

An accelerated rehabilitation of a hand injury in a collegiate volleyball player.

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Objective: To report the case of a collegiate volleyball player who sustained a proximal phalanx comminuted fracture and the early return to sport.

Background: A 22 year old, 6'3", 175 pound female Division I collegiate volleyball player (middle blocker) reported pain, limited ROM, and edema in the fifth digit of her right hand during a mid-semester practice. The athlete explained that the pain began after completing a block and was unable to complete her next play. Upon examination the athlete presented with edema, ecchymosis, no obvious deformity, and point tenderness along the proximal phalanx of the 5th digit with snapping occurring along the posteromedial border just proximal to the PIP joint. ROM was significantly limited; the athlete was unable to make a fist or a lumbrical grip. Manual muscle tests of both the flexors and extensors were weak and painful. Both a tap test and longitudinal loading test were positive. Sensation was intact and capillary refill was normal.

Differential diagnosis: Fracture, Extensor Digitorum Communi injury, PIP joint collateral ligament injury

Treatment: The athlete was diagnosed with a spiral, oblique fracture of the 5th proximal phalanx neck with apex volar angulation. Surgery was scheduled for the next day and included open-reduction internal fixation with interfragmentary screws. At 1.5 weeks post-surgery, the athlete presented with a 20° extensor lag of the PIP joint with flexion to within one-centimeter of the palm. At 2.5 weeks post-surgery, athlete presented with a 10° extensor lag at the PIP joint, however, this was passively correctable to neutral. Additionally, there was a 5° extensor lag of MP joint which could be passively hyperextended to 5°. At this time the physician approved AAROM. At 3.5 weeks post-surgery, athlete presented with approximately 10° of passive hyperextension of the MP joint and active extension of the PIP joint to 10° and passive extension to 0°. At 7.5 weeks post-surgery, PIP joint motion was 90° (active & passive) as compared to 100° on the opposite side. Additionally, x-rays revealed a healed fracture. Criteria to return to competition included full functional ROM and pain free participation while wearing an approved splint.

Uniqueness: This case is unique due to the: (1) use of interfragmentary screws versus Kirschner wires to repair a comminuted fracture, (2) early return to participation in NCAA volleyball, and (3) introduction of a semi-rigid brace that meets the standards of the National Association of Women's and Girl's Sports (NAWGS). Previous literature has demonstrated that unstable comminuted fractures may require percutaneous Kirschner wire fixation if alignment is not satisfactory following one to two weeks of closed reduction treatment. Our surgeon opted to secure the fracture with four interfragmentary screws. These screws provide stability, better skeletal pain control, and allowance of early intensive rehabilitation. A review of literature reports that following two weeks of immobilization post-surgery gentle exercises may begin. However, four days after surgery the athlete began AROM exercises of flexion, extension, abduction and adduction. The athlete wore a removable forearm-based orthoplast splint when not in rehabilitation. As indicated in the clinical course, the athlete's ROM progressed to allow her to begin limited sport specific drills (forearm passing) at 3.5 weeks post-surgery. At 4.5 weeks post-surgery, the athlete was participating in all drills at practice, including attacking. In addition the athlete was allowed to return to full competition at six weeks. By incorporating a circular cone design in the splint, the semi-rigid materials provided greater support while meeting the criteria of the NAWGS rules interpreter and the surgeon. The athlete was allowed to compete in NCAA varsity matches wearing a splint fabricated of 1/8" alliplast padding, 1/8" polyethylene plastic and 1/8" neoprene.

Conclusion: Although not applicable to all cases, early controlled rehabilitation can allow accelerated return to competition with no complications.