The Collateral Ligament of the Digits of the Hand: Anatomy, Physiology, Biomechanics, Injury, and Treatment

Leo M. Rozmaryn, MD*

Continuing Medical Education

CME INFORMATION AND DISCLOSURES

The Journal of Hand Surgery will contain at least 2 clinically relevant articles selected by the editor to be offered for CME in each issue. For CME credit, the participant must read the articles in print or online and correctly answer all related questions through an online examination. The questions on the test are designed to make the reader think and will occasionally require the reader to go back and scrutinize the article for details.

The JHS CME Activity fee of $15.00 includes the exam questions/answers only and does not include access to the JHS articles referenced.

Statement of Need: This CME activity was developed by the JHS editors as a convenient education tool to help increase or affirm reader's knowledge. The overall goal of the activity is for participants to evaluate the appropriateness of clinical data and apply it to their practice and the provision of patient care.

Accreditation: The ASSH is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

AMA PRA Credit Designation: The American Society for Surgery of the Hand designates this Journal-Based CME activity for a maximum of 1.00 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

ASSH Disclaimer: The material presented in this CME activity is made available by the ASSH for educational purposes only. This material is not intended to represent the only methods or the best procedures appropriate for the medical situation(s) discussed, but rather it is intended to present an approach, view, statement, or opinion of the authors that may be helpful, or of interest, to other practitioners. Examinees agree to participate in this medical education activity, sponsored by the ASSH, with full knowledge and awareness that they waive any claim they may have against the ASSH for reliance on any information presented. The approval of the US Food and Drug Administration is required for procedures and drugs that are considered experimental. Instrumentation systems discussed or reviewed during this educational activity may not yet have received FDA approval.

Provider Information can be found at http://www.assh.org/Pages/ContactUs.aspx.

Technical Requirements for the Online Examination can be found at http://jhandsurg.org/cme/home.

Privacy Policy can be found at http://www.assh.org/pages/ASSHPrivacyPolicy.aspx.

ASSH Disclosure Policy: As a provider accredited by the ACCME, the ASSH must ensure balance, independence, objectivity, and scientific rigor in all its activities.

Disclosures for this Article

Editors

David T. Netscher, MD, has no relevant conflicts of interest to disclose.

Authors

All authors of this journal-based CME activity have no relevant conflicts of interest to disclose. In the printed or PDF version of this article, author affiliations can be found at the bottom of the first page.

Planners

David T. Netscher, MD, has no relevant conflicts of interest to disclose. The editorial and education staff involved with this journal-based CME activity has no relevant conflicts of interest to disclose.

Learning Objectives

Upon completion of this CME activity, the learner should achieve an understanding of:

- The anatomy of pathophysiology of the collateral ligaments of the digits of the hand
- The most important stabilizers to lateral deviation at the metacarpophalangeal (MCP), proximal interphalangeal (PIP), and distal interphalangeal (DIP) joints
- Diagnosis of injuries to those structures
- Management and treatment of injuries involving the collateral ligaments

Deadline: Each examination purchased in 2017 must be completed by January 31, 2018, to be eligible for CME. A certificate will be issued upon completion of the activity. Estimated time to complete each JHS CME activity is up to one hour.

*From the *The Orthopedic Center, The Centers for Advanced Orthopedics, Rockville, MD.*

Received for publication May 9, 2017; accepted in revised form August 23, 2017.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

Corresponding author: Leo M. Rozmaryn, MD, The Orthopedic Center, The Centers for Advanced Orthopedics, 9420 Key West Ave. Suite 300, Rockville, MD 20850; e-mail: lrozmaryn@gmail.com.

0363-5023/17/4211-0008$36.00/0
http://dx.doi.org/10.1016/j.jhsa.2017.08.024

Ligament injuries are among the most common musculoskeletal injuries seen in clinical practice and ligaments are the most frequently injured structures in a joint. Ligaments play an important role in balancing joint mobility and joint stability. Disruption of joint ligaments severely impairs joint function. Over the past 10 years, a new appreciation of a neuroanatomy and neurophysiology of joint ligaments and its biofeedback loops to surrounding muscles and tendons has emerged to explain the relationship between primary and secondary restraints that allow normal joint motion yet prevent pathological motion. This review focuses on this recent information with a view to new clinical approaches to these common problems. *(J Hand Surg Am. 2017;42(11):904–915. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words Dislocation, finger, joint, injury, ligament.

Ligament injuries are among the most common musculoskeletal injuries seen in clinical practice and ligaments are the most frequently injured structure in a joint. Ligaments play an important role in balancing joint mobility and joint stability and their disruption severely impairs joint function.

In 2009, a National Electronic Injury Surveillance System study showed 3.5 million upper extremity injuries a year in the United States.[1] Finger injuries were 38% of those (1.3 million) and 16% of those (210,000) were sprains and strains. Dislocations accounted for 5% (65,000). The incidence of finger sprains is 37.3 per 100,000 a year in the United States. The proximal interphalangeal (PIP) joint is most commonly injured, followed by the thumb metacarpophalangeal (MCP) joint, and then the finger MCP joints.[1]

There are many time-honored methods of treating finger ligament injuries but, unfortunately, all too frequently this injury leads to finger stiffness, instability, chronic pain, swelling, and a substantial loss of function.

Over the past 10 years, there have been many advances in the understanding of the anatomy, physiology, and biomechanics of the ligamentous joint capsule of the MCP, PIP, and distal interphalangeal (DIP) joints. I focus on this new information with a view to new clinical approaches for these common problems.

ANATOMY

MCP joint of the thumb

The collateral ligament originates dorsally on the condyle of the metacarpal head and extends in a palmar and distal direction to insert on the tubercle of the proximal phalanx. It runs adjacent to the accessory collateral ligament (Fig. 1). The radial collateral ligament (RCL) of the thumb has been reported to be 4 to 8 mm wide and 12 to 14 mm in length.[2]

Collateral ligaments of the index MCP joint

The ulnar collateral ligament (UCL) is 4 to 8 mm wide and 12 to 14 mm long.[3] The proper UCL (pUCL) originates at the dorsoulnar MCP head (one-third of the way down from the dorsal surface) and inserts on the proximal volar aspect of the proximal phalanx (one-quarter of the distance from volar to dorsal) The proper RCL (pRCL) originates from the dorsoradial aspect (one-third of the distance from the dorsal surface) of the MCP head and inserts on the lateral tubercle of the proximal phalanx (one-quarter of the distance from volar to dorsal)[4] (Fig. 2).

The center of the origin of the pRCL is 40% volar to the dorsal cortex of the metacarpal head. The most dorsal part of the attachment on the proximal phalanx is 20% volar to the dorsal cortex.[5] The center of the insertion of the pRCL is 46% dorsal to the volar cortex of the proximal phalanx. The most volar portion of the pRCL insertion is 20% from the volar cortex of the proximal phalanx in the index and 29% in the thumb.[6] The distance between the center of the origin and the center of the insertion of the pRCL in full flexion is 15% more than in extension (Fig. 3).

PIP joint ligaments

The proper collateral ligment (pCL) arises dorsal and proximal to the fovea on the side of the proximal phalanx head with an oblong shape and inserts broadly on the base of the middle phalanx. Ligament fibers are stout and parallel to the middle phalanx in all angles of PIP flexion. The volar edge is more oblique than the dorsal edge, giving it a fan shape,