From a functional standpoint, wrist and ankle injuries can result in significant disability and therefore are a reason for many patient visits to specialized physicians. The primary pathologies include fractures, ligament and tendon trauma, cartilage deterioration and nerve damage. Recent advances in ultrasound and magnetic resonance imaging (MRI) have begun to reshape our understanding and treatment of these pathologies.

Injuries of the hand are common and account for over 25% of all worker's compensation injuries in the United States. These injuries can be categorized into fractures, ligament and tendon injury, cartilage deterioration and nerve trauma. Most injuries are handled effectively non-surgically, but long term impairment and recurrence of symptoms is common. The most common fracture is the scaphoid fracture, which is often a result of a fall on an outstretched arm (FOOSH). These fractures are critical to diagnose accurately as avascular necrosis is a potential complication of a mismanaged fracture. Besides fractures, repetitive strain injuries are a common cause of hand symptoms. This includes tendon and ligament injury along with nerve disorders. Because of our culture of typing, the extensor tendons are particular vulnerable to low grade repetitive trauma. The result may be micro-tearing of the tendon, tendinosis or concurrent cyst formation from the adjacent carpal bones. When this trauma occurs on the flexor side, a cyst may form on the tendon and prevent it from gliding properly. This results in a phenomenon known as trigger finger. These are managed in various ways depending on severity and associated functional impairment. Traditional treatments include therapy, steroid injection, immobilization and surgical intervention. More recent interventions include regenerative treatments such a prolotherapy or platelet-rich plasma therapy. A skilled practitioner may also use an ultrasound guided micro-debridement technique to non-surgically remove areas of tendinosis or cyst formation.

One of the most common pathologies of the hand is nerve compression of the median nerve at the wrist, commonly referred to as carpal tunnel syndrome. This is most often a repetitive strain injury causing swelling of the carpal ligament, thickening and eventual compression of the median nerve. An accurate diagnosis is critical, as other pathologies may cause similar symptoms such as a neuroma or more proximal nerve compression (ie pronator syndrome). Traditional therapy includes splinting, therapy and possible steroid injection. Surgery is indicated when there is evidence of active denervation. New techniques such an hydronurolysis may provide near immediate relief without the need for surgery. Proper selection of patients for this minimally-invasive treatment is critical and should be based on electrodiagnostic and ultrasound findings.

The pathology seen the foot in many ways mirrors those seen in the hand. Differences can be seen because of the unique ground forces at play in the foot with ambulation. Because of this, the most common fractures are stress fractures. These occur in areas of high impact and translational force, namely the navicular bone. The symptoms consist of vague mid-foot pain and treatment is generally non-weight bearing for 6 weeks and then weight-bearing as tolerated for an additional 6 weeks using a walking boot. Some preliminary studies suggest that growth factor injections may accelerate bone healing. Other areas of stress fractures include the metatarsals and
sesmoid bones (both commonly seen in dancers). Traumatic fractures often involve the talus and may require surgical intervention depending on displacement and functional impairment. Tendon and ligament injuries are by far the most common pathologies in the foot. Low grade repetitive stress may cause a slow change in foot mechanics that result in deterioration of these supportive structures. Every minute in the United States, someone experiences an ankle sprain. About 40% of these individuals will experience chronic pain from this syndrome. Ankle sprains can be classified by location and extent of ligament injury and may be in the lateral, medial or high ankle portions of the foot. Traditional treatment includes immobilization, therapy and steroid injections. New research suggests the role of regenerative treatments as effective tools to help ligaments properly and quickly heal. Other common tendon and soft tissue injury include achilles tendinopathy and plantar faciitis. Because of a naturally poor vascular supply, these injuries to heal slowly and poorly. Again, the role of regenerative techniques has offered some hope for changing the current management of these pathologies, which may include shoeare modification or orthotics.

Nerve trauma is the foot is less common than in the hand, but can result in significant functional impairment. Besides metabolic neuropathies such as diabetes, the most common nerve trauma is tibial neuritis. The posterior tibial nerve travels posterior to the medial malleolus and may become irritated because of a low-grade repetitive strain of the adjacent tendons. Symptoms includes burning pain the foot and loss of sensation. The traditional therapy of this neuropathy and most in the foot include modifying shoeware, orthotics and therapy to help reduce nerve compression (ie nerve glide therapy). Interesting research in the role for hydromeurolysis in this area is being explored in humans. Also, the role growth factors to facilitate nerve regeneration is also a promising application.

The hand and foot pathologies may result in significant functional deficits and current management is being challenged by research that suggests a minimally-invasive and regenerative approach may promote more rapid and efficient healing. The use of advanced imaging such as ultrasound and advanced MRI has provided new windows into these pathologies and paved a path for novel interventions.

Select References:

