

Pronator teres syndrome, a challenging differential diagnosis of median nerve compression— case report

Abstract

Median entrapment neuropathies viewed as a common finding in clinical practice hold several challenging differentials diagnoses when the site of compression is proximal to the carpal tunnel, requiring a reliable understanding of the anatomy involved in this nerve path, and possible sites of compression.

The pronator teres syndrome, most seen in women around the age of 40/50 years old, can manifest by pain in the proximal anterior aspect of the forearm, usually when alternating between pronation and supination of this segment, with or without resistance and can mimic the typical distal symptoms of carpal tunnel syndrome.

This case report describes the path taken by a patient, initially exhibiting mild paresthesia of the hand and first three fingers in 2018, bilaterally, whose complaints were attributed to the misdiagnosis of carpal tunnel syndrome for about 3 years. He underwent several conservative treatments and left carpal decompression surgery without resolution. He also had several visits to the hospital and was accompanied by different specialties including Neurology, Rheumatology, and Orthopaedics. In 2021 he was referred by Orthopaedics to a Physiatry consult, where after a methodical physical exam and complementary diagnostic exams, the pronator syndrome was diagnosed.

The objective of this article is to highlight the typical challenges when facing the differential diagnosis of median nerve compression.

Keywords: pronator teres muscle, electromyography, median nerve compression, diagnosis

Volume 7 Issue 2 - 2022

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Received: March 24, 2022 | **Published:** April 13, 2022

Abbreviations: PTM, pronator teres muscle; PTS, pronator teres syndrome; EMG, electromyography; MRC, Medical Research Council

Introduction

Median entrapment neuropathies, although a common finding in everyday practice, typically in the form of carpal tunnel syndrome, holds several challenging differentials diagnosis, requiring a reliable understanding of the anatomy involved in this nerve path, and possible sites of proximal compression.¹⁻³ From proximal to distal, it's possible to find several points of compression including the Struthers' ligament, by the aponeurotic expansion of the biceps brachii muscle (*Lacertus fibrosus*), between the humeral and ulnar heads of the pronator teres muscle (PTM), and by the arch formed by the two insertions of the superficial flexor muscle of the fingers.^{4,5}

The Pronator Teres Syndrome (PTS) is first described by Henrik Seyffarth in 1951, showing the possibility of median nerve entrapment by the pronator teres muscle (PR). In most cases (66%), this muscle originates and forms two unequal heads: the larger humeral head from the upper part of the medial epicondyle and the smaller ulnar head from the coronoid process of the ulna. They pass down to the forearm, forming a common flexor tendon, and inserting into the radial shaft.³⁻⁵

Several authors report that in approximately two-thirds of the anatomic models studied, the median nerve passed between the humeral and ulnar heads of the pronator teres, distal to the first branches of the median nerve (supplying this muscle), representing a potential compression site⁴⁻⁶

PTS typical presentation consists of pain in the proximal anterior aspect of the forearm, usually when alternating between pronation and supination of this segment. As for possible clinical findings, this pain is aggravated by resistance testing of the pronator teres, compression of the pronator teres, flexor-pronator hypertrophy, and a positive Tinel sign of the median nerve at the region of the pronator muscle. This syndrome is most frequently seen in women ranging from 40 to 50 years old.⁷

This case describes the path taken by a patient, initially exhibiting mild paresthesia of the hand and first three fingers in 2018, bilaterally, whose complaints were attributed to the misdiagnosis of carpal tunnel syndrome for about 3 years. He underwent several conservative treatments and left carpal decompression surgery without resolution. He also had several visits to the hospital for these complaints and was accompanied by different specialties including Neurology, Rheumatology, and Orthopaedics. In 2021 he was referred by Orthopaedics to a Physiatry consult, where after a methodical physical exam and complementary diagnostic exams, the pronator syndrome was diagnosed.

The objective of this article is to highlight the typical challenges when facing the differential diagnosis of median nerve compression.

Clinical case description

The following case concerns a 48-year-old patient, working as seafood gathered, who was admitted to the Physical Medicine and Rehabilitation Department in November 2021. He was referred by the Orthopaedics Department, for a clinical opinion, due to recurrent

paresthesia with marked strength and sensory reduction in both hands, starting in 2018 and although he underwent conservative treatment and carpal tunnel release surgery (2019), the patient reported worsening of his symptoms.

This diagnosis was shared and supported in consultations attributed to various specialties, where the focus and analogy was the common link between the patient's typical compression symptoms and the possible well-known site of compression, the carpal tunnel. Throw out the 3 years following this case the only proximal clinical examination was performed at the cervical region. Cervical imagery was done by magnetic resonance imaging with no relevant pathological findings. This clinical suspicion was supported by an EMG of 31/05/2019, with the following report: Increased distal motor latency, conserved conduction speed, and absence of sensory response of the median nerve bilaterally. Changes compatible with bilateral severe carpal tunnel syndrome. Normal conduction studies, motor and sensory, of the cubital nerve bilaterally.

In terms of personal history, the patient was hospitalized in March 2018 in the Cardiology department for aortic-mitral endocarditis with severe heart failure, history of heroin and cocaine use for several years, hepatitis C diagnosed around 20 years ago, diagnosis of psoriasis made during the respective hospitalization and hospitalization in 2019 for ischaemic stroke, requiring fibrinolysis and with the complete recovery and achievement of autonomy at a personal and professional level (Functional Independence Measure scale of 126/126 and Barthel scale of 100/100), after the rehabilitation program.

Due to the recurrence of complaints and the absence of relief from the surgical intervention, he went for a consultation with Physical Medicine and Rehabilitation in 2021, where an important focus was given to his unusual professional activity as a shellfish picker, whose activity corresponded to a daily repetition of pronosupination motion, necessary to catch razor clams from the ground.

In the clinical examination, it was reported mild hypertrophy of the proximal forearm musculature in both arms and oedema of both hands. At the level of the elbow, no compromise on the range of motion or strength was noted, and the patient had a negative Cozen's test, or isometric testing of the extensor carpi radialis brevis, for pain and weakness. The patient had grade 4 wrist flexion and grade 3 prehension strength according to the Medical Research Council (MRC) Scale for Muscle Strength.⁸ The cervical physical examination showed no alteration, and Spurling's test was negative. At the pronator teres region, a positive Tinel's sign and compression of the pronator teres was positive with sharp pain irradiating to the first 3 fingers. The pronator teres syndrome test was negative. This test involves the compression of the median nerve by the pronator teres muscle during resisted pronation, with the elbow at 90°, the force within the pronator teres muscle is minimized by its shortened length, by eliminating the effect of the humeral head of the pronator teres. As the elbow is extended, the pronator teres muscle reaches a more optimal length for its humeral head, resulting in increased force production, thereby reducing the space between the heads of the pronator teres and the median nerve's path, reproducing the patient's symptoms if positive.⁷

After the physical examination, and the suspicion of pronator teres syndrome, the patient was accompanied by a new EMG of the left arm, with the following report: "Examination showed data compatible with a lesion of the left median nerve, located at forearm level (at or above the emergence of the branch that innervates the pronator teres muscle), of primary and moderate demyelinating physiopathology" further supporting this diagnosis.^{9,10}

The patient has then scheduled a consult to do an ultrasound-guided median nerve hydrodissection and initiate specific physical rehabilitation.¹¹

Discussion

An electrodiagnostic study is an important tool in identifying the site of compression, however, the application of this test alone, without clinical suspicion, without detailed information, or in the face of operator-dependent factors may result in misdiagnosis in cases of proximal median nerve compressions, as shown by the path chosen in this case and supported by the first EMG, for about 3 years. According to studies, when performing EMG, the operator should electromyographically test the forearm flexor muscles innervated by the median nerve, thus allowing, together with detailed clinical information, to assist in the exclusion of carpal tunnel syndrome, the most frequent site of compression.^{9,10}

The present case illustrates the difficulty described in the literature, regarding the differential diagnosis of these entities, due to the typical incidence of compression at the level of the carpal tunnel and the importance of understanding the pathophysiology of the pronator teres syndrome, to exclude this mechanism when suspected.¹²

Acknowledgments

None.

Conflicts of interest

The authors have no conflicts of interest to declare.

Funding

None.

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