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Review Article

Wartenberg's Syndrome: Diagnosis and Treatment

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Introduction

Wartenberg's syndrome is a peripheral neuropathy caused by entrapment of the superficial radial nerve (SRN), presenting with paresthesia in the nerve distribution [1]. Currently, there are no established guidelines or recommendations for the proper treatment of this condition. As such, the objective of this paper is to complete a literature review outlining the diagnosis and treatment of Wartenberg's syndrome.

Search Strategy/Methods

A systematic literature search was completed and up to date as of February 5th, 2018. The data bases MEDLINE (Ovid), EMBASE (Ovid) and Cinahl were searched using engine specific strategies unique to each database to maximize sensitivity (Appendix A). Abstract and titles were stored and compiled in Zotero™ reference manager. Two reviewers (GM and JK) independently reviewed the title and abstracts of each citation to ensure the paper involved true cases of Wartenberg's syndrome. Studies that seemed to meet the above went on to full text review. All levels of evidence were accepted, from randomized controlled trials to case reports.

Results

After screening, the results of our search produced 7 case series and 23 case reports. The number of patients in each study ranges from 1-51 with an average patient age of 41 years with the majority of patients being female. Etiologies range from work related complaints, blunt trauma, as well as direct compression due to watch straps, handcuffs and casts or splints. Associated conditions include De Quervain's tenosynovitis, carpal tunnel syndrome, flexor carpi radialis tendonitis, lateral antebrachial cutaneous nerve palsy, as well as lateral epicondylitis. Systemic conditions associated with SRN compression include diabetes, multiple sclerosis as well as arthritis.

History

In 1932, Dr. Robert Wartenberg, then a neurologist at University of Freiberg, described a series of five cases of peripheral neuropathy involving the SRN [2]. Inspired by its similarity to isolated involvement of the lateral femoral cutaneous nerve of the thigh, or meralgia paresthetica, he first coined the name, Cheiralgia Paresthetica, for this condition. Despite the condition being commonly named after him, Wartenberg was not the first to publish on the topic as he referred to previous work published by Schlesinger and Matzdorff, who attributed compression by a wrist watch band as the cause of the neuropathy, in his original article [3, 4]. In the following 50 years, the condition had received very little attention in the scientific literature and textbooks as only three cases were reported in 1954 [5]. The prevalence of the condition is unknown but seems to be underdiagnosed due to overlap with lateral antebrachial cutaneous nerve injury, the inability to detect sensory deficits on the dorsolateral aspect of the hand, and comorbidity with De Quervain's tenosynovitis [6].

Consequently, current diagnosis and therapies for Wartenberg's syndrome have not been rigorously studied or validated.

Description of Disease

Wartenberg's syndrome is a peripheral neuropathy caused by the entrapment of the superficial branch of the radial nerve in the forearm. As the radial nerve emerges from the intermuscular septum anterior to the lateral epicondyle, it splits into two branches, the superficial branch and the deep branch, also known as the posterior interosseous nerve [7, 8]. The superficial branch travels down the anterior forearm deep to the brachioradialis and emerges superficially approximately 8.0 - 9.0 cm proximal to the radial styloid between the tendons of brachioradialis and extensor radialis carpi longus [8]. Exclusively as a sensory nerve, it innervates the dorsal aspect of the hand between the thumb and the lateral ring finger excluding the areas overlying the distal one thirds of the index and middle fingers. Consequently, symptoms and signs of Wartenberg's syndrome relate to paresthesia and anesthesia in the distribution of the nerve, most commonly in between the index finger and the medial thumb.

Patients with Wartenberg's syndrome can present with pain, sensations of burning, numbness and tingling, and dysesthesia in the previously described distribution of the superficial radial nerve [6, 9]. These symptoms can potentially cause patients to present with weakness and limitations in range of motion and consequently, decreased function, of the hand [1, 9]. Due to the paucity of literature on the subject, the epidemiologic data for this condition is currently lacking. However, studies have reported it can affect people from a wide age range (19-63 and 20-69) with a higher proportion of females (35/51 and 40/50) being affected by the condition, and symptoms lasting between 15 days to 21 months [6, 9].

Causes/Risk factors

The causes of Wartenberg's syndrome predominantly stem from disturbances of SRN. One study reported that the leading cause of the syndrome is compressive pressure on the nerve, which includes watch-strap compression (8 cases), tight plaster/dressing (4 cases) and other causes of compression such as scar entrapment (9 cases) [9]. Furthermore, other causes reported in literatures include tight application of handcuffs, which lead to its other notorious name of handcuff neuropathy [10, 11], overexertion (repetitive pronation and supination) [1, 12], Diabetes [1, 13, 14], mass-occupying lesions including lipoma, abscess formation, and neuroma [15, 19], as well as post steroid injection for De Quervain's tenosynovitis [20]. Iatrogenic causes include previous hand or wrist surgeries causing deep scar tissue formation and keloid scar formation as well as following an Opponens transfer in which the ring finger flexor digitorum superficialis tendon was inadvertently brought over top of the SRN [21, 22]. An anatomical cause that can predispose to SRN compression is a variant of the first dorsal extensor compartment causing inflammation and its subsequent irritation of the SRN [23].

Another condition that can make a patient more susceptible to Wartenberg's syndrome is a phenomenon known as double crush syndrome in which there is compression at a site proximal to the symptomatic area, and has been documented following radial nerve compression in the spiral groove as well as a mass at the elbow [19, 24]. Lastly, Wartenberg's syndrome following trauma has been documented in a few cases in which a distal radius fracture with excessive bone spur formation and a non-union following a distal radius and ulna fracture [21].

Associated conditions

Wartenberg's syndrome is highly co-morbid with many other pathologies of the upper extremities. Studies both report a high association with De Quervain's tenosynovitis as well as carpal tunnel syndrome [1, 6, 9, 10, 21, 24]. In addition, ganglions of first extensor compartment, flexor carpi radialis tendinitis, neuroma of the lateral antebrachial cutaneous nerve, schwannoma of brachial plexus and other peripheral nerve entrapment syndromes have been reported with Wartenberg's syndrome in literature [6, 9].

Diagnosis

Physical exam for Wartenberg's syndrome should focus on determining the affected area of sensory abnormality in the dorsolateral aspect of the hand. One study reported 100% altered vibration and fine touch sensation in the dorsolateral aspect of the hand in its cases [8]. Furthermore, patients may also present with weakened pinch and grip strength secondary to pain and symptom reproduction with forced pronation, ulnar deviation and resisted isometrics of the wrist extensors and brachioradialis [1, 6].

Another common finding of Wartenberg's syndrome is a positive Tinel's sign over the course of superficial branch of the radial nerve, commonly over the radial styloid or just distal to the brachioradialis muscle belly, where the nerve exits from the deep fascia [6, 9, 22]. Furthermore, as Wartenberg's syndrome is highly comorbid with De Quervain's tenosynovitis, patients may very likely present with a positive Finkelstein test [6, 9, 21]. However, the distinguishing feature of Wartenberg's syndrome from De Quervain's tenosynovitis is that the pain is present regardless of position when performing a Finkelstein test [23].

Other test modalities used to diagnose Wartenberg's syndrome also include nerve conduction studies; however, this has shown limited effectiveness [6, 9]. In addition, when considering other comorbid pathologies, nerve blocks with lidocaine may be employed to rule out associated lateral antebrachial cutaneous nerve injury [8].

Treatment

Since many cases of Wartenberg's syndrome involve external compression on the nerve, they generally resolve upon relief of this pressure. Initial therapies may be conservative, including removal of the compressive force (wrist watch, hand cuffs, plaster cast), preventing repetitive overexertion by patients, splinting and providing symptomatic relief such as rest and NSAID [5, 8, 21]. One study demonstrated 71% good to excellent results following conservative treatment [9]. However, another prospective study showed less effectiveness following 6 months of wrist and forearm splinting, restriction of activities, physiotherapy and anti-inflammatory medications with only 30% of the patients showing improvement [8]. Both studies acknowledge that long duration of symptoms, over 6 months, may be an indicator for resistance to conservative therapy and, therefore, may require surgical intervention [8, 9]. Other factors, including previous operation, chronic occupational injuries, severe crush injury to the forearm and wrist and neuroma, may also predispose patients to failing conservative treatment [8]. When related to systemic conditions such as Diabetes, resolution of symptoms occurred after correction of the underlying causes [13].

Surgical interventions are indicated when conservative therapies fail. Since many cases of Wartenberg's syndrome involve compression along the course of the SRN, the surgical approach involves releasing the fascia over the nerve course over the length of the forearm [6, 9].

In cases with associated De Quervain's synovitis, symptoms may be due to chronic edema or traction on the nerve due to limited movement and a first extensor compartment release may relieve symptoms [6, 9]. If neurolysis fails, nerve resection may become necessary when there is a prolonged history associated with numerous consultations, multiple previous surgeries and in the cases of neuroma formation[6]. Surgical treatment demonstrated effectiveness of 86% and 74% reporting –Excellent‖ or –Good‖ from Dellon's and Lanzetta's studies, respectively [6,9].

Conclusion

Wartenberg's syndrome is an underrecognized entity and is often comorbid with other pathologies of the hand or wrist. Due to overlapping symptoms and physical exam findings with conditions such as De Quervain's tenosynovitis and other neuropathies involving the radial nerve, it is often misdiagnosed, leading to undertreatment. A detailed and specific physical exam should be undertaken in order to correctly identify the condition, and to avoid inappropriate surgical procedures such as a first extensor compartment release for De Quervain's tenosynovitis. Once identified, conservative treatment should be initiated, which includes immobilization, removal of compressive agents around the wrist, as well as rest from repetitive activities involving pronation and supination of the wrist. Failing conservative treatment, surgical decompression and a full fascial release overlying SRN has shown high rates of success.

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