

Pseudoangina as an Unusual Presentation of Non-Osseous Arterial Thoracic Outlet Syndrome: A Case Report.

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Case Report

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Abstract

Background

Thoracic outlet syndrome (TOS) encompasses disorders caused by compression of the neurovascular structures traversing the thoracic outlet. Arterial thoracic outlet syndrome (aTOS) is the rarest subtype, accounting for approximately 1% of cases. It is typically associated with cervical ribs or other osseous abnormalities and carries a significant risk of distal embolization and limb-threatening ischemia. Presentation with recurrent angina-like chest pain is uncommon and may result in diagnostic delay.

Case Presentation

A 27-year-old previously healthy man presented with recurrent left-sided chest pain radiating to the neck and left upper limb for four weeks. Initial investigations for a cardiac cause, including serial electrocardiograms, cardiac biomarkers, transthoracic echocardiography, treadmill stress testing, coronary angiography, and Holter monitoring, were normal. Further evaluation revealed intermittent left upper-limb paresthesia and cold intolerance. The Adson maneuver reproduced symptoms and was associated with attenuation of the left radial pulse and dusky discoloration of the fingers. Chest and cervical spine radiographs showed no cervical rib or other osseous abnormality. Dynamic computed tomography angiography demonstrated positional compression of the left subclavian artery during arm abduction, which resolved in the neutral position, while dynamic venography was normal. A diagnosis of left-sided non-osseous arterial thoracic outlet syndrome was established. The patient was referred for vascular surgical evaluation and thoracic outlet decompression.

Conclusion

Arterial thoracic outlet syndrome should be considered in young patients with recurrent non-cardiac chest pain, particularly when accompanied by upper-limb neurovascular symptoms. A high index of suspicion and dynamic vascular imaging are critical for timely diagnosis, especially in the absence of the osseous abnormalities classically associated with aTOS.

Introduction

Thoracic outlet syndrome (TOS) refers to a spectrum of disorders resulting from compression of the brachial plexus, subclavian artery, or subclavian vein within the thoracic outlet, a confined space bordered by the clavicle, first rib, and scalene muscles.¹ Based on the structure involved, TOS is classified as neurogenic (nTOS), venous (vTOS), or arterial (aTOS).^{1,2} Neurogenic TOS accounts for more than 90% of cases, venous TOS approximately 3–4%, and arterial TOS only about 1%.^{1,3,4}

Although rare, aTOS is clinically important because delayed diagnosis may result in arterial injury, thrombosis, distal embolization, and limb-threatening ischemia.^{3,5} It predominantly affects young adults without conventional cardiovascular risk factors and is strongly associated with cervical ribs or other congenital osseous abnormalities.^{1,5,6}

The usual presentation of aTOS includes upper-limb ischemic symptoms such as pain, pallor, coldness, and paresthesia.^{1,6} Chest pain is an unusual manifestation and may mimic cardiac ischemia, leading to extensive cardiological evaluation before the correct diagnosis is established. We report a rare case of non-osseous arterial thoracic outlet syndrome presenting predominantly as recurrent angina-like chest pain in the absence of any identifiable bony abnormality.

Case Report

A 27-year-old man with no medical comorbidities, cardiovascular risk factors, or significant family history presented with recurrent episodes of left-sided chest pain for four weeks. The pain radiated to the left side of the neck and upper limb and occurred intermittently without a clear relationship to exertion. He denied dyspnea, palpitations, diaphoresis, syncope, fever, trauma, or strenuous upper-limb activity.

Because of the recurrent chest pain, an acute coronary syndrome was initially suspected. Serial electrocardiograms and cardiac biomarkers were normal. Persistent symptoms led to referral to a tertiary cardiac center, where transthoracic echocardiography demonstrated normal cardiac structure and function. Exercise treadmill testing was negative for inducible ischemia, coronary angiography revealed normal coronary arteries, and 24-hour Holter monitoring showed no significant arrhythmias or ischemic changes. A cardiac etiology was therefore considered unlikely.

The patient was subsequently referred for evaluation of persistent non-cardiac chest pain. Differential diagnoses included musculoskeletal disorders, pleuropulmonary diseases, and thoracic outlet syndrome. Focused reassessment revealed that the chest pain was consistently associated with radiation to the left upper limb, intermittent paresthesia, and subjective coldness of the left hand.

Given these neurovascular symptoms, a focused vascular examination was performed. The Adson maneuver reproduced the patient's symptoms and resulted in attenuation of the left radial pulse with dusky discoloration of the fingers, while the contralateral limb remained normal (Fig. 1). These findings suggested dynamic arterial compression at the thoracic outlet.

Radiographs of the chest and cervical spine demonstrated no cervical rib, anomalous first rib, elongated C7 transverse process, or other osseous abnormality.

Dynamic computed tomography angiography performed with provocative arm positioning demonstrated significant compression of the left subclavian artery during overhead abduction, with restoration of normal caliber in the neutral position (Fig. 2). Dynamic venography showed no venous obstruction or thrombosis.

Based on the clinical findings and dynamic vascular imaging, a diagnosis of left-sided non-osseous arterial thoracic outlet syndrome was established. The principal diagnostic challenge was the atypical presentation with recurrent angina-like chest pain and the absence of any bony abnormality. The patient was referred to vascular surgery for definitive management. Thoracic outlet decompression was recommended; however, the patient declined surgical intervention. No ischemic complications occurred during the period of observation.

Timeline

Time	Clinical Event
4 weeks before diagnosis	Onset of recurrent left-sided chest pain radiating to the neck and left upper limb
Initial presentation	Evaluation for suspected acute coronary syndrome
Subsequent days	Serial ECGs and cardiac biomarkers normal
Tertiary cardiac evaluation	Echocardiography, treadmill stress test, coronary angiography, and Holter monitoring normal
Further assessment	Intermittent paresthesia and cold intolerance of the left upper limb identified
Vascular examination	Positive Adson maneuver with radial pulse attenuation and finger discoloration
Diagnostic imaging	Dynamic CT angiography demonstrated positional compression of the left subclavian artery
Final diagnosis	Left-sided non-osseous arterial thoracic outlet syndrome
Outcome	Referred for vascular surgical management; surgery declined

Discussion

Arterial thoracic outlet syndrome is the rarest but potentially most serious form of TOS because untreated subclavian artery compression may lead to aneurysm formation, thrombosis, distal embolization, and irreversible limb ischemia.^{3,5} Most patients are young adults without atherosclerotic risk factors and have an associated cervical rib or other osseous anomaly.^{1,5,6}

The absence of any identifiable bony abnormality in our patient is therefore noteworthy. Previous studies have reported a strong association between aTOS and cervical ribs or anomalous first ribs, with cervical ribs implicated in the majority of cases.^{1,4,5} A meta-analysis demonstrated a markedly higher prevalence of cervical ribs among symptomatic TOS patients than among the general population.⁷ Consequently, the occurrence of aTOS without an underlying osseous abnormality is distinctly uncommon.

In such cases, compression is presumed to arise from soft-tissue structures, including hypertrophied scalene muscles or fibromuscular bands within the scalene triangle.⁵ Positional or repetitive compression mechanisms have also been described, particularly in individuals performing frequent overhead arm movements.⁸

Another distinctive aspect of this case was the predominance of chest pain rather than overt upper-limb ischemia. Thoracic outlet compression can occasionally produce pseudoangina, a clinical syndrome that closely mimics cardiac ischemia despite normal coronary arteries.^{8,9} Pain may result from involvement of the lower brachial plexus or adjacent sympathetic fibers, leading to referred discomfort in the anterior chest wall.^{8,9} The associated upper-limb paresthesia and cold intolerance provided the key clinical clues that redirected evaluation toward a vascular thoracic outlet disorder.

Provocative maneuvers such as the Adson test have limited specificity and should not be interpreted in isolation.¹ However, reproduction of the patient's symptoms together with objective digital color changes and pulse attenuation strengthened the clinical suspicion. Definitive diagnosis was achieved through dynamic CT angiography, which demonstrated reversible compression of the subclavian artery during arm abduction.

Cross-sectional imaging with provocative positioning plays a central role in the evaluation of suspected vascular TOS by defining the site and severity of arterial compression.^{5,6} In the present case, dynamic imaging was particularly valuable because conventional radiography failed to identify the osseous abnormalities typically associated with aTOS.

Management of aTOS generally requires surgical decompression to prevent progressive arterial injury and thromboembolic complications.^{5,6} Although our patient declined surgery, early vascular surgical referral was warranted given the demonstrated dynamic arterial compression.

The main strength of this report is the documentation of a rare presentation of non-osseous aTOS manifesting as recurrent angina-like chest pain. Its principal limitation is the absence of long-term follow-up and postoperative outcome data.

Conclusion

Arterial thoracic outlet syndrome should be considered in young patients with persistent or recurrent chest pain when cardiac investigations are unrevealing, particularly in the presence of upper-limb neurovascular symptoms. Although most cases are associated with cervical ribs or other osseous abnormalities, aTOS can occur in their absence. Dynamic vascular imaging is essential for diagnosis and facilitates timely referral for definitive management.

Abbreviations

TOS

thoracic outlet syndrome

aTOS

arterial thoracic outlet syndrome

nTOS

neurogenic thoracic outlet syndrome

vTOS

venous thoracic outlet syndrome

CT

Computerised Tomography

Declarations

Funding - Nil

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Consent to participate – Not Applicable

Written Consent for publication - Written informed consent was obtained from the patient for publication of this case report and the accompanying clinical and radiologic images.

Availability of data and material (data transparency) - Not Applicable

Code availability – Not Applicable

Large Language Model (LLM) - Not Applicable

Authors' contributions -

Dr Manish Singh - Conceived the study, managed the patient, performed the literature review, interpreted the clinical findings, and wrote the initial manuscript draft.

Dr Puneet Saxena - Contributed to the clinical management, critically reviewed the manuscript, provided expert intellectual input and approved the final version for publication.

Dr Simple Gupta - Contributed to manuscript revision, and critical review of the literature.

Dr Deepu K Peter - Assisted with data collection, acquisition of clinical information, and manuscript editing.

Dr Rahul Dudhal - Contributed to the interpretation of findings and critically revised the manuscript for important intellectual content.

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Figures



Figure 1

Clinical photograph taken during the Adson manoeuvre showing diffuse dusky and violaceous discolouration of the left hand and fingers, contrasting with the normally perfused right hand.

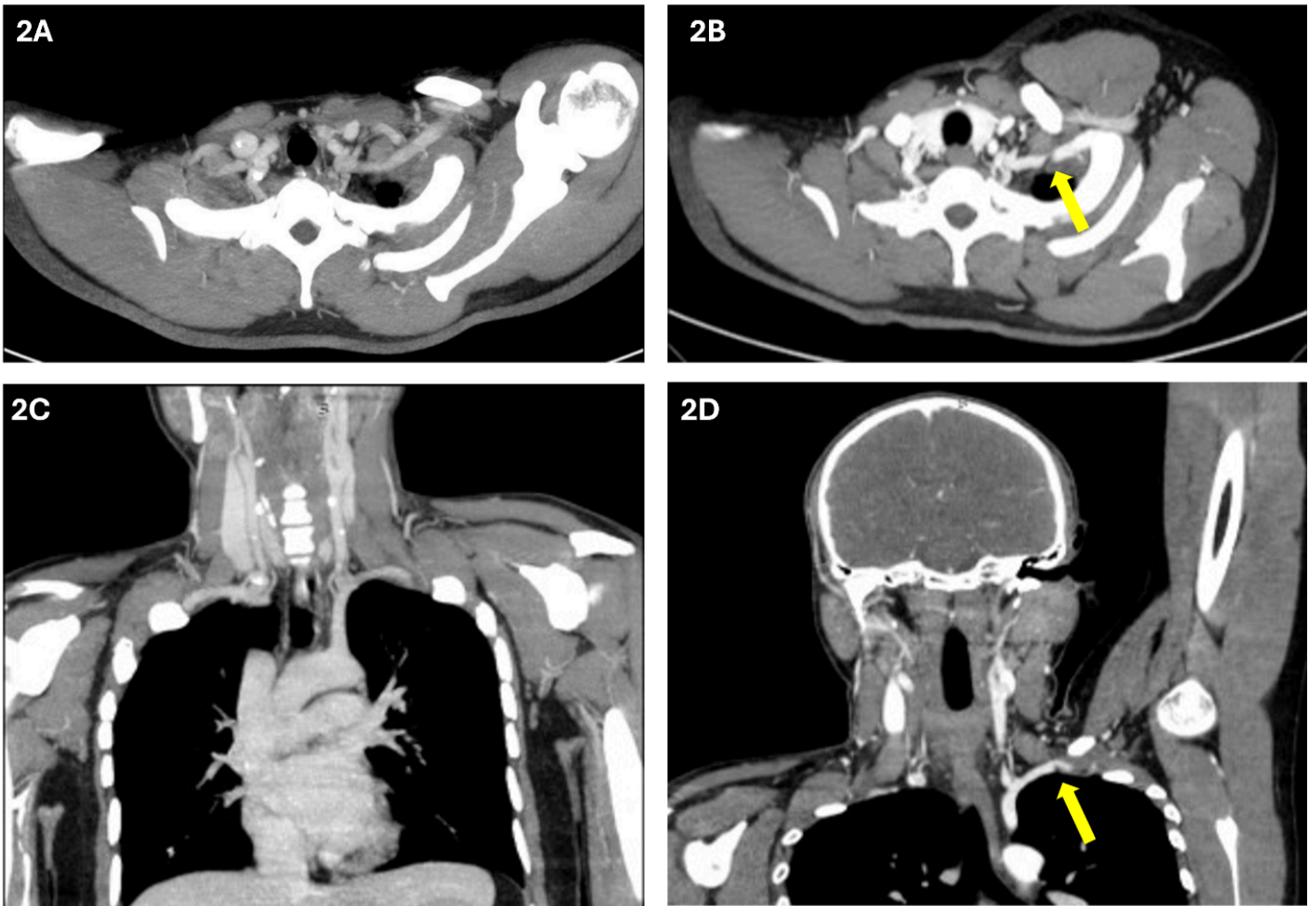


Figure 2

Dynamic CT angiography of the thoracic outlet; maximum intensity projection reconstructions. Axial (2A) and coronal (2C) images acquired with the arms in the neutral position show the left subclavian artery to be of normal calibre as it traverses the costoclavicular space, measuring 9.0 mm in diameter. Axial (2B) and coronal (2D) images acquired with the arms in overhead abduction demonstrate severe focal narrowing of the left subclavian artery within the costoclavicular space, between the clavicle and the first rib (arrows), with a residual lumen of 0.9 mm — a 90% reduction in luminal diameter. Post-stenotic dilatation is seen in the segment immediately distal. No cervical rib, anomalous first rib or elongated C7 transverse process was identified.