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Case Report

Guyon's Canal Syndrome in a Professional Bicyclist: a Case Report and Brief Review of Literature

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ABSTRACT

Guyon's canal syndrome, an ulnar nerve entrapment at the wrist, is rare diagnosis but a well known entity. This clinical syndrome results from compression of ulnar nerve within a tight triangular fibroosseous tunnel about 1.5 cm long located at the carpus. The most common causes that involve the ulnar nerve at the wrist are compression from a ganglion, occupational traumatic neuritis, a musculotendinous arch and disease of the ulnar artery. We describe case report of Guyon's canal syndrome in a professional bicyclist and discuss the anatomy, aetiology, clinical features, and treatment. It is emphasized that the knowledge of both normal and aberrant anatomy of ulnar nerve at the wrist is very important for a satisfactory surgical result. Early surgical decompression gives best results in case Guyon' s canal syndrome caused by space occupying lesions like ganglion.

Key Words: Guyon's canal syndrome, ulnar nerve, anatomy, electromyography.

INTRODUCTION

Guyon's canal syndrome, an ulnar nerve entrapment at the wrist, is a well-recognized entity. Often seen in long-distance cyclists who lean with the pisiform pressing on the handlebars. [1] A detailed review of the syndrome was presented by Shea and McClain based on 136 reported cases in 1969. [2] Common causes of Guyon's canal syndrome are thrombosis of the ulnar artery, [3] true or false aneurysm of ulnar artery, space occupying lesions such as a ganglion [4] or lipoma, fracture of the hamate [5] with hemorrhage may cause pressure on the ulnar nerve, other causes include occupational traumatic neuritis, [6] presence of aberrant muscles. [7,8] Early clinical diagnosis and better knowledge of surgical anatomy gives best results after surgical decompression. [9]

CASE REPORT

27 years old man professional bicyclist presented with a four years history of intermittent dull aching and burning pain in the left palm and in little and ring fingers with progressive weakness of the left hand for last 8 months. He tended to drop objects and he noticed a slow onset weakness in his left hand. On examination, there was wasting of hypothenar eminence. Book test, Card test and Egawa test were positive confirming the weakness of Adductor pollicis and interossei both palmar and dorsal. Abductor digiti quinti weakness was

also present. Sensory impairment was present in the distribution of ulnar nerve in hand. Tinel's sign was positive. X-ray of wrist was normal. Rheumatological and endocrinological blood tests were also normal. Electromyographic examination showed fibrillation and positive sharp waves at rest and weakness in ulnar muscles of the hand (lumbricals, abductor digiti quinti, and adductor pollicis). Conduction velocity studies of the left ulnar nerve for interosseous muscle showed delayed latencies. Despite continued occupational therapy, splinting and cessation of all bicycling, the patient's symptoms worsened over a period of time. Patient was operated after taking proper consent a Brunner- type incision was made over the interval between pisiform and hook of hamate, and Guyon's canal was released in its entirety. There was no evidence of any mass, aneurysm, or other space occupying lesion but there were distinct narrowing and flattening of ulnar nerve beneath the distal edge of the volar carpal ligament. An extra-neural neurolysis of ulnar nerve at the wrist was completely performed with section of the volar wrist crease. The wound was closed in layers as a rule. Postoperatively, the patient was placed in a volar splint for 2 weeks and then weaned out of the splint and began early range of motion and strengthening exercises.

Wasting of hypothenar eminence with clawing of little and ring fingers due to involvement of ulnar nerve in Guyon's canal.

Surface marking of skin incision commonly used for decompression of Guyon's canal syndrome

The symptoms improved one year after the surgery with partial recovery of motor weakness and sensibility. The electromyographic control was performed, showing increase in the conduction velocity at final follow up.

DISCUSSION

Guyon's canal or the ulnar-carpal canal is bounded proximally and medially by the pisiform bone and laterally and distally by the hook of the hamate. [1,10,4] The canal's floor is formed by the transverse carpal ligament and its roof is formed by the volar carpal ligament. [2,11,1,4] At the distal end of the canal's floor is the pisohamate hiatus, which is bounded superiorly by a concave musculotendinous arch and below by the pisohamate ligament. [4]

Within Guyon's canal lie the ulnar artery and nerve. [11,10,4] The nerve is divided into a superficial branch, which is sensory to the little finger's palmar surface and the ring finger's ulnar side, and is motor to the palmaris brevis muscle, and a deep motor branch, which innervates the hypothenar muscles and then passes through the pisohamate hiatus to innervate the third and fourth lumbricals, the interossei, the adductor pollicis, and the deep head of the flexor pollicis brevis muscles. [2,11,1,4]

Compared with the median nerve in the carpal tunnel, the ulnar nerve is more prone to injury by direct external compression in Guyon's canal, because of its more superficial location.[1] The area of the transverse carpal ligament covering the canal is also thinner than the portion of the ligament covering the carpal tunnel. [1]

The ulnar nerve may be compressed anywhere along the course of the Guyon's canal causing sensorimotor, only motor, or only sensory abnormalities. Shea and McClain (1969) divided lesions of the ulnar nerve in Guyon's canal into three types, depending on the anatomical site at the wrist at which the ulnar nerve is compressed. [2,11,1,10,4]

In type I, the ulnar nerve is involved just proximal to or within Guyon.s canal and there are both motor and sensory abnormalities; weakness in all intrinsic hand muscles innervated by ulnar nerve and sensory deficit in the hypothenar eminence and ulnar half of the ring finger, both on the palmar surface only but not at the dorsum that is innervated by the dorsal Cutaneous nerve. [2,11,1]

In type II, the location of compression is along the deep branch and there is only weakness in muscles innervated by the deep branch; depending on the location, it may spare some hypothenar muscles. [2,11,1,10,4]

In type III, the location of compression is distal in the end of the Guyon's canal and only sensory abnormalities on palmar ulnar distribution; there is no motor deficit. It is the most rare of the three syndromes. [2,11,1]

Shea and McClain[2] listed 19 different lesions causing compression of the ulnar nerve at the wrist and hand; the most frequent cause was ganglion [4] (28.7%), occupational neuritis [6] (23.5%), laceration (10.3%), ulnar artery disease [5] (8.1%), fracture of carpal bones [4] (5.9%). Most of lesions (52%) were type II, 30% were type I and 18% were type III. [2,1] The causes of involvement of the ulnar nerve in the vicinity of Guyon's canal are: congenital (anomalous muscles, accessory ossicles), [7,8] trauma,[5] rheumatoid arthritis,[11,4] and mass lesions (intrinsic or extrinsic),[2,11,4] vascular. [10] Georgiev [7] et al. summarized different variants of abductor digiti minimi responsible for Guyon's canal syndrome like absence, origins from the fascia of the forearm, palmaris longus, fascia of the flexor carpi radialis, intermuscular fascia, three origins, and fusion with the flexor digiti minimi brevis.

The diagnosis of distal ulnar neuropathy is based on clinical criteria but electromyography and determination of the nerve conduction should be done to localize the lesion and to determine the extent of nerve damage. [9,5,7] An accurate history must be taken including details about occupation, hobby and life style. [2,11] Generalized disorders have to be considered such as rheumatoid arthritis, scleroderma, and diabetes mellitus. The possibility of an abnormality of the cervical spine, shoulder, and elbow must be excluded.[11] Symptoms are similar to those of ulnar nerve involvement at the elbow, except for there will never be sensory loss in the dorsum of the hand because the dorsal cutaneous branch leaves the forearm 5-8 cm proximal to the wrist. Pain, when present, may be exacerbated by tapping over pisiform (Tinel's sign). [2,11] It may also radiate up the forearm. The Palmaris brevis sign may occasionally be useful in diagnosis which helps to differentiate between ulnar nerve compression at the cubital tunnel or at the wrist, when the patient abducts the little finger on volition, there is simultaneous contraction of the Palmaris brevis this contraction will be absent if the entrapment of the ulnar nerve is at the cubital tunnel but

it is usually preserved when the ulnar nerve is compressed at the pisohamate hiatus. [2,11]

Electrodiagnostics [11,1,10] is usually helpful in localizing the site of the lesion. In type I, electrodiagnostic studies may reveal normal motor conduction velocity of the ulnar nerve in the across-the-elbow and elbow to- wrist segments, prolonged distal latency to the abductor digiti minimi and first dorsal interosseous muscles, prolonged sensory latency and diminished evoked sensory responses. In type II, normal motor conduction velocity in the ulnar nerve in the across the- elbow and elbow-to wrist segments, normal sensory latency and sensory evoked responses, normal distal motor latency to the abductor digiti quinti minimi and prolonged latency to the first dorsal interosseous; denervation potentials in the first dorsal interosseous but not in the abductor digiti quinti. [9,11,10,5,4]

X-rays of the hand and of the wrist including the carpal -canal view are necessary to demonstrate possible fractures and bone displacement.[11] Magnetic resonance imaging is indicated only in patients with equivocal clinical findings, a suspected mass lesion or persistent symptoms after surgery. [10,5] Ultrasound [12] is good investigations for ruling out space occupying lesions. The treatment requires evaluation of the etiological factor. If the syndrome results from mechanical repetitive trauma (occupation, hobby, life style), the approach is trying to avoid the pressure on the hypothenar eminence. [9,11,1,4] An initial trial of conservative therapy by immobilization, discontinuance of traumatic habits and local injection of cortisone may be tried. Surgical decompression may be indicated in refractory cases.

If mass lesions cause compression, the therapy is surgical. Mass lesions such as small ganglia may not always be palpable through the skin. Persistent signs of impairment of the deep branch of the ulnar nerve with distal latency criteria to suggest involvement of the ulnar nerve in Guyon's canal warrant surgical exploration. [4] When the surgical exploration of the Guyon's canal region is performed, the ulnar nerve and artery can be freed in Guyon's canal .If a ganglion is present it can be dissected out and removed completely with its deeper pedicle. If an obvious mass lesion is found, it is excised; otherwise, all constricting bands are divided and the pisohamate hiatus is unroofed. [9,1,4]

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