SCIENTIFIC ARTICLE

Intraneural Ganglions of the Hand and Wrist

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Purpose To review 15 patients who were treated for intraneural ganglions of the hand and wrist.

Methods Between 1990 and 2012, 15 patients were treated for intraneural ganglions of the hand and wrist. There were 9 women and 6 men, averaged age 42 years. Ten patients presented with a mass and 5 with symptoms of entrapment neuropathy. The ganglions involved the ulnar nerve at the wrist in 5 patients, the dorsal branch of the ulnar nerve in 2, the superficial radial nerve in 2, a digital nerve in 4, and the dorsal branch of a digital nerve in 2. Eight patients had magnetic resonance imaging evaluations that showed cystic masses that did not confirm intraneural ganglions. In all patients diagnosis was made intraoperatively. Ganglions were treated by intraneural dissection and excision of the cyst in 10 patients, excision of the articular branch and decompression of the cyst in 4, and excision of the ganglion and the nerve in 1.

Results Postoperative follow-up averaged 57 months. There were no complications or recurrences. Five patients had transient paresthesias that improved after an average of 2 months. Preoperative symptoms improved in all patients. Patients returned to normal daily and work activities at an average of 10 days.

Conclusions Intraneural ganglions should be considered in the differential diagnosis of a mass in the vicinity of a nerve. Surgical excision is usually curative but simple excision of the articular branch and decompression of the cyst seems simpler and equally effective. *(J Hand Surg Am. 2015;40(8):1625−1630. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic IV.

Key words Cyst, ganglion, hand, intraneural, nerve.

Intraneural ganglions are rare mucinous cysts that originate within the epineurium of peripheral nerves.[1−5] Intraneural ganglions involve the common peroneal nerves most frequently[6−8] and are relatively uncommon in the hands and the wrists.[9−13] The ulnar nerve is the most commonly involved nerve in the upper extremity.[13−15] However, there are several case reports of involvement of other peripheral nerves such as the median,[16] superficial radial,[17] suprascapular,[18,19] digital nerves.[20,21] They occur most commonly in adults and rarely in children.

The pathogenesis of the intraneural ganglions has been poorly understood and controversial. For a long time, most investigators subscribed to the de novo theory of formation.[1,16] This theory attributes the formation of intraneural ganglions to degenerative changes within the epineurium or perineurium that leads to cyst formation within the nerve sheath. Spinner and colleagues[22−24] introduced the unifying articular (synovial) theory of formation of intraneural ganglions. They suggested that a capsular defect allows joint fluid to pass along an articular branch into the parent nerve. Intra-articular pressure pushes the synovial fluid along the path of least resistance with extension of the

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involvement along the nerve and its branches. The fluid propagation usually advances proximally but it can extend distally or in both directions.[25]

Traditionally, treatment of these lesions required careful intraneural dissection of the ganglion off the nerve fascicles and excision of the ganglion.[1–6] This also required the occasional use of an operating microscope. Historically, some surgeons have suggested resection of the nerve and nerve grafting as an option for treating these lesions.[24,26,27] Herrin et al[27] performed an excision of a sural nerve that was involved with an intraneural ganglion. Their rationale was that the nerve deficit was not substantial. Luckily, most surgeons did not adopt that method of treatment because of the magnitude of the nerve deficit that could result from nerve resection to treat this benign condition. Now, with the understanding of the pathological features of intraneural ganglions and how they are connected to the joint via the articular branch, most surgeons have adopted a simpler technique of searching for and excising the articular branch and decompressing the ganglion by either aspiration or unroofing.[7,8,15,19,22,23]

Patients may present with a painless mass or with symptoms and signs of nerve irritation or compression depending on the size and location of the ganglion. Usually there is no pain in the involved joint. Magnetic resonance imaging (MRI) or ultrasound can identify the cystic mass, but frequently it does not show the communicating articular branch. Recently, high-resolution MRI with or without an arthrogram has been used more frequently and with reasonable success to identify the connecting articular branch between the joint to the intraneural ganglion.[28,29] A new MRI pulse sequence technology that uses a 3-dimensional fast spin echo (FSE) sequence has been found to be more accurate in identifying joint connections with the intraneural ganglions than the 2-dimensional FSE sequence.[30]

The purpose of this study was to review our patients with intraneural ganglions of the hand and wrist. This relatively large series is also interesting because it spans 23 years during which there was a major evolution in our understanding of the etiology of intraneural ganglion. This series thus demonstrates how this evolution was reflected in the management of our patients with these lesions.

MATERIALS AND METHODS

We obtained institutional review board approval for this study and each participating patient signed written consent. We conducted a retrospective review of patients who were treated for intraneural ganglions of the hand and wrist by the senior author (NN) between 1990 and 2012. Fifteen patients were identified. There were 9 women and 6 men, aged 27 to 69 years (average, 42 y). All 15 patients were available for review. Ten patients presented with a mass, and 5 with symptoms of entrapment neuropathy in the form of numbness, tingling, clumsiness, and weakness. One patient with an intraneural ganglion of the ulnar nerve at the wrist presented with a mass on the volar ulnar aspect of the wrist associated with numbness and tingling of the ring and little fingers. Seven patients were diagnosed before introduction of the articular theory; 8 patients were diagnosed afterward. The 8 patients who were treated after introduction of the articular theory included 2 with involvement of the main trunk of the ulnar nerve, 2 with involvement of the motor branch of the ulnar nerve, and 1 each with involvement of the dorsal branch of the ulnar nerve, the superficial nerve, a digital nerve of the little finger, and the dorsal branch of a digital nerve of the ring finger.

Overall, the ulnar nerve at the wrist was involved in 5 patients, the dorsal branch of the ulnar nerve in 2, the superficial radial nerve in 2, a digital nerve in 4, and the dorsal branch of a digital nerve in 2. The intraneural ganglions of the digital nerves involved the volar radial aspect of the thumb at the level of the interphalangeal joint in 1 patient and the volar radial aspect of the ring finger in 2. One was proximal to the proximal interphalangeal joint (PIP) and the other was distal to it. One ganglion was along the volar aspect of the proximal phalanx of the little finger just proximal to the PIP joint. Three patients had atrophy of the hypothenar muscles and the first dorsal interosseous muscle. Four patients had decreased sensibility along the volar aspects of the ring and little fingers. Static 2-point discrimination averaged 8 mm in the ring and little fingers, compared with 4 mm for other digits. Semmes-Weinstein monofilament test averaged 0.22 g compared with 0.04 g for the other digits. Radiographs were obtained in 9 patients; all were unremarkable. An MRI was obtained in 8 patients and consistently showed a cystic mass, but the study was not confirmatory for an intraneural ganglion. No obvious communications between the cystic mass and the adjacent joints could be identified. Of those 8 MRIs, 6 were obtained after presentation of the articular theory. Our knowledge and adoption of that theory have made us aware of the possible connections to adjacent joints and prompted us to obtain MRIs more frequently for patients in whom we suspected an intraneural ganglion.