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Clinical Case

Diagnosis of thoracic outlet syndrome in Primary Health Care: a case report

Diagnóstico da síndrome do desfiladeiro torácico na atenção primária à saúde: um relato de caso

Diagnóstico del síndrome del desfiladero torácico en la atención primaria de salud: reporte de un caso

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Abstract

Introduction: The diagnosis of pain affecting the cervical region and upper limbs is a common situation in the routine of Primary Health Care (PHC), although it can be challenging. The Thoracic Outlet Syndrome (TOS) is a rare cause of pain, and its identification is achieved through progressive exclusion. **Case Presentation:** A 45-year-old male patient, followed up at a Health Center, presented with pain and paresthesia in the left upper limb for three years. Despite conservative treatments, symptoms persisted, and over the course of follow-up, trophic changes emerged, along with signs suggestive of neurovascular involvement and impairment of work-related activities, which prompted further investigation. Positive provocative tests and complementary examinations confirmed the diagnosis of TOS, and the patient was referred for specialized evaluation. **Conclusions:** This case exemplifies the management of cervical musculoskeletal pain and demonstrates that, even in the face of a challenging diagnosis, care was guided by the principles of quaternary prevention, highlighting the potential of longitudinal care within PHC, in addition to addressing TOS as a diagnosis of progressive exclusion.

Keywords: Thoracic outlet syndrome; Chronic pain; Paresthesia; Nerve crush.

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Resumo

Introdução: O diagnóstico das algias que acometem a região cervical e os membros superiores é uma situação comum na rotina da Atenção Primária à Saúde (APS), contudo, pode ser desafiadora. A Síndrome do Desfiladeiro Torácico (SDT) configura-se como uma causa rara de dor e sua identificação é realizada por exclusão progressiva. **Apresentação do caso:** Paciente masculino, 45 anos, em acompanhamento na Unidade Básica de Saúde (UBS) devido a dor e parestesia no membro superior esquerdo há três anos. Apesar da realização de tratamentos conservadores, o quadro persistiu e, ao longo do acompanhamento, surgiram alterações tróficas, bem como sinais sugestivos de comprometimento neurovascular e impacto nas atividades laborais, o que motivou a ampliação da investigação. Testes provocativos positivos e exames complementares confirmaram o diagnóstico de SDT, sendo o paciente encaminhado para avaliação especializada. **Conclusão:** Este caso exemplifica o manejo de um quadro de dor musculoesquelética cervical e demonstra que, mesmo diante de um diagnóstico desafiador, a condução foi balizada pelas prerrogativas do cuidado quaternário, evidenciando o potencial da longitudinalidade do cuidado na APS, além de abordar o diagnóstico da SDT como uma exclusão progressiva.

Palavras-chave: Síndrome do desfiladeiro torácico; Dor crônica; Parestesia; Compressão nervosa.

Resumen

Introducción: El diagnóstico de los dolores que afectan la región cervical y los miembros superiores es una situación frecuente en la rutina de la Atención Primaria de Salud (APS); sin embargo, puede resultar desafiante. El Síndrome del Desfiladero Torácico (SDT) se configura como una causa rara de dolor, y su identificación se realiza mediante exclusión progresiva. Presentación del caso: Paciente masculino de 45 años, en seguimiento en una Unidad Básica de Salud (UBS), que presenta dolor y parestesias en el miembro superior izquierdo desde hace tres años. A pesar de la realización de tratamientos conservadores, el cuadro persistió y, a lo largo del seguimiento, aparecieron alteraciones tróficas, así como signos sugestivos de compromiso neurovascular e impacto en las actividades laborales, lo que motivó la ampliación de la investigación. Pruebas provocativas positivas y exámenes complementarios confirmaron el diagnóstico de SDT, siendo el paciente derivado para evaluación especializada. Conclusión: Este caso ejemplifica el manejo de un cuadro de dolor musculoesquelético cervical y demuestra que, incluso ante un diagnóstico desafiante, la atención fue guiada por los principios del cuidado cuaternario, evidenciando el potencial de la longitudinalidad del cuidado dentro de la APS, además de abordar el diagnóstico del SDT como una exclusión progresiva.

Palabras clave: Síndrome del desfiladero torácico; Dolor crónico; Parestesia; Compresión nerviosa.

INTRODUCTION

The diagnosis and treatment of pain, especially in the neck and upper limbs, are a common reality in the clinical routine of Primary Health Care (PHC). Usually, musculoskeletal disorders are associated with traumas, mechanical neck pain, tendinopathies, nerve compression syndromes, and cervical radiculopathies.[1,2] In most cases, these disorders are unspecific, with overlapping symptoms, chronic complaints, and previous treatment failures. Therefore, it is up to the family doctor to carry out a precise and progressive-exclusion approach to diagnoses.[3]

As in many cases in PHC, the approach to the patient with chronic pain complaint should be carried out respecting the principles of quaternary prevention, rationalizing the use of health resources and prioritizing evaluation through pre-tests or clinical diagnosis. Complementary tests or referrals should be requested only in cases of therapeutic failure, presence of alarming signs, or atypical evolution of the condition.[4]

The Thoracic Outlet Syndrome (TOS) comprises a heterogeneous set of clinical conditions characterized by the compression of neurovascular structures in the cervicothoracic transition, which may involve the brachial plexus, subclavian artery, or subclavian vein. This compression results in varied clinical manifestations, such as pain in the cervical and scapular regions, paresthesias, muscle weakness, and signs of vascular impairment in the upper limbs, with varying intensity and pattern according to the affected structure.[5,6]

Although potentially disabling, TOS presents low prevalence when compared to the most common causes of pain in the upper limbs treated at PHC, contributing to diagnostic delays and inadequate therapeutic approaches. The symptomatic overlap with mechanical neck pain, cervical radiculopathies, tendinopathies, and myofascial pain syndromes makes its clinical recognition particularly challenging at the first level of care.[7,8]

TOS is usually subdivided into three main forms, according to the compressed structure: neurogenic, venous, and arterial. The neurogenic form is the most prevalent, corresponding to approximately 90–95% of cases, while venous and arterial forms are less frequent, but associated with a higher risk of thrombotic and ischemic complications. Congenital anatomical variations, such as cervical rib and alterations of the first rib, although less common, may also contribute to developing the syndrome.[5,6]

The etiology of TOS is multifactorial, involving the interaction between anatomical and acquired factors. Among the latter, cervical trauma (especially whiplash), sustained postural changes, and activities that require repetitive physical exertion or prolonged elevation of the upper limbs are highlighted. These conditions favor the development of muscle contractures and myofascial trigger points in muscle groups, such as scalene, subclavian, pectoralis minor, and trapezius, contributing to the progressive compression of neurovascular structures. Such factors are particularly relevant in athletes and workers subjected to continuous mechanical overload, such as bodybuilders, rowers, and construction professionals.[9,8]

The TOS diagnosis is mainly based on clinical evaluation, through detailed anamnesis and directed physical examination, including the performance of provocative tests such as the Adson's Test and Halstead maneuver. In the Adson's Test, cervical extension and rotation associated with deep inspiration, with radial pulse palpation, are considered positive when there is reduction of the pulse and/or reproduction of the symptoms. In the Halstead maneuver, performed with the patient sitting or standing, the upper limb is abducted at approximately 45°, with lower traction, while evaluating the radial pulse; the decrease or absence of the ipsilateral pulse and/or the reproduction of pain or paresthesia characterize a positive result, suggesting neurovascular compression in the thoracic outlet.[10,11]

The complementary investigation has an auxiliary role, being mainly indicated for the exclusion of differential diagnoses, identification of anatomical variations, or etiological confirmation in selected cases. Imaging methods, such as radiography, computed tomography, magnetic resonance imaging, and vascular or brachial plexus ultrasonography, can be used in a rational and clinical context-oriented manner.[9,6]

Regarding the treatment, the initial approach to TOS should be conservative, including stepped analgesia according to pain intensity, careful use of anti-inflammatory drugs, physiotherapy focused on postural correction, stretching and muscle strengthening, as well as health education and self-care stimulation. The surgical approach remains reserved for refractory cases in relation to clinical treatment or vascular forms associated with higher risk of complications, and should be considered after specialized evaluation.[5,6]

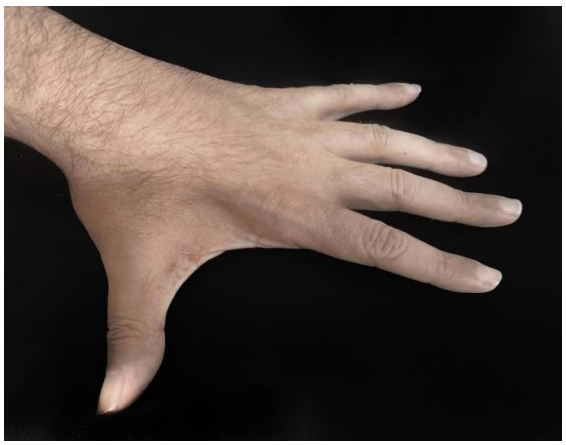
Thus, within the PHC context, TOS should be understood as a diagnosis of progressive exclusion, established along the longitudinal follow-up of the patient, based on the persistence of symptoms, conservative treatment failure, and the emergence of clinical signs suggestive of significant neurological or vascular impairment. This perspective is consistent with the principles of Family and Community Medicine, which privilege clinical reasoning, quaternary prevention, and rational use of diagnostic and therapeutic resources.

CASE PRESENTATION

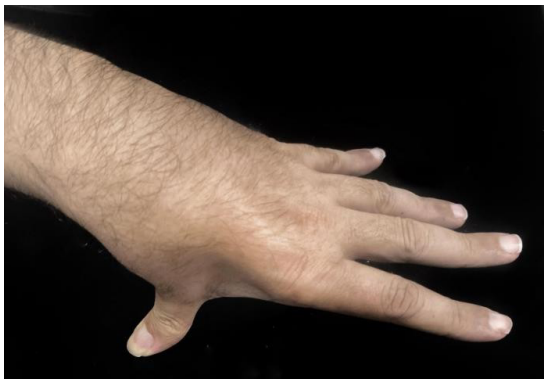
A 45-year-old male patient, with heart disease, history of metastatic mixed testicle tumor in remission for 11 years, sought a Health Center (*Unidade Básica de Saúde* – UBS) due to constant pain and paresthesia in the left upper limb, which started three years ago, with progressive worsening in the last three months. The patient reported repercussions on daily activities, especially in his work, which consists in the repetitive and continuous use of computer mouse and keyboard. Based on the anamnesis, the initial diagnosis was of chronic musculoskeletal pain resulting from functional overload and repetitive effort.

Conservative measures were adopted for the treatment of the case, such as analgesia, thiamine supplementation, and physiotherapy. However, the patient did not present significant improvement and, in addition, there was worsening of symptoms, with intensification of paresthesia and signs of tissue atrophy in the left hand, which led the team to consider neurological and/or vascular impairment, thus motivating the expansion of diagnostic investigation.

Upon physical examination, the patient presented with pain and paresthesia to active and passive mobilization of the left upper limb, in addition to pain at palpation of the supraclavicular fossa, anterior scalene, and pectoralis minor muscles. Halstead's and Adson's provocative tests were performed, which were positive. Throughout the longitudinal follow-up, dermatological alterations secondary to chronic impairment were observed—such as atrophy of skin, nails, and soft tissues (Figures 1, 2, and 3).



Source: Prepared by the authors, 2025.
Figure 1. View of the back of the left hand, spread.



Source: Prepared by the authors, 2025.
Figure 2. View of the back of the left hand, with thumb extended.

Source: Prepared by the authors, 2025.
Figure 3. View of the back of the left hand, with thumb flexion.

The patient brought previously-requested tests from other services, including electroneuromyography, which evidenced findings compatible with TOS. Doppler ultrasonography of the left upper limb was also performed, in which a reduction of the peak systolic velocity of the left subclavian artery was observed during limb assessment.

Based on the correlation between clinical history, physical examination findings, and complementary tests, the diagnosis of TOS was established, and the patient was referred for specialized evaluation in neurology and vascular surgery.

DISCUSSION

This case evidences a very common situation in the clinical practice of family doctors in PHC, in which there are daily complaints of musculoskeletal pain—in this case, involving cervical pain and upper limb. In such situations, initially, the management is syndromic, considering more prevalent and common diagnoses, such as shoulder impingement syndrome, epicondylitis, carpal tunnel syndrome, and cervical radiculopathies.[12,3,13] However, this report contributes to demonstrating how we can address atypical situations of the clinical everyday life, in which cases present long evolution and, mainly, therapeutic failures.

In the present report, initially, the proposed treatment was consistent with regard to the prioritization of conservative measures, avoiding excessive interventions and investigations. Nonetheless, the persistence and worsening of symptoms, as well as the refractoriness in relation to the initial treatment measures, demonstrated the need to use other diagnostic means to correctly diagnose and treat the patient.

TOS is a heterogeneous clinical condition due to the compression of neurovascular structures in the thoracic outlet, region delimited by cervical muscles, clavicle, and first rib. The anatomical complexity of this region explains the clinical variability and diagnostic difficulty of the syndrome, especially in PHC, where unspecific musculoskeletal conditions predominate.[5,10,8]

From an epidemiological point of view, TOS predominantly affects young, economically-active adults, with a higher prevalence in women, in an approximate proportion of 3:1. According to recent studies, neurogenic forms have a higher predilection for women, while venous forms occur more often in men.[14,15] Furthermore, it is observed that vascular presentations tend to occur in earlier age groups, whereas neurogenic TOS is concentrated between the third and fourth decades of life, which reinforces its functional and socioeconomic impact.[5,6]

The clinical presentation of TOS varies according to the pathophysiological mechanism involved. In arterial forms, patients may present with symptoms compatible with ischemia, such as persistent pain in the affected limb, paresthesias, skin coldness, paleness, and exacerbation of symptoms at exertion, with improvement at rest. Venous involvement is classically manifested by proximal edema of the upper limb, superficial venous dilation, and cyanosis, and may or may not be associated with pain. In the most prevalent neurogenic form, cervical pain, paresthesias, sensory and motor deficits predominate, with possible evolution to functional impairment and muscular trophic changes such as hypotrophy or atrophy.[5,8,6]

In the present case, the association of pain and paresthesia in the upper left limb, accompanied by trophic alterations, suggests a pattern of predominantly neurogenic involvement, with possible chronic vascular repercussion. According to recent literature, mixed presentations are frequent, reinforcing the understanding of TOS as a continuous clinical spectrum, and not as strictly defined categories.[6,9]

The TOS diagnosis remains essentially clinical, based on detailed anamnesis and directed physical examination. Initially, patients may report ill-localized pain, feeling of weight or fatigue in the upper limb after prolonged use, and unspecific paresthesias, symptoms often attributed to common musculoskeletal conditions in PHC.[16] With the progression of the syndrome, signs of vascular involvement can appear, such as skin coldness, paleness, and cyanosis, which requires greater clinical surveillance by the family doctor.[9,17,6]

In view of this unspecific condition, the differential diagnosis of TOS should include vascular conditions, such as atherosclerosis, vasculitis and Raynaud's syndrome; neurological, such as carpal tunnel syndrome and cervical radiculopathy; and musculoskeletal, such as shoulder impingement syndrome and mechanical neck pain.[10] Recent studies reinforce that the progressive exclusion of these conditions is a key part of clinical reasoning in primary care, especially in chronic pain syndromes of the upper limb.[8,6]

Although physical examination is essential in the evaluation, there are no pathognomonic signs of TOS. It is recommended a systematic evaluation that includes skin inspection, investigation of trophic alterations, peripheral pulse palpation, and complete neurological examination of sensitivity and motor skills. Provocative tests, such as Adson's Test and Halstead maneuver, can help in diagnostic suspicion, especially in cases with possible vascular impairment, although they have limited sensitivity and specificity and should be interpreted with caution.[9,5]

It should be noted that complementary tests have an adjuvant role and must be requested in a careful way, in accordance with the principles of quaternary prevention. Standard X-rays allow to identify bone alterations or anatomical variations, while methods, such as computed tomography, magnetic resonance imaging, and vascular or brachial plexus ultrasonography, contribute to anatomical characterization and exclusion of differential diagnoses, especially in refractory cases or those with signs of clinical severity.[9,6,18]

The treatment of TOS should be preferably initiated by a conservative approach, especially in neurogenic and muscular forms. This approach includes stepped analgesia, careful use of anti-inflammatory drugs, physiotherapy focused on strengthening the muscles of the scapular waist, postural correction, and health education. The modification of occupational activities and the reduction of repetitive efforts are paramount strategies for the control of symptoms and prevention of recurrences, as highlighted in recent reviews.[5,8]

Authors of contemporary studies indicate that only a minority of patients (about 10 to 20%) present criteria for surgical treatment, usually related to refractory treatment to conservative treatment, or presence of significant anatomical anomalies or vascular complications. In cases of arterial vascular involvement or

suspicion of severe secondary etiologies, such as pulmonary apex neoplasms, the specialized evaluation should be quickly performed.[6]

In the present case, refractoriness to conservative treatment justified the referral for specialized evaluation, highlighting the central role of Family and Community Medicine in coordinating care and in shared decision-making. Surgical techniques aim at decompression of the neurovascular bundle, which may involve first rib resection, scalenectomy, or pectoralis minor release. Despite the good results in selected cases, these interventions are associated with potential complications, such as pneumothorax, chylothorax, vascular lesions, and phrenic nerve paralysis, which reinforces the importance of adequate patient selection.[5,6,19]

CONCLUSIONS

TOS is a disease that can cause significant damage to the quality of life of the patient, with clinical consequences that affect their daily, work, and leisure activities. It is a pathology with unspecific clinical signs that commonly resembles other disorders affecting the thoracic spine region, especially in its early stages.

In this report, however, we do not seek to merely investigate the diagnosis of TOS or to reinforce that professionals have knowledge of the syndrome—which, consequently, can lead to the correct and early diagnosis—but rather expand the focus of disease management in PHC, based on the prerogatives of quaternary prevention, longitudinal care, and attention to warning signs, therapeutic failures, and persistence of symptoms. This is how we will achieve, within the scope of Family and Community Medicine, the appropriate treatment and resumption of the patient's quality of life and well-being.

ETHICS COMMITTEE

The research was submitted to the evaluation of the Research Ethics Committee, under CAAE 25126719.8.0000.5342, and conducted in accordance with the ethical principles established by Resolution No. 466/2012 of the National Health Council, which provides for the guidelines and regulatory standards of research involving human beings, ensuring respect for the principles of autonomy, beneficence, nonmaleficence, justice, and equity, as well as the protection of participants regarding information confidentiality and Informed Consent Form. Furthermore, the patient signed the Informed Consent Form, authorizing the disclosure of clinical information for academic and scientific purposes, with guarantee of confidentiality and anonymity.

CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS' CONTRIBUTIONS

MWPL: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. SOS: Conceptualization, Formal analysis, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing. CSR: Conceptualization, Data curation, Methodology,

Writing – original draft, Writing – review & editing. NCA: Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. GLV: Conceptualization, Methodology, Visualization, Writing – original draft, Writing – review & editing. TCF: Methodology, Project administration, Supervision, Validation, Writing – review & editing.

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