safe (physician orders permit).
• **Observation/inspection/palpation (including skin assessment):** If there has been trauma or damage to the hand, assess the extent of surrounding soft tissue injury. Assess the surgical incision (which may be an extension of a traumatic laceration) for intact sutures, signs of infection (e.g., erythema, warmth, inappropriate drainage, odor), and appropriate healing

• **Palpation**
  – Tenderness of the volar aspect of the PIP joint is common. Assess for pitting edema, wound drainage, signs of infection, and other signs/symptoms in posttraumatic and postoperative patients

• **Posture:** Assess that wrist, MCP joints, PIP joints and distal interphalangeal (DIP) joints are positioned correctly in any splints that are to be applied. This may vary depending on surgeon preference and if other injuries are present

• **Range of motion:** Measure AROM and PROM of the PIP joint, both in flexion and extension (unless contraindicated due to the nature of the injury) using goniometry. Also, take note of deficits involving the rest of the hand, including presence of normal tenodesis (when the wrist extends, the fingers passively flex). Complete a gross assessment of the entire upper extremity and compare to the unaffected side

• **Reflex testing:** Assess reflexes as indicated

• **Self-care/activities of daily living:** Observe ADLs as indicated. Use formal assessments if significant deficits are reported or observed

• **Special tests specific to diagnosis:**
  – QuickDASH[^17]
    - An 11 item self-report tool used “to measure physical function and symptoms in people with any or multiple musculoskeletal disorders of the upper limb”

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**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[^6]
  – Raynaud’s syndrome
  – Cryoglobulinemia
  – Cold urticaria
  – Paroxysmal cold hemoglobinuria
  – Impaired circulation

• **Cryotherapy** precautions[^6]
  – Hypertension – cold can lead to an increase in blood pressure
  – Hypersensitivity to cold
  – Avoid aggressive treatment with cold modalities over an acute wound
  – Avoid placement over superficial nerves for extended periods (> 1 hour)
  – Cold may be counterproductive if being used to facilitate muscle relaxation and reduce pain in patients who do not tolerate the modality

• **Thermotherapy** contraindications[^6]
  – 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

• **Therapeutic ultrasound** contraindications; do not use[^6]
  – in an area with infection or bleeding
  – if a tumor or malignancy is present in the area
  – in the area of a deep vein thrombosis (DVT) or thrombophlebitis
  – over epiphyseal plates
• **Therapeutic ultrasound precautions**
  - Sensory deficits
  - Individuals that cannot communicate effectively (e.g., impaired cognition, language barrier)
  - Circulatory impairments
  - Plastic or metal implants
  - Note: Always decrease ultrasound intensity if the patient complains of discomfort

**Diagnosis/need for treatment:** Pain, tenderness, and edema in the hand/digit; PIP joint ROM deficits in extension; functional disability from loss of ROM

**Rule out**
- Boutonniere deformity
- Extensor tendon rupture
- Phalangeal fracture

**Prognosis**
- In a nonrandomized study conducted in the United Kingdom, 69% of patients treated with exercise only or exercise, splinting, and/or ultrasound responded to the conservative intervention within 10 sessions and no longer required intervention

- In a survey of hand therapists, it was reported that PIP joint flexion contracture was common to treat, but was fairly uncommon upon discharge

- Surgical intervention for PIP joint flexion contracture is complex, and its results unpredictable

- Most patients can tolerate a 15° to 20° PIP flexion contracture and experience no functional impairments or disabilities

**Referral to other disciplines**
- Occupational therapist for ADL deficits or orthosis application/fabrication
- Hand therapist
- Back to physician if infection or other pathology is suspected, as well as for lack of progress. Usually, 1 month is long enough to note measurable progress

**Other considerations**
- Spanish researchers evaluated short-term clinical outcomes following a silicone PIP joint implant in arthritic patients who did not respond to conservative treatment

  - In a review of 36 proximal PIP joints that were replaced with Avanta silicone implants with a volar approach in 26 patients, pain relief was greatly reduced in all patients, with a mean reduction of ~ 7 points
  - Total ROM increased from 35° to 72°
  - Patient satisfaction averaged 4.8 on a 5-point Likert scale
  - The median final score on the QuickDASH was 7
  - Average coronal deformity decreased from 12° to 4° and average flexion contracture decreased from 18° to 0°
  - No revision surgeries were required and only 2 implant fractures occurred by 2 years post surgery

**Treatment summary**
- Orthosis fabrication/splinting and therapeutic exercise are the primary therapy interventions indicated for this condition, but to date there is no consensus on the best overall treatment intervention. Rehabilitation protocols and the nature of the injury vary greatly making it difficult to directly compare interventions

- Equipment to control edema is also commonly prescribed, for example: Coban, neoprene sleeves, digit caps, JOBST compression gloves

- Manual therapy, along with moist heat and ultrasound, may also be used in conjunction with orthoses and exercise

- Individuals who fail to achieve sufficient improvement with therapy may opt to undergo surgery to address the PIP joint flexion contracture

- Orthosis use/splinting
  - At this time, not enough evidence exists to allow for recommendations on the most effective type of orthosis. Other existing pathologies and injuries to the finger should be taken into account when selecting a type of orthosis to fabricate/use
  - A treatment protocol consisting of daytime dynamic extension splinting and night time static progressive splinting may be as effective as other treatment protocols

The results of a single blind randomized controlled clinical trial conducted in Australia showed a significant improvement in PIP extension for both the control group and experimental group, but significantly greater improvement in the experimental group. Control group therapy consisted of paraffin wax thermotherapy followed by A/PROM, and US (frequency of visits was not reported). The experimental group intervention was static progressive night extension splinting (adjusted weekly) and dynamic extension splint use at least 6 continuous hours/day with removal for ADLs. Treatment was provided for 3 months. Improvements in QuickDASH scores were reported for both groups but were not significantly different pre and post intervention or between groups. The patient should be instructed to remove the orthosis frequently to check for areas of redness or irritation. If any part of the orthosis is irritating the skin or is too tight, the therapist should modify the orthosis immediately (e.g., padding, widening of the orthosis). There is an association between time in the orthosis and final PIP joint extension ROM. Generally, the more time the patient spends wearing the orthosis, the greater the improvement in extension ROM. Dynamic orthoses
- This type of orthosis is usually custom fabricated for the patient. The orthosis holds the PIP joint in extension, but allows the patient to actively flex the PIP joint and the surrounding joints. The Capener splint is an example of a dynamic orthosis.
- Prefabricated dynamic PIP joint splints are available (e.g., LMB splint, Dynasplint Systems).
- A hand-based outrigger orthosis may also be used to create dynamic traction that extends the PIP joint passively, while allowing AROM into flexion. This type of orthosis may be worn 8-12 hours a day, and can be worn during functional activities requiring use of the affected hand. Studies have suggested that dynamic orthoses may be more effective than the other types.

Authors of a prospective cohort study conducted in Australia found that the duration of dynamic orthotic use (weeks of treatment) for a stiff PIP joint is significantly associated with the extent of contracture resolution. A total of 41 patients with a deficit in either extension or flexion of the PIP participated. A total of 48 joints were treated. The relationship between contracture resolution and number of weeks of treatment with a dynamic orthosis was examined, controlling for baseline ROM, weekly total end range time, pretreatment joint stiffness, time since injury, and diagnosis. ROM increased in a linear fashion. Slower recovery of ROM and longer duration of orthotic use were observed when treatment was aimed at improving extension than when it was aimed at improving flexion. Flexion gains were maximized at about 12 weeks. Extension gains continued past 17 weeks.

Serial static/static progressive splinting
- Volar gutter orthoses may be employed to immobilize the PIP joint and facilitate gradual extension of the joint. These may be prefabricated or custom fabricated. Custom-fabricated orthoses are more advantageous, as they can be modified as ROM improves, and the straps can be placed to emphasize appropriate torque on the PIP joint. The patient should be instructed to wear this type of orthosis for 8-12 hours per day. The amount of increase of PROM is thought to be proportional to the amount of time the joint is held at its end range (“total end range time”).
- The application of low load prolonged stress is thought to direct remodeling of connective tissue during healing.
- Pre-fabricated static progressive orthoses are available (e.g., JAS EZ-finger, Joint Jack).
- Joint-jack splint
- This splint can be adjusted by the patient. The splint uses a screw on the volar side of the splint that produces tension to pull the PIP joint into extension. The splint should be worn for 30 minutes to an hour several times throughout the day. The patient should be instructed to adjust the screw as needed to provide an adequate stretch to the PIP joint.
| Pain, tenderness, and edema | Eliminate/decrease pain, tenderness, and edema | **Edema management** | N/A | Patient education for pain management (ice pack/heat pack as indicated and appropriate), independent home program and compliance with orthosis use and wrapping
Written and verbal instruction should be provided |

The reduction of edema in the affected joint should be one of the first goals of treatment. Coban wrap, neoprene sleeves, digit caps, JOBST compression gloves, and other similar products may be used to control edema.

Retrograde massage of the wrist, hand, and fingers can be incorporated into as well. Patient education to maintain elevation in the acute phase post trauma and/or postoperatively is also important.

AROM exercises should begin as early as possible to reduce edema, and also to help prevent progression of joint stiffness\(^8\).

**Other therapeutic strategies**

Ice to reduce pain, swelling, and edema after therapy sessions and as needed.

Trial of low-intensity pulsed ultrasound (dose 0.10-0.15 Watts/second) for edema management may be employed\(^2\).

Wound care: Following open injuries to the finger or hand, the patient may require dressing changes, and, in some cases, may require debridement of the wound. As with orthosis use, close communication with the surgeon/physician is required when selecting the type of dressing to be used.

Scar management: In cases of trauma resulting in open wounds or in surgical cases, scar massage should be performed once adequate wound healing is achieved. Increased scar thickness can result in adhesions that can limit ROM of the PIP joint\(^{12}\).
| Reduced PIP joint ROM | Improve ROM of the PIP joint and other joints found deficient | **Prescription, application of devices and equipment**  
Please see *Treatment summary*, above, for recommendations around splinting | Therapeutic strategies should progress as appropriate until functional ROM is restored | A written explanation of appropriate home exercises for daily use should be provided |
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<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Manual therapy</strong></td>
<td><strong>Therapeutic exercises</strong></td>
<td></td>
</tr>
</tbody>
</table>
|                       |                                                               | Joint mobilizations and PROM of the PIP joint, as indicated to normalize arthrokinematics and increase ROM\(^{(12)}\) | Stretching exercises:  
G gentle, passive stretching of the PIP joint to help restore extension.\(^{(12)}\) Care should be taken to avoid being overly aggressive, which may result in increased pain, edema, and inflammation |                                                                                 |
<table>
<thead>
<tr>
<th>Reduced grip/pinch strength</th>
<th>Increase grip/pinch strength</th>
<th>Therapeutic exercises</th>
<th>Strengthening should begin with AROM of the affected digit, followed by gentle manual resistance and progressing to grip strengthening activities, including Theraputty, clothespins, dynagrips, FlexiGrips, and other hand-strengthening equipment</th>
</tr>
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<tbody>
<tr>
<td>AROM exercises: Nerve and tendon gliding (straight hand, hook fist, full fist, tabletop, and straight fist) may also be incorporated (10) using 3 sets of 15 to 25 repetitions</td>
<td>Blocking exercises of the PIP (and DIP) joints should be performed, (10) with an emphasis on achieving maximal extension of the PIP joint with each repetition</td>
<td>These exercises should be performed in a pain-free range and progressed slowly to the patient’s tolerance</td>
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<tr>
<td>Adequate support to the proximal joint is necessary to allow for isolated flexion and extension of the joint. These exercises may be performed in 3 sets of 15 to 25</td>
<td>Wrist strengthening exercises to increase wrist flexion and extension, and forearm pronation and supination, should be initiated once healing occurs. Strengthening should begin with AROM, progressing to resistive exercises using dumbbells and weighted sticks (10)</td>
<td>These exercises should be performed in a pain-free range and progressed slowly to the patient’s tolerance. Each exercise may be performed in 3 sets of 15 repetitions</td>
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<tr>
<td>Progressive resistive exercises using therapy putty, hand helper exercisers, graded resistance hand grips can be initiated when cleared by physician</td>
<td>Coexisting injuries to the hand/finger should be considered when choosing which strengthening exercises, if any, may be appropriate</td>
<td>Provide patient and family/caregivers with written instructions regarding exercises that can be performed at home</td>
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</table>

Provide patient and family/caregivers with written instructions regarding exercises that can be performed at home.
Restrictions in daily/occupational activities and/or sport(s)

<table>
<thead>
<tr>
<th>Restore prior functional capacity in daily/occupational activities and/or sport(s)</th>
<th><strong>Functional training</strong></th>
<th>Progress each unique patient as appropriate and indicated</th>
<th>Provide patient and family/caregivers with written instructions regarding functional activities that can be performed at home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional strengthening for upper-extremity movements in daily activities may be incorporated&lt;sup&gt;10&lt;/sup&gt;</td>
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</table>

**At risk for reinjury**

<table>
<thead>
<tr>
<th>Patient education for prevention of reinjury; home exercise program</th>
<th><strong>Patient education</strong></th>
<th>N/A</th>
<th>Written instructions should be provided for the patient and/or caregiver(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient may be provided with information on how to avoid reinjury and should be educated on the importance of exercise compliance</td>
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</tbody>
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**Desired Outcomes/Outcome Measures**

› Desired outcomes
  • Eliminated/decreased pain and tenderness
    ‒ VAS
  • Decreased edema
    ‒ Circumferential measurements
    ‒ Volumetric measurements
  • Improved ROM of the PIP joint and other joints found deficient
    ‒ Goniometric measurements
  • Increased grip/pinch strength
    ‒ Dynamometer
    ‒ Pinch meter
  • Restored prior functional capacity in daily/occupational activities and/or sport(s)
    ‒ QuickDASH

**Maintenance or Prevention**

› Patients may need to continue to wear the orthosis intermittently for a period of time after achieving improved extension to maintain ROM. Additionally, AROM and strengthening activities should be continued in a home exercise program. Injuries to the hand that may result in PIP joint flexion contracture may be prevented through use of appropriate safety equipment in occupations and sports in which hand injury is likely

› In general, immobilization for more than 3 to 4 weeks following a dislocation of the PIP joint should be avoided in order to prevent joint stiffness and PIP flexion contracture. Early supervised AROM is recommended. Edema should be managed with elastic tape (Coban) or a pressure garment to further control loss of ROM and joint stiffness<sup>15</sup>

**Note**

› Recent review of the literature has found no updated research evidence on this topic since previous publication on January 22, 2016
Coding Matrix

References are rated using the following codes, listed in order of strength:

- **M** Published meta-analysis
- **SR** Published systematic or integrative literature review
- **RCT** Published research (randomized controlled trial)
- **R** Published research (not randomized controlled trial)
- **C** Case histories, case studies
- **G** Published guidelines
- **RV** Published review of the literature
- **RU** Published research utilization report
- **QI** Published quality improvement report
- **L** Legislation
- **PGR** Published government report
- **PFR** Published funded report
- **PP** Policies, procedures, protocols
- **X** Practice exemplars, stories, opinions
- **GI** General or background information/texts/reports
- **U** Unpublished research, reviews, poster presentations or other such materials
- **CP** Conference proceedings, abstracts, presentation

References