

Worsening Hypertensive Control as a Clue to High-Grade Brachiocephalic and Subclavian Artery Stenosis in Primary Care: A Case Report

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Patient: Male, 67-year-old
Final Diagnosis: Brachiocephalic • subclavian artery stenosis
Symptoms: Unequal blood pressure
Clinical Procedure: —
Specialty: Family Medicine

Objective: Unusual clinical course
Background: Upper-extremity peripheral arterial disease (PAD) is a less common manifestation of peripheral arterial disease than lower-extremity PAD. Many patients with upper-extremity PAD remain asymptomatic until significant arterial stenosis develops, leading to the manifestation of limb ischemia. Measuring bilateral arm blood pressure can detect an inter-arm blood pressure difference and lead to early diagnosis and management. This report describes the case of a 67-year-old man who presented with uncontrolled hypertension and was found to have unequal upper-limb blood pressure measurements due to high-grade brachiocephalic and subclavian artery stenosis.

Case Report: We present the case of a 67-year-old man who attended a primary care clinic for hypertension follow-up. He experienced worsening of his previously controlled hypertension over 3 months, without claudication or neurological symptoms. Physical examination identified a significant inter-arm blood pressure discrepancy and diminished pulses in the affected limb. Computed tomography angiography confirmed high-grade stenosis over the right brachiocephalic artery and subclavian artery. He was subsequently referred to the vascular team and managed with medical therapy and regular surveillance. At 1-year follow-up, he remained asymptomatic with no reported complications.

Conclusions: This case highlights the importance of considering upper-extremity PAD in patients with uncontrolled hypertension detected during a routine primary care follow-up. Early diagnosis and optimal medical therapy are crucial for achieving favorable outcomes and preventing complications by reducing cardiovascular risk.

Keywords: Blood Pressure • Hypertension • Peripheral Arterial Disease • Subclavian Artery • General Practitioners

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Introduction

Brachiocephalic and subclavian artery stenoses are uncommon manifestations of peripheral arterial disease (PAD), with a reported prevalence of approximately 1.5% [1]. Their presence indicates systemic atherosclerosis and is linked to increased cardiovascular morbidity and mortality, independent of pre-existing cardiovascular disease (CVD) and its risk factors [2]. The primary underlying cause is atherosclerosis, although nonatherosclerotic conditions associated with subclavian artery stenosis also exist, such as various forms of arteritis, thoracic outlet syndrome, fibromuscular dysplasia, and neurofibromatosis [3].

Patients typically present in their sixth or seventh decade of life, and the disease increases with PAD risk factors such as smoking, diabetes mellitus, hypertension, dyslipidemia, and lower-extremity PAD [1]. Among those with subclavian or brachiocephalic artery lesions, 52% have coexisting coronary artery disease, while 29% have carotid artery stenosis [4]. Therefore, these patients are at a higher risk of developing coronary artery disease and cerebrovascular events. Among reported cases of brachiocephalic and subclavian artery stenosis, diagnosis is typically made in tertiary care settings, highlighting a potential gap in early recognition at the primary care level [5,6]. We report the case of a 67-year-old man with unequal upper-limb blood pressure measurements due to right brachiocephalic and subclavian artery stenosis. The case highlights the importance of considering upper-extremity PAD, particularly in patients presenting with uncontrolled hypertension during primary care follow-up.

Case Report

A 67-year-old man with diabetes mellitus, hypertension, stage 3a chronic kidney disease, and dyslipidemia attended a regular follow-up visit at a primary care clinic. His blood pressure has been uncontrolled over the previous 3 months after previously reaching a target of 130/80 mm Hg. He has been on a single-agent antihypertensive—perindopril 8 mg once daily—for the past year. During previous visits when his blood pressure was normotensive, the arm used for measurement was not recorded. He was asymptomatic and did not specifically report any upper- or lower-limb pain, claudication symptoms, weakness, or coldness. He also denied any chest pain, exertional symptoms or symptoms suggestive of subclavian steal syndrome such as dizziness, syncope, visual disturbance, or neurological deficits.

On physical examination, he had a lean build, with a body mass index of 24 kg/m² and no other features suggestive of secondary hypertension. Peripheral pulses were palpable bilaterally but were reduced in the right brachial and radial arteries.

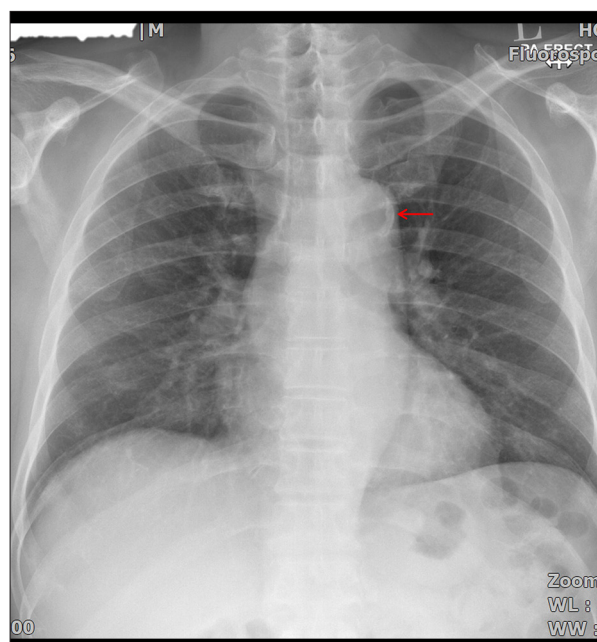


Figure 1. Posteroanterior erect chest radiograph showed normal lungs, mural calcification of the aortic knuckle (red arrow), and normal heart size.

A notable 38 mm Hg difference in systolic blood pressure between the arms was observed, with the left arm measuring 162 mm Hg and the right 124 mm Hg. There was no significant difference between the diastolic pressures of his arms, which were approximately 75 to 76 mm Hg. There were no signs of limb ischemia, skin changes, or muscle wasting. Cardiac and lung examinations were unremarkable.

Chest radiography showed mural calcification at the aortic knuckle, with a normal heart size (**Figure 1**). A standard 12-lead electrocardiogram (ECG) (**Figure 2**) revealed a sinus rhythm with left axis deviation. The patient was referred to the surgical team and further evaluated with duplex ultrasonography, which revealed biphasic waveforms in the right brachial, radial, and ulnar arteries, with normal arterial flow patterns in the left upper limb. Computed tomography (CT) angiography (**Figure 3**) was then performed, revealing high-grade stenosis at the junction of the distal right brachiocephalic artery and proximal right subclavian artery, with a mural calcified plaque or thrombus. Subsequent magnetic resonance imaging (MRI) of the thorax (**Figure 4**) showed no external compression or fibrous bands along or near the stenotic segment.

Under the care of the vascular team, he was started on antiplatelet therapy, and his antihypertensive regimen was optimized, escalating from monotherapy (perindopril 8 mg once daily) to combination therapy by adding a beta-blocker (metoprolol 100 mg twice daily) and a calcium channel blocker (amlodipine 10 mg once daily). He was instructed to have his blood

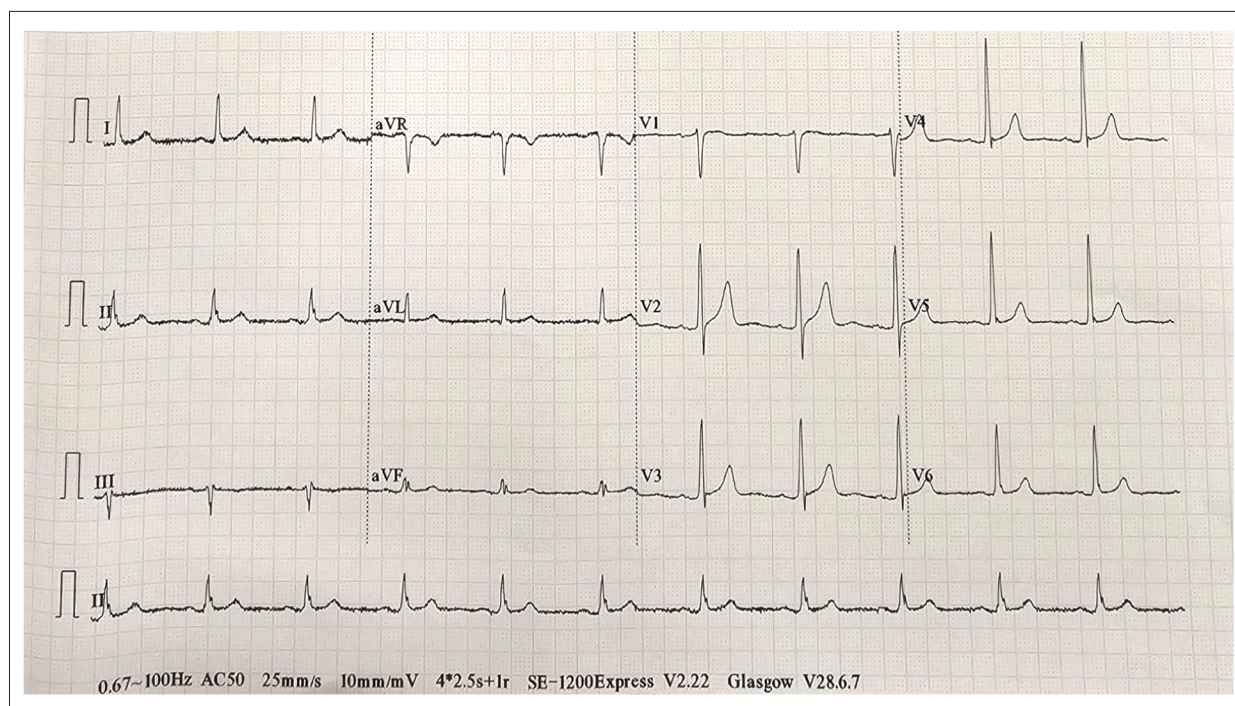


Figure 2. Standard 12-lead electrocardiogram revealed a sinus rhythm with left axis deviation.



Figure 3. Contrast-enhanced computed tomography scans in coronal (A), axial (B), and sagittal (C) views showed high-grade stenosis in the distal right brachiocephalic artery and the proximal right subclavian artery, with mural calcified plaque or thrombus (red arrows).

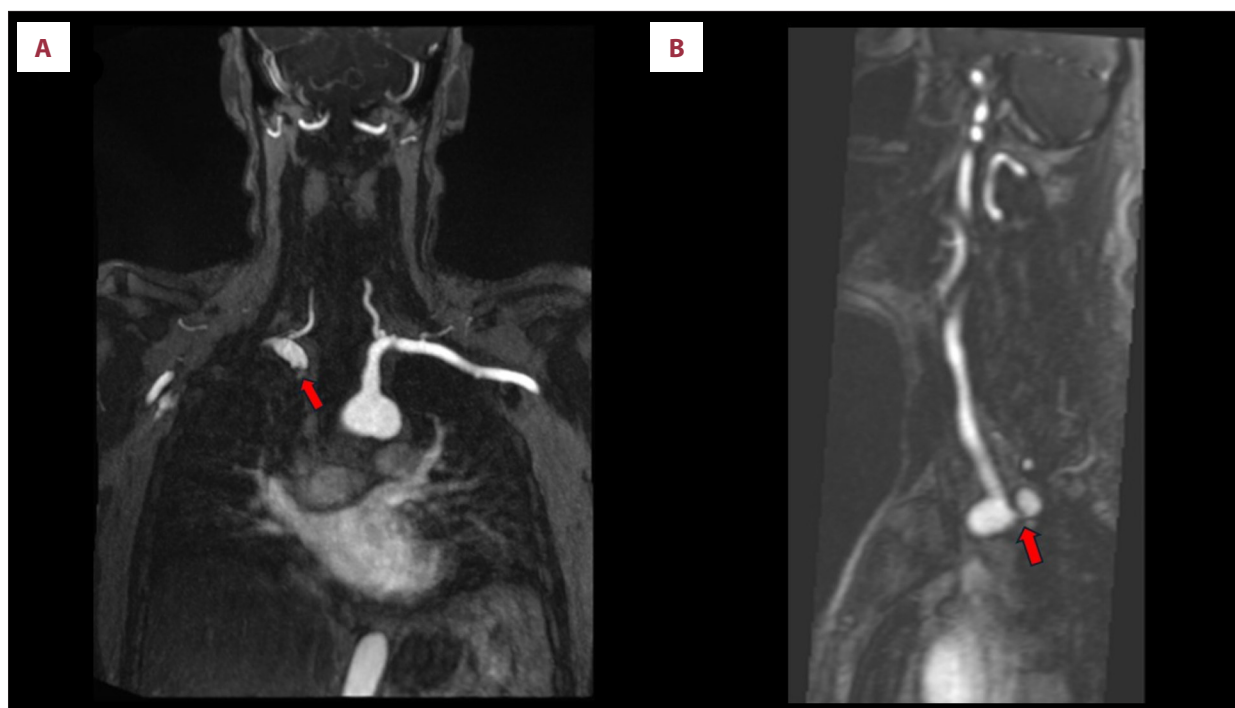


Figure 4. Contrast-enhanced magnetic resonance imaging in coronal (A) and sagittal (B) views showed a high-grade stenosis at the distal right brachiocephalic artery and proximal right subclavian artery (red arrows). The thrombus is not as obvious as in computed tomography scan, but shows no external compression or fibrous band along or near the stenotic segment.

pressure measured using his left arm. Shared care between the primary care physician and the vascular surgeon continued with follow-ups at 3- to 6-month intervals. Revascularization was not offered because of the absence of ischemic symptoms. At the 1-year follow-up, the patient remained asymptomatic, with good blood pressure control and no progression of symptoms or occurrence of ischemic events.

Discussion

The significance of bilateral arm blood pressure measurement in a patient presenting with uncontrolled hypertension in primary care is highlighted in this case to aid in diagnosis of upper-extremity PAD. Identifying this condition early in a primary care patient is important as the disease increases the risk of CVD mortality and morbidity [2]. This report shows that this uncommon vascular disease may first be recognized during a routine hypertension follow-up, prior to the onset of symptoms, highlighting the advantageous position of primary care physicians in early recognition to facilitate timely vascular diagnosis and cardiovascular risk reduction among patients at high risk or with suspected vascular disease.

In this case, the 67-year-old man presented with worsening blood pressure control despite previously being stable on anti-hypertensive treatment. Previous case reports have identified

incidental findings of subclavian artery stenosis in different clinical settings. One case involved a patient who presented to the emergency department with diabetic ketoacidosis, whereas another was identified during surgery [5,6]. These case reports also highlighted a marked inter-arm systolic blood pressure difference as a key clinical finding that prompted further vascular evaluation. To date, we have not found a case report describing uncontrolled hypertension as the initial presentation of upper-extremity PAD in a primary care setting. Once symptomatic, upper-extremity PAD carries higher rates of morbidity and mortality, including chronic symptoms in 21.3% of patients, an amputation rate of 13.3%, and a 2-year mortality rate of 10% [7]. Therefore, timely identification of proximal arterial disease before the development of symptoms and ischemic complications are crucial.

A systolic inter-arm blood pressure difference greater than 10 to 15 mm Hg is highly predictive of subclavian or proximal arterial disease and should prompt further vascular evaluation [8]. Although the current local Clinical Practice Guideline on the Management of Hypertension (2018) recommends bilateral arm blood pressure measurement at the initial visit, this single-case observation suggests that repeating inter-arm blood pressure measurement during follow-up may be beneficial in selected patients with long-standing cardiovascular risk factors, especially when blood pressure control worsens or when asymmetrical vascular findings are present.

Initial evaluation in suspected cases includes confirmation of blood pressure measurements in both arms, pulse examination, and assessment for symptoms of limb ischemia or neurological compromise. Duplex ultrasonography serves as a first-line, non-invasive investigation to detect arterial flow abnormalities [1]. Advanced vascular imaging, such as CT angiography or MRI, can subsequently confirm the diagnosis and facilitate further management. In this patient, advanced imaging with CT angiography demonstrated stenosis of the proximal arteries, while the MRI thorax excluded extrinsic compression, supporting a diagnosis of atherosclerotic occlusive disease.

Another important finding in this case was the presence of aortic arch calcification (AAC) on chest radiography. As chest radiography is widely available and commonly performed in primary care settings, recognition of AAC also provides an additional clue to underlying systemic atherosclerotic disease [9]. Therefore, incidental detection of AAC should prompt clinicians to consider a more comprehensive cardiovascular risk assessment and evaluation for concomitant vascular disease, particularly in patients with multiple cardiovascular risk factors.

Current management of brachiocephalic and subclavian artery stenoses depends on symptom burden and the degree of ischemia [10]. Revascularization procedures such as bypass grafting, angioplasty, and stenting are generally reserved for symptomatic patients [10]. In asymptomatic patients, optimal medical therapy remains the cornerstone of management, and this includes antiplatelet therapy, aggressive blood pressure control, lipid and glycemic optimization, and smoking cessation [10]. Targets include blood pressure below 130/80 mm Hg, low-density lipoprotein cholesterol below 1.4 mmol/L, and glycated hemoglobin (HbA1c) below 7% [10]. Primary care physicians play a central role in coordinating care through regular monitoring and optimization of medical therapies. Consistent with these principles, our patient was managed conservatively with antiplatelet therapy and intensification of antihypertensive treatment, while remaining under vascular surveillance.

References:

1. Patel RAG, White CJ. Brachiocephalic and subclavian stenosis: Current concepts for cardiovascular specialists. *Prog Cardiovasc Dis.* 2021;65:44-48
2. Aboyans V, Criqui MH, McDermott MM, et al. The vital prognosis of subclavian stenosis. *J Am Coll Cardiol.* 2007;49(14):1540-45
3. Bruntzos EN, Petersen B, Binkert C, et al. Primary stenting of subclavian and innominate artery occlusive disease: A single center's experience. *Cardiovasc Intervent Radiol.* 2004;27(6):616-23
4. Ochoa VM, Yeghiazarians Y. Subclavian artery stenosis: A review for the vascular medicine practitioner. *Vasc Med.* 2011;16(1):29-34
5. Ravichandran A, Anand NN, Ramalingam AK, Mohan A. Discrepancy of blood pressure between limbs bilateral subclavian artery stenosis: A case report. *International Journal of Advances in Medicine.* 2022;10(1):82-84
6. Kim DH, Yun MJ, Na HS, et al. Bilateral subclavian artery stenosis found by inter-arm blood pressure difference during distal pancreatectomy. *Korean J Anesthesiol.* 2013;65(5):477-79

Conclusions

This case report demonstrates the importance of inter-arm blood pressure measurement among patients with uncontrolled or worsening blood pressure control during routine follow-up visits, which presents an opportunity to detect upper-extremity PAD early within primary care settings prior to the onset of symptoms. The worsening of this hypertension control should prompt consideration of alternative causes, such as vascular disease or inaccurate blood pressure measurement, before intensifying antihypertensive therapy. Early detection before the manifestation of ischemia enables timely referral, accurate blood pressure assessment, and implementation of cardiovascular risk-reduction measures.

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Declaration About Informed Consent

Signed informed consent was provided by the patient.

AI Disclosure

All information in this report was extracted from the patient's medical records. ChatGPT was used during the preparation of this manuscript to assist with language refinement, grammar, and improvement of clarity and readability. Following the use of this tool, the authors carefully reviewed, evaluated, and revised the content as necessary and take full responsibility for the accuracy and final content of the publication.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

7. Armengol G, Goudot G, Miranda S, et al. Symptomatic upper extremity peripheral artery disease is associated with poor outcomes and a broad spectrum of etiologies. *Angiology*. 2025;76(4):382-90
8. Clark CE, Taylor RS, Shore AC, et al. Association of a difference in systolic blood pressure between arms with vascular disease and mortality: A systematic review and meta-analysis. *Lancet*. 2012;379(9819):905-14
9. García Tellado A, Castillo Leonet A, Queipo Menéndez J, et al. Significance of aortic arch calcification as a cardiovascular risk marker: Analysis of a cohort of hospitalized patients in internal medicine. *Rev Clin Esp (Barc)*. 2025;225(8):502350
10. Mazzolai L, Teixido-Tura G, Lanzi S, et al. 2024 ESC Guidelines for the management of peripheral arterial and aortic diseases. *Eur Heart J*. 2024;45(36):3538-700