Hand Fractures: A Review of Current Treatment Strategies

Clifton Meals, MD, Roy Meals, MD

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Learning Objectives

- Appraise the history and epidemiology and mechanics of hand fractures.
- Clarify the diagnosis of hand fractures through clinical and radiographic findings.
- List general operative and nonoperative treatment principles of hand fractures.
- Elucidate the treatment principles of individual hand fractures, including the thumb.
- Discuss the complications of hand fractures and their treatment.

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Fractures of the tubular bones of the hand are common and potentially debilitating. The majority of these injuries may be treated without an operation. Surgery, however, offers distinct advantages in properly selected cases. We present a review of hand fracture management, with special attention paid to advances since 2008. The history and mechanisms of these fractures are discussed, as are treatment options and common complications. Early mobilization of the fractured hand is emphasized because soft tissue recovery may be more problematic than that of bone. *(J Hand Surg 2013;38A:1021–1031. Copyright © 2013 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words Hand, fracture, metacarpal, phalanges.

THE HAND IS VALUABLE AND vulnerable. Its ability to both sense and manipulate its environment is unique in nature. As such, the hand is frequently injured. Despite its mechanical refinement, the hand is particularly resilient to fractures, and when they occur, broken digits can often be treated without an operation. Surgery, nonetheless, has a place in the management of carefully chosen cases. Although hand fractures are generally forgiving, soft tissue injury is not. It is easy for the treating physician to do more harm than good, even without cutting the skin. Hand surgeons have special claim to only the most complicated injuries; many fractures of the hand can be treated by a variety of physicians. The majority of hand fractures are appropriately treated by emergency physicians, primary care doctors, and general orthopedic and plastic surgeons. The following is intended for an accordingly broad audience. We present management strategies for the most representative tubular bone fractures of the hand. We highlight recent research to avoid rehashing previous reviews.[1–4]

HISTORY

Rudimentary care of hand fractures (eg, rest and elevation) is presumably as old as humans themselves. Upright posture may have contributed to an increase in these injuries, and today, falls from standing height remain a major source of hand injuries. The ancient Egyptian Imhotep described reduction and immobilization of fractures in 3000 BC. Hippocrates in 200 BC and Galen in AD 160 recommended prolonged immobilization of broken bones and frequent dressing changes. More durable, plaster-based splinting materials were developed in the Middle East as early as the 10th century. As this technology reached 19th-century Europe, it permitted less frequent splint exchange in an era of population expansion and increased demand for medical attention. Sophisticated splinting of the hand and the so-called "intrinsic-plus" position were advocated by James in the 20th century. The Belgian surgeon Lambotte described operative care of a phalangeal fracture as early as 1904.[5] He stabilized this proximal phalanx with a *fixateur externe,* a phrase he coined.[6] Kirschner developed the use of fine wires for skeletal traction; this technique and fixation with K-wires are relevant to the treatment of hand fractures a century later. Twentieth-century advances in anesthesia, radiology, and metallurgy have helped to refine the operative care of hand fractures. The fact remains, however, as it was known to ancient physicians, that the majority of these injuries can be treated without surgery.[7]

From the Department of Orthopedics, George Washington University Medical Center, Washington, DC, and the Department of Orthopedics, UCLA Medical Center, Los Angeles, California.

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Corresponding author: Clifton Meals, MD, George Washington University Medical Center, Department of Orthopedics, 22nd & I Street, NW, 7th Floor, Washington, DC 20037; e-mail: cliftongm@gmail.com.

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EPIDEMIOLOGY

Hand fractures are among the most common skeletal injuries. As is the case with many orthopedic injuries, young men and elderly women are most susceptible. Modes of injury in different age groups are predictable: children and young adults are frequently injured in sports-related activities, middle-age manual laborers are prone to work-related injuries, and older patients may experience hand trauma as the result of a fall or motor vehicle collision. The distal phalanx is the most commonly fractured bone in the hand.[1] A large subset of young adult males fracture their fifth metacarpal, classically the result of violent contact with the fist.[3,8]

DIAGNOSIS

Diagnosis of hand fractures begins with a thorough patient interview. The patient should describe the mechanism of injury because this may suggest certain reduction maneuvers, assist in identifying secondary injuries, and reveal pathological fractures. A very low-impact injury leading to fracture, for instance, should raise the suspicion of osteoporosis or enchondroma. In addition to a history of the injury, it is important to note the patient's handedness, their functional status, occupation, hobbies, and expectations for recovery. A 25-year-old concert pianist and a retiree with the same fracture represent different challenges to the treating physician.

Physical examination of the hand begins with noting skin integrity including abrasions and lacerations and the location and extent of any bruising, swelling, or underlying deformity. A neurovascular examination is undertaken with attention paid to the digits distal to any injury. Angular and particularly rotational deformity can be subtle when the patient is unable to make a full fist and demonstrate parallel digital alignment. In this instance, examining end-on the digital pulps and the planar alignment of the nails with respect to the adjacent digits and the opposite hand is revealing. Caution must be exercised, however, when identifying a pathological supination deformity in the small finger because the uninjured small finger tends to scissor with the ring finger at midflexion and then come into parallel align-