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Kevin C. Chung

Section I: Soft Tissue

Approach to Fingertip Injuries

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Patricia Martin-Playa and Anthony Foo

The fingertip is mankind's tactile interface with the physical world, from reading braille, to using touchscreens, to wielding power tools. Its special tissue architecture demands astute evaluation and meticulous surgical or nonsurgical care after injury to return patients to their preinjury level of function. Attentive deliberation of physiologic, vocational, and psychosocial factors could improve the odds of achieving satisfactory results. In this article, we explore these aspects of fingertip injury to provoke readers to examine their practices and philosophies.

Nerve Compression in the Upper Limb

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Ellen Y. Lee and Aymeric Y.T. Lim



Video content accompanies this article at <http://www.plasticsurgery.theclinics.com>.

Nerve compression occurs in fibro-osseous tunnels as the nerves cross joints. The pathology involves traction and adhesion, aside from compression. This can occur at multiple sites along the course of the nerve. Regardless of level, clinical assessment is standard and a systematic approach to uncover all sites of compression is advised. Evolution of management for carpal tunnel and cubital tunnel syndrome is reviewed with an emphasis on natural history and nonsurgical treatment, which are not commonly discussed. Treatment is multimodal and the systemic factors that contribute to nerve dysfunction should also be addressed.

Flexor Tendon Injuries

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Jin Bo Tang

The developments in flexor tendon repairs have remarkably changed the methods of surgical repair of the flexor tendons and treatment of the critical annular pulleys, as well as the postoperative active motion protocols. The article summarizes the current knowledge and clinical methods in treating flexor tendon injuries, the keys to achieving reliable clinical repairs, and recent evolution in repair techniques and rehabilitation.

Tendon Transfers for Peripheral Nerve Palsies

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Scott N. Loewenstein and Joshua M. Adkinson

Recovery after an upper extremity peripheral nerve injury varies depending on multiple factors. In patients with poor functional recovery, tendon transfers may be indicated. The decision to perform an early tendon transfer at the time of nerve repair or before expected reinnervation is considered on a case-by-case basis. There are a multitude of potential tendon transfer options, the choices of which depend on remaining function, specific deficits, and surgeon experience and preferences. A thoughtful approach to reconstruction can lead to a substantial functional improvement with minimal donor site morbidity.

Tendinopathies of the Forearm, Wrist, and Hand

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Eric R. Wagner and Michael B. Gottschalk

Tendinopathy and tendinitis are some of the most frequently encountered disorders in hand and upper extremity surgery. Patients often present with progressively increasing pain over a subacute or chronic period. In most cases it is a clinical diagnosis, with confirmation via advanced imaging. First-line treatment consists of conservative measures such as activity modification, splints, and injections. After a 3- to 6-month trial of nonoperative treatment, surgery usually involves decompression of the involved tendons and debridement of any inflammatory tissue. Patient and anatomic factors can affect the outcomes of both nonoperative and operative treatments.

Managing Swan Neck and Boutonniere Deformities

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Kate Elzinga and Kevin C. Chung

Acute and chronic injuries to the finger extensor mechanism can result in swan neck and boutonniere deformities. Loss of coordination between the multiple, specialized components of the extensor mechanism results in tendon imbalances leading to altered interphalangeal joint flexion and extension forces. Treatments include corrective splinting and operative interventions. Swan neck deformities are functionally limiting. Surgical correction generally results in functional benefit. Boutonniere deformities are functional but aesthetically displeasing; proximal interphalangeal (PIP) joint flexion and the ability to make a fist are maintained. Surgical improvement can be attempted with caution. Attempts to improve PIP extension can impede flexion, resulting in a poor functional outcome.

The Pathogenesis and Treatment of the Stiff Finger

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Eric D. Wang and Paymon Rahgozar

“Stiff finger,” defined as a finger with decreased range of motion in one or more joints, is commonly found after hand injury and is classified into flexion or extension deformities. Pathogenesis is due to dysfunction in one or more of the following anatomic components: (1) osseous and articular; (2) capsuloligamentous; (3) musculotendinous units; (4) soft tissue and fascia. Evaluation and treatment are based on accurate identification and correction of pathologic structures. The mainstay of treatment is directed hand therapy with exercises and splinting to mobilize stiff joints. Operative interventions are offered after gains from therapy have been exhausted.

Nerve Tumors of the Upper Extremity

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Sophia A. Strike and Mark E. Puhaindran

Nerve sheath tumors of the upper extremity are among the common neoplastic pathologies encountered by hand surgeons. A majority of these tumors are benign schwannomas or neurofibromas and may be associated with neurofibromatosis. Clinical signs of malignant transformation include new onset of pain and rapid growth. Imaging characteristics, such as standardized uptake value greater than 4.0 on PET scan, may aid in the diagnosis of a malignant tumor. Surgical excision, often with intrafascicular dissection with nerve preservation, is recommended treatment of benign lesions. Wide surgical excision is recommended for malignant lesions.

Managing Mutilating Hand Injuries

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Amitabha Lahiri

Mutilating injuries include a wide and heterogeneous spectrum of clinical presentations, each being unique in terms of pattern of tissue damage, patient

characteristics, and functional requirements. Understanding the principles of reconstruction of bone and soft tissues, a wide repertoire of surgical techniques, and the ability to plan the reconstructive journey leading to a functional hand are crucial. Management of these injuries involves several on-the-spot decisions by the surgeon. This article aims to equip the surgeon with the key principles and the bits of knowledge that are essential for effective planning and execution when dealing with such injuries.

Efficiency in Digital and Hand Replantation

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Shimpei Ono and Kevin C. Chung

The literature on surgical techniques and recent evidence in microsurgical digital and hand replantation is reviewed. Replantation should not be done routinely without considering postoperative functional outcomes. Achieving best outcomes is related to the success of microvascular anastomosis and to adequacy of bone fixation, tendon and nerve repair, and soft-tissue coverage. Replantation surgery has become a routine procedure. However, little is known about the decision-making process for digital and hand amputation. A study comparing the outcomes of digital and hand amputations treated with replantation or revision amputation is needed. Outcome assessment includes not only function but also patient-reported outcomes.

Hand Infections

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Wendy Z.W. Teo and Kevin C. Chung

Hand infections can lead to debilitating and permanent disability, particularly if they are not treated promptly or properly. The unique anatomy of the hand, with its numerous enclosed and confined spaces, warrants special considerations. For instance, infections in deep spaces of the hand may require surgical drainage despite an appropriate course of antimicrobial treatment. Thorough history and examination are crucial in guiding further investigations and management, particularly because there are numerous mimickers of hand infections, such as gout and pseudogout.

Management of Acute Extensor Tendon Injuries

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Alfred P. Yoon and Kevin C. Chung

Thin soft tissue covering extensor tendons make them prone to injury. The extensor mechanism achieves a delicate balance with the flexor system. Inappropriate management in the acute setting can lead to long-term deformity and dysfunction. Acute extensor tendon injuries are usually managed with splinting and/or primary repair of the tendon. In cases of tendon length loss, tendon graft or flap may be necessary for reconstruction. This article presents a series of cases illustrating the appropriate management of traumatic extensor tendon injuries.

Considerations in Flap Selection for Soft Tissue Defects of the Hand

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Soumen Das De and Sandeep Jacob Sebastian

Soft tissue defects of the hand commonly arise as a consequence of trauma or infection and after resection of tumors. Restoring a thin and pliable soft tissue envelope is critical to restoring mobility and optimizing functional outcomes. The appearance, color, and texture match as well as donor site issues are increasingly important aspects of hand reconstruction. This article discusses the principles of soft tissue reconstruction in the hand and presents a rational approach to clinical decision making to ensure optimal outcomes.

Section II: Bone and Joint

Thumb Basal Joint Arthritis

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Brent B. Pickrell and Kyle R. Eberlin

Thumb carpometacarpal arthritis is a common condition treated by hand surgeons. This condition most frequently affects the elderly and postmenopausal women. Nonoperative treatment options include activity modification, orthoses, and injections. Although many patients can be treated conservatively, those with persistent and recalcitrant symptoms may benefit from surgical intervention. There are myriad surgical options, and the best option often depends on the patient's goals and functional demands, surgeon experience, and patient preference.

Phalangeal and Metacarpal Fractures

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Amir H. Taghinia and Simon G. Talbot

The management of phalangeal and metacarpal fractures continues to evolve. Nonoperative or less invasive techniques, limiting the need for soft tissue dissection and resultant stiffness, are being developed and becoming more popular. The competing forces of fracture stability to optimize healing and early mobilization to optimize function need careful balancing. As imaging, equipment, and techniques improve, hand surgeons can tailor individualized care to the unique needs of each patient.

Pediatric Hand and Wrist Fractures

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Janice C.Y. Liao and Alphonsus K.S. Chong

Hand and wrist fractures are common in the pediatric population. Accurate diagnosis relies on the understanding of the physal anatomy and carpal ossification. Treatment of these fractures is largely influenced by physal biology and compliance with treatment. A majority have a favorable outcome with nonoperative treatment. Operative treatment should be considered in patients with clinical deformity, open fractures, and significant fracture displacement. Physal-friendly surgical approaches and implants should be used to minimize the sequelae of physal injury.

Injuries Around the Proximal Interphalangeal Joint

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Ruth En Si Tan and Andre Eu Jin Cheah



Video content accompanies this article at <http://www.plasticsurgery.theclinics.com>.

Proximal interphalangeal joint (PIPJ) injuries are common and challenging to treat, involving a spectrum of conditions ranging from isolated ligamentous injuries to severe fracture dislocations. The main goal of treatment is to achieve a congruent, stable joint, which is key to achieving early range of motion and a favorable outcome. Injuries that do not compromise the stability of the joint may be treated nonsurgically, whereas those that render the joint unstable may be managed with one of many surgical strategies available. This article focuses on the current practices of treatment of injuries around the PIPJ.

Treatment of Carpal Instability and Distal Radioulnar Joint Instability

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David Meng Kiat Tan and Jin Xi Lim



Video content accompanies this article at <http://www.plasticsurgery.theclinics.com>.

Carpal instability and distal radioulnar joint instability represent an important set of conditions responsible for pain and disability in the wrist. Either condition can occur

as a result of ligamentous failure or loss of articular congruity from fractures or a combination of both. Instability itself is a clinical diagnosis supported by relevant imaging modalities. Carpal and distal radioulnar joint instability needs to be considered according to its stage and severity as well as other factors like etiology and chronicity to determine the optimal treatment option. This article summarizes the conditions most relevant to the practice of a hand surgeon, with emphasis divided equally between assessment and diagnosis, staging, and treatment. The 3 most common carpal instability conditions are outlined in this article together with a review on acute and chronic distal radioulnar joint instability.

Fractures of the Carpal Bones

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Brian M. Christie and Brett F. Michelotti

Diagnosis and proper initial management of acute fractures of the carpal bones is critical because of the limited blood supply of many bones of the wrist and the role of the carpus in optimizing hand function. Pathology is correctly diagnosed by a focused history and examination. Injuries may be missed with a cursory examination and routine wrist radiographs. Together, fractures of the scaphoid and triquetrum make up nearly 90% of carpal bone fractures. Relative frequency, mechanism of injury, diagnosis, and management principles are covered for each of the bones of the wrist.

Joint Fusion and Arthroplasty in the Hand

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Michiro Yamamoto and Kevin C. Chung

Numerous techniques are available for treating finger joint disorders such as osteoarthritis and inflammatory arthritis. Joint fusion and arthroplasty have different concepts but can improve hand function. Joint fusion is indicated in patients with painful finger joints with or without poor soft tissue condition. Implant arthroplasty is indicated for degenerative or inflammatory arthritis in elderly patients because implants may require future revision. Arthroplasty with an autologous osteochondral cartilage graft is an option for young patients with posttraumatic metacarpophalangeal or proximal interphalangeal joint osteoarthritis, whereas vascular joint transfers are rarely used. Surgeons must carefully check each patient's condition and treatment expectations.

Treatment of Common Congenital Hand Conditions

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Bin Wang, Xiaofei Tian, and Yong Hu

Congenital hand difference is caused by abnormal embryonic development of the limb and represents one of the most prevalent congenital birth defects worldwide. Using the new classification system proposed by Oberg, Manske and Tonkin (OMT) and endorsed by the International Federation of Societies for Surgery of the Hand, congenital hand differences are classified into malformations, deformations, and dysplasias and syndromes. Malformations are subdivided into abnormal development of proximal-distal, radial-ulnar (anterior-posterior), dorsal-ventral, and unspecified axis. We introduce here the state-of-the-art surgical treatment for thumb duplication and syndactyly. The surgical principle, timing, procedures, and postsurgical management are described for each condition.