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Case Report

Radiological diagnosis and emergency endovascular management, and follow-up of a unruptured right subclavian artery aneurysm in an elderly patient: A case report ☆

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ABSTRACT

Right subclavian artery aneurysms are rare vascular anomalies that can present significant diagnostic and management challenges, especially in elderly patients. We present a case of a 72-year-old female who presented with sudden onset chest pain and was diagnosed with an unruptured right subclavian artery aneurysm with partial thrombus formation. Advanced imaging, including chest X-ray and contrast-enhanced CT scan, confirmed the diagnosis and guided a successful endovascular repair, stabilizing the patient. Follow-up care included regular clinical assessments and imaging studies to monitor the aneurysm's status and detect potential complications. This case underscores the critical role of early radiological diagnosis and prompt intervention in managing subclavian artery aneurysms, highlighting the effectiveness of endovascular techniques in such cases.

Introduction

Right subclavian artery aneurysms are uncommon, comprising less than 1% of all peripheral artery aneurysms [1]. These aneurysms often remain asymptomatic until they reach a critical size or cause significant complications such as rupture or compression of adjacent structures, leading to life-threatening conditions. It is essential to distinguish between true aneurysms and pseudoaneurysms for proper diagnosis and treatment. True aneurysms involve all 3 layers of the arterial wall, whereas pseudoaneurysms result from a breach in the arterial wall, with blood contained by the surrounding tissues, forming a false lumen [2,3]. These aneurysms often remain asymptomatic until they reach a critical size or cause significant complications such as rupture or compression of adjacent structures, leading to life-threatening conditions. Early detection and appropriate management are crucial to preventing this condition's associated morbidity and mortality. With the advent of advanced imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI), the diagnosis and characterization of these

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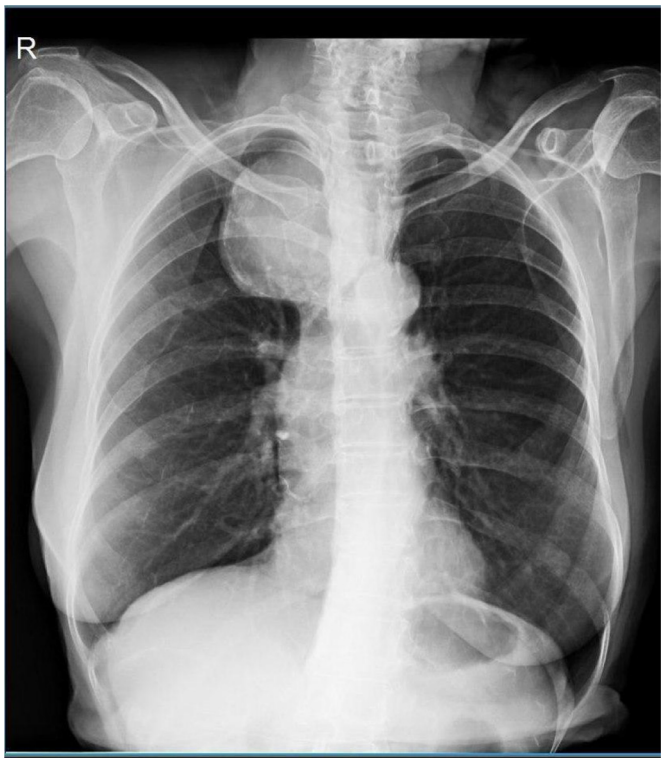

Fig. 1 – Chest X-ray showing a rounded opacity in the right upper mediastinal region adjacent to the trachea, suggesting a mass or aneurysmal dilation.

aneurysms have become more precise, facilitating timely intervention [4].

Recent advances in imaging modalities have significantly improved the ability to detect and manage subclavian artery aneurysms. CT angiography (CTA) and magnetic resonance angiography (MRA) provide detailed anatomical information that is crucial for surgical or endovascular planning [5]. These techniques allow for an accurate assessment of the aneurysm's size, location, and relationship to surrounding structures, vital for determining the most appropriate treatment strategy. In particular, CTA has become the gold standard for diagnosing and planning the management of vascular aneurysms due to its high resolution and ability to provide 3-dimensional reconstructions [6].

The clinical presentation of subclavian artery aneurysms can vary widely, ranging from asymptomatic incidental findings to acute symptoms resulting from compression of nearby structures or thrombosis. In elderly patients, the presence of comorbid conditions such as hypertension, atherosclerosis, and other cardiovascular diseases can further complicate the clinical picture and management decisions [7]. A high index of suspicion, coupled with detailed imaging studies, is essential for accurate diagnosis and timely intervention in these patients.

Management of subclavian artery aneurysms typically involves surgical or endovascular approaches, depending on the size, location, and patient's overall health status. Endovascular techniques, such as stent graft placement, have gained popularity due to their minimally invasive nature and favorable outcomes, particularly in high-risk surgical candidates [8]. The treatment choice should be individualized based on a comprehensive assessment of the aneurysm's characteristics and the patient's clinical condition. This case report discusses the diagnostic and management challenges of an unruptured right subclavian artery aneurysm with features suggestive of partial thrombus formation in an elderly patient, highlighting the importance of advanced imaging and timely intervention.

Case presentation

A 72-year-old female presented to the emergency department with a chief complaint of sudden onset chest pain radiating to the right shoulder and neck, accompanied by shortness of breath and dizziness for the past 24 hours. The patient also reported a 2-month history of intermittent, dull chest pain and mild exertional dyspnea. She denied any recent trauma or significant weight loss. The patient has a family history of cardiovascular diseases, including hypertension and coronary artery disease in her father and an aortic aneurysm in her brother.

The chest pain began abruptly and was described as sharp and stabbing In nature, with an Intensity of 8 out of 10 on the pain scale. It was exacerbated by physical activity and relieved partially by rest. The patient also noted occasional palpitations and a feeling of impending doom. She had experienced similar but less severe episodes of chest pain over the past 2 months, which she attributed to indigestion. Additionally, she mentioned occasional hoarseness of voice and difficulty

Fig. 2 – CECT Chest highlighting a prominent aneurysmal dilation of the right subclavian artery, well-circumscribed and significantly enlarged, with partial thrombus formation. (Coronal View).

swallowing, which she had not previously reported to her primary care physician.

During the physical examination, the patient appeared anxious and clutched her chest. Her vital signs were as follows: blood pressure 160/95 mmHg, heart rate 110 beats per minute, respiratory rate 22 breaths per minute, and oxygen saturation 95% on room air. A cardiac examination revealed a regular rhythm with a loud systolic murmur best heard over the right second intercostal space. There was no jugular venous distention, and lung auscultation was clear bilaterally. Abdominal examination was unremarkable, and peripheral pulses were palpable and symmetric.

The patient's imaging studies revealed significant findings. Fig. 1 shows a chest X-ray with a rounded opacity in the right upper mediastinal region adjacent to the trachea, suggesting a mass or aneurysmal dilation. Fig. 2 presents a CECT chest scan highlighting a prominent aneurysmal dilation of the right subclavian artery, which is well-circumscribed and significantly enlarged, with evidence of partial thrombus formation (Coronal View). Finally, Fig. 3 depicts an axial CT chest scan with contrast, demonstrating a large aneurysm of the right subclavian artery adjacent to the aorta (Cross-sectional). These images collectively provide a comprehensive view of the aneurysm's size, location, and characteristics.

Table 1 shows comprehensive laboratory investigations were conducted to assess the patient's overall health status and identify any underlying abnormalities.

Upon admission, the patient was stabilized with oxygen therapy and pain management. Given the high suspicion of a right subclavian artery aneurysm, a vascular surgery consultation was obtained. The patient was started on antihypertensive medications to control her blood pressure and prevent further aneurysmal expansion. Lisinopril 10 mg daily and metoprolol 50 mg twice daily were prescribed. Surgical intervention was planned, and an emergency endovascular repair was performed successfully. A stent graft was placed to secure the aneurysm, and the patient was monitored in the intensive care unit postoperatively. She received anticoagulation therapy to prevent thromboembolic complications. Apixaban 5 mg twice daily was initiated. Her recovery was uneventful, and she was discharged on postoperative day 7 with follow-up plans for regular imaging to monitor the aneurysm.

Follow-up and management

Due to the absence of post-treatment images, we emphasize the standard follow-up protocol and management strategies based on current guidelines and literature. Follow-up care included regular clinical assessments and imaging studies to monitor the aneurysm's status and detect potential complications. The patient was scheduled for duplex ultrasound and CTA at 3 months, 6 months, and annually thereafter to ensure continued stability of the aneurysm and stent graft. Anticoagulation therapy was continued to prevent thromboembolic events, and the patient's antihypertensive regimen was optimized to maintain blood pressure within target ranges.

Discussion

The diagnosis of subclavian artery aneurysms often relies heavily on advanced imaging modalities. In this case, initial imaging studies, including chest X-ray and CT angiography,

Fig. 3 – Axial CT chest scan with contrast showing a large aneurysm of the right subclavian artery adjacent to the aorta. (Cross-sectional view).

Table 1 – Laboratory investigations.

Test	Result	Reference range
Hemoglobin	13.5 g/dL	12-18 g/dL
White Blood Cell Count	8,500/μL	4,000- 11,000/ μL
Platelets	230,000/μL	150,000-400,000/μL
Blood Urea Nitrogen (BUN)	15 mg/dL	7-20 mg/dL
Serum Creatinine	1.0 mg/dL	0.6-1.3 mg/dL
Glucose	90 mg/dL	70-100 mg/dL
C-Reactive Protein (CRP)	5 mg/L	<10 mg/L
Erythrocyte Sedimentation Rate (ESR)	20 mm/hr	0-20 mm/hr
Urine Routine	Normal	Normal
Antinuclear Antibody (ANA)	Negative	Negative
Rheumatoid Factor	Negative	Negative

played a pivotal role in identifying the aneurysm and assessing its characteristics. The chest X-ray revealed a rounded opacity in the right upper mediastinal region, raising suspicion of an aneurysmal dilation, which was confirmed by subsequent CT imaging [9]. CT angiography provided detailed information on the aneurysm's size, location, and presence of partial thrombus formation, which was critical for planning the endovascular intervention [10].

It is important to note that superficial vascular lesions, such as pseudoaneurysms, are easily identifiable by ultrasound, whereas deeper lesions, like subclavian artery aneurysms, require CT angiography for accurate diagnosis. Ultrasound findings for pseudoaneurysms typically include the presence of a "to-and-fro" waveform in Doppler studies and the "swirl sign," indicating turbulent blood flow within the pseudoaneurysm sac [3,11]. CT angiography, on the other hand, provides comprehensive visualization of both aneurysms and pseudoaneurysms, allowing for precise anatomical assessment and aiding in treatment planning [12].

The management of subclavian artery aneurysms, particularly those with partial thrombus formation, requires a multidisciplinary approach involving vascular surgeons, interventional radiologists, and critical care specialists. In this case, the patient underwent endovascular repair with stent graft placement, which was successful in stabilizing the aneurysm and preventing further complications. Endovascular techniques are effective in managing subclavian artery aneurysms, offering a less invasive alternative to open surgery with reduced perioperative risks [13]. In this case, the successful outcome underscores the importance of timely intervention and the role of advanced imaging in guiding treatment decisions.

Several studies have highlighted the benefits of endovascular repair for subclavian artery aneurysms. For instance, a study by Duwayri et al. [14] reported excellent outcomes with endovascular stent graft placement in patients with subclavian artery aneurysms, with high rates of aneurysm exclusion and low complication rates. Similarly, another study by Oderich et al. [15] demonstrated the feasibility and safety of endovascular repair for subclavian artery aneurysms, emphasizing its role as a viable alternative to open surgery. These findings are consistent with our experience in this case, where endovascular repair provided a durable solution with minimal complications.

Recent literature further supports the utility of endovascular approaches. In a comprehensive review by Mitchell et al. [16], endovascular repair was associated with lower perioper-

ative morbidity and mortality compared to open surgical techniques, making it a preferred option for high-risk patients. Another study by Sharma et al. highlighted the long-term benefits of endovascular repair, including reduced risk of aneurysm recurrence and improved quality of life for patients [17].

Despite the advancements in imaging and intervention techniques, managing subclavian artery aneurysms remains challenging. Partial thrombus formation within the aneurysm increases the risk of distal embolization and requires careful perioperative management. In this case, the patient was managed with anticoagulation therapy postoperatively to prevent thromboembolic complications, which highlights the need for comprehensive care and close monitoring in the perioperative period. The presence of comorbid conditions, particularly in elderly patients, adds to the complexity of management and necessitates a tailored approach to treatment.

A study by Zhou et al. indicated that elderly patients with comorbid conditions have an increased risk of complications and require individualized treatment plans. This is particularly relevant in cases with partial thrombus formation where careful anticoagulation and monitoring are critical to prevent distal embolization [18]. Additionally, endovascular treatment outcomes can be significantly affected by the patient's overall health status, as highlighted by Bisdas et al. [19], who found that patient comorbidities play a crucial role in determining the success of endovascular interventions.

Furthermore, the importance of follow-up and surveillance postintervention cannot be overstated. As noted by Lin et al., regular imaging follow-up is essential to monitor for potential recurrence or complications, ensuring long-term patient health. This case contributes to the growing body of literature on managing subclavian artery aneurysms and underscores the importance of continued research and development of best practice guidelines for these complex vascular anomalies [20].

This case report highlights the critical role of advanced imaging modalities in diagnosing and managing subclavian artery aneurysms. The use of CT angiography allowed for precise characterization of the aneurysm and facilitated successful endovascular intervention. The multidisciplinary approach and timely intervention were key factors in achieving a favorable outcome for the patient. Ongoing surveillance with regular imaging follow-up is essential to monitor for potential recurrence or complications, ensuring long-term patient health . This case contributes to the growing body of literature on managing subclavian artery aneurysms and underscores the importance of continued research and development of best practice guidelines for these complex vascular anomalies.

Conclusion

This case highlights the successful diagnosis and management of an unruptured right subclavian artery aneurysm with partial thrombus formation in an elderly patient, underscoring the critical role of advanced imaging and prompt intervention. The effective use of endovascular repair as a minimally invasive treatment option demonstrates its value in acute settings. The patient was managed with antihypertensive and anticoagulant therapy, emphasizing the importance of a multidisciplinary approach. Regular follow-up care with clinical assessments and imaging studies is crucial for monitoring the aneurysm and detecting potential complications. Early recognition and timely intervention remain essential in managing subclavian artery aneurysms to achieve favorable outcomes.

Author's contribution

PA provided the data and materials from the archive and his notes. He then wrote the manuscript, collected the images, and put them in perspective according to the case's timeline. He then reviewed the manuscript and did the final editing.

Patient consent

Written informed consent was obtained from the patient before her inclusion in this case report.

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