

Rock Climbing: Treating Common Wrist and Finger Injuries and Integrating Medical Philosophies, Part One

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Rock climbing is a popular sport among both males and females from recreation to competition. While rock climbing involves upper body strength, it also involves endless grip strength, which reflects the tactile ability to ascend and descend many different rock faces in various terrains. Understanding the different types of grip techniques is essential for preventing and/or treating acute and chronic injuries associated with this sport. Typical injuries include soft-tissue damage, metacarpophalangeal-proximal interphalangeal-distal interphalangeal (MCP-PIP-DIP) sprains, flexor-tendon strains and pulley strains, joint contractures, tendonitis (and possible tenosynovitis), and carpal tunnel syndrome. More serious injuries include ruptures, severe joint contractures, and avulsions related to the fingers.

There are three major categories for different types of climbing: face climbing, bouldering and crack climbing. Face climbing consists of seeking out knobs, rock edges, and pockets within the rock face for handholds and footholds while ascending during the climb. Bouldering involves climbing over big rocks. This is the part of rock climbing that is contagious, and is used as cross-training and strength maintenance by many athletes. Crack climbing requires more grip strength, especially among elite climbers. This situation involves using cracks and wedging one's fingers, hands and feet into the face of the rock in order to ascend it. The torque used produces high acute injury rates among novice climbers, while more experienced climbers develop more chronic injuries. Novice and experienced climbers alike suffer slippages that may result in acute joint dislocations and ruptures.

There are four common grips used in rock climbing, which pre-dispose climbers to injuries: open, cling, pinch, and pocket. The open grip uses wide hand grips over large handholds. This grip progresses to a cling grip as the individual pushes him/herself into the ascent. This is the most painful grip because it "crimps" the DIP joints due to hyperextension while pulling up, and force is exerted downward onto the DIP joint. The pinch grip uses the index finger and thumb to hang on to a handhold on a projection of the rock face. A pocket grip requires a great deal of experience in order to develop the strength required for putting the second and third phalanges into holes on the rock face. This primarily supports most of the individual's weight.

Common Injuries Associated With Climbing

Typical muscles associated with these injuries involve the wrist and finger flexors. Key muscles include the *flexor carpi radialis*, *palmaris longus*, *flexor digitorum superficialis*, *flexor digitorum profundus*, *flexor carpi ulnaris*, and the *flexor pollicis longus*. PIP primary muscles involve the flexor digitorum superficialis, whereas the DIP primary muscles are the flexor digitorum profundus.

The most common injuries are soft-tissue injuries to the fingertip due to split fingers, "gobies"

(scrapes on the posterior aspect of the hand), scarring (hypertonic) due to crack climbing, which creates repetitive surface area wear, and scrapes that occur with this climbing technique.

Ligament injuries involve the collateral ligaments of the PIP and MCP: the thumb's MCP ulnar collateral ligament (pinch grip) and the PIP collateral ligaments of the second through fourth digits from rapid ascents that entrap the PIP in a crack.

Fingertip shearing and compression tend to result from cling grip. Tendon strains, also known as "climber's finger," are the result of cling grip in the flexor muscle groups. This also affects pulleys and adjacent tendon sheaths. More severe injuries incurred by climbers include acute injuries from slipping off the face of the rock, avulsions, pulley strains, dislocations, ruptures, and possible finger amputations.

Another injury that needs to be addressed is nodules located in the tendons due to tendon strains, which reoccur either in the affected phalanges (fingers) and/or in the distal aspect of the palm, and which can cause a triggering and/or locking of the finger(s). This is basically due to the nodule catching on the first annular pulley, causing a triggering or locking of the finger in flexion at the affected joint DIP/PIP.

Annular pulley ruptures are very common in the first and second digits. The most common is the second annular rupture, primarily during the cling grip from excess finger stress. Joint contractures usually happen at the PIP joint of the affected finger, usually the fourth phalangeal joint (ring finger). Lastly, a common with climbers is carpal tunnel syndrome, which compresses the median nerve due to contraction of the wrist and finger flexors on the handholds used while ascending the face of the rock.

Western Treatment Protocols

Typical treatments of soft-tissue injuries include some type of protection from abrasions, like neoprene sleeves or thin rubber pads. Gloves are not usually part of the climber's gear because they interfere with good handholds and feeling for the next prospective grip.

Treatment for sprains (ligaments) specifically involving the collateral ligaments includes RICE (rest, ice, compression and elevation), range-of-motion exercises, and using "buddy tape" to splint the affected finger to the finger next to it. Although persistent pain and swelling may take months to resolve, the athlete is still able to climb.

Inflammatory conditions as a result of overuse include tendonitis and tenosynovitis, which presents as pain with swelling on the anterior surface of the affected area. This can radiate into the palm and/or up the flexors, which presents as pain and decrease in active range of motion.

Nodules are a result of long-term tendonitis and tenosynovitis, creating a trigger finger either in the first and/or second annular pulley of the involved phalange, which can be replicated with pressure over the respected area during flexion and extension. Typical treatments include injecting lidocaine and/or corticosteroids into the affected area. If the patient progresses to a locked phalange, surgery is required to release the affected pulley.

Ruptures due to acute pulley mechanisms usually happen in the volar proximal phalange, when palpating bowstringing and point tenderness is prominent. Use of MRI or computer tomography is definitive. Referral to an orthopedic surgeon for surgery is standard.

Less severe pulley injuries that are specific to the second annular pulley involve partial tears and usually splint taping to the finger next to injury, which enables recovery and rest.

Carpal tunnel syndrome is another injury common among climbers, due to compression of the median nerve from long-term handholds, causing the wrist flexors to stay contracted for long periods of time. Pain, numbness and even paresthesias are present in the first four phalanges. Phalen's and Tinel's tests are usually positive. Typical management protocols involve rest, splinting the wrist in neutral positions, and anti-inflammatory medications. More severe cases require injection of corticosteroids to manage the swelling.

Preventative exercises specific to climbers include the cling grip, which is performed by doing one- or two-finger pull-ups on doorjambs or training boards. This cannot only be used as a strengthening exercise, but can also lead to overuse injury.

In part two of this series, we will look at the treatment of injuries associated with rock climbing from an Eastern perspective. A complete list of references will also be included in part two of this series.

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