

Iatrogenic aortic dissection following transradial coronary angiography in a patient with an aberrant right subclavian artery

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Abstract

An aberrant right subclavian artery is a congenital aortic arch anomaly in which the right subclavian artery originates from the proximal descending aorta. The presence of an aberrant right subclavian artery can make right transradial coronary interventions more difficult and even lead to complications. Iatrogenic intramural hematomas and dissection of aberrant right subclavian arteries during transradial coronary angiography have been previously reported. We herein report a case of iatrogenic aortic dissection following attempts to perform right transradial coronary angiography in a patient with an aberrant right subclavian artery. Clinicians should be vigilant for the presence of an aberrant right subclavian artery during right transradial coronary angiography and ensure gentle manipulation of wires and catheters to avoid complications.

Keywords

Aberrant right subclavian artery, aortic dissection, transradial coronary angiography, intramural hematoma, iatrogenic, complications

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Introduction

The right subclavian artery normally derives from the brachiocephalic trunk. An aberrant right subclavian artery arises from the proximal descending aorta and occurs in 0.07% to 0.20% of the general

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population.¹ An aberrant right subclavian artery is reportedly a common anatomic variation that can lead to failure of transradial coronary angiography and interventions.¹ The tortuous course of an aberrant right subclavian artery through the descending aorta to the ascending aorta makes it difficult to pass a guidewire and a diagnostic catheter to the aortic root.² In fact, the procedural success rate of transradial coronary interventions in patients with an aberrant right subclavian artery is as low as 60%.¹ Moreover, catheter manipulation in a tortuous aberrant right subclavian artery can cause iatrogenic vascular injuries such as intramural hematomas.² We herein report a case of iatrogenic aortic dissection following transradial coronary angiography in a patient with an aberrant right subclavian artery.

Case report

A 64-year-old woman with a 5-year history of exertional chest pain was admitted to the Department of Cardiology at the First Affiliated Hospital of Chengdu Medical College. The patient was normotensive (blood pressure of 130/68 mmHg at admission) and had been previously diagnosed with coronary artery disease based on her symptoms in an outpatient clinic. Her electrocardiogram demonstrated ST-segment depression in leads V1 to V6, while her troponin level was within the reference range. Elective coronary angiography was attempted from the right radial artery. A 0.035-inch loach guidewire (Terumo Corporation, Tokyo, Japan) could not be advanced into the ascending aorta but was repeatedly inserted into the descending aorta despite extensive manipulation. The patient suddenly experienced severe chest pain without ST-segment elevation in the electrocardiogram. The procedure was immediately suspended. Although the patient had sinus tachycardia, the pulses in her extremities

were symmetrical and regular without pulse deficits. Her blood pressure was normal. Multidetector computed tomography (MDCT) was performed, and an aberrant right subclavian artery and an iatrogenic aortic dissection (DeBakey IIIb) with right renal artery involvement were diagnosed (Figure 1). Tramadol was administered for pain relief (50-mg oral capsule three times a day), and the patient's blood pressure was strictly controlled with metoprolol and nifedipine extended-release tablets. The vascular surgery team recommended endovascular or surgical aortic repair to resolve the patient's renal malperfusion. However, the patient refused any invasive treatments and was discharged with antihypertensives. Her blood pressure and pulse rate were 110/62 mmHg and 65 bpm, respectively, at hospital discharge. No chest pain was present at her 3- and 8-month post-discharge follow-up visits. Follow-up MDCT was performed at 8 months and showed that the aortic dissection was stable and that the right renal artery involvement was unchanged; the right kidney remained poorly perfused (Figure 2). However, the renal function was normal.

Discussion

An aberrant right subclavian artery, also known as *arteria lusoria*, was first reported in 1987.³ Most patients with an aberrant right subclavian artery are asymptomatic, and the variant is usually recognized during right transradial coronary angiography.^{4,5} The tortuous course of the artery and the angle between the aberrant right subclavian artery and the aorta make guidewires difficult to advance into the ascending aorta because the anatomic variation instead favors entrance of guidewires into the descending aorta.^{4,6} The presence of an aberrant right subclavian artery may increase the number of catheters used for coronary angiography and prolong the procedure time if

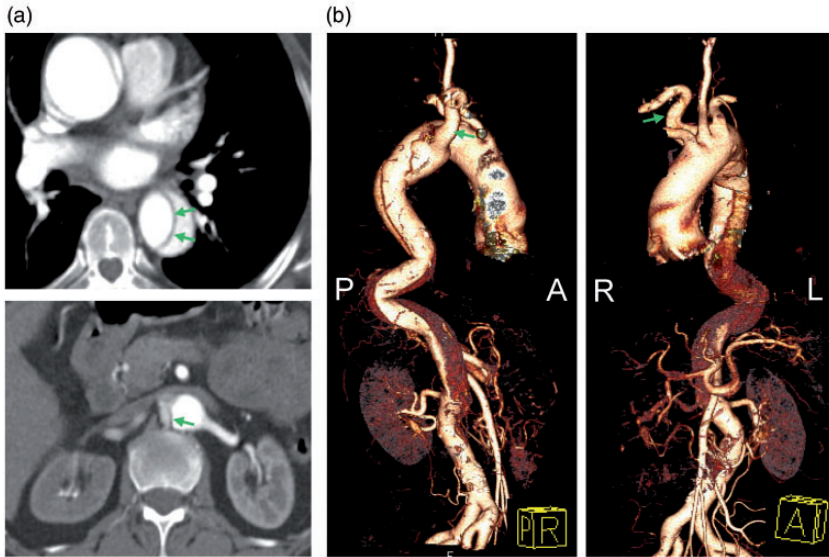


Figure 1. Aortic dissection following attempts to perform right radial angiography in a patient with an aberrant right subclavian artery. (a) Multidetector computed tomography scans showing aortic dissection (arrows, upper panel) with right renal artery involvement (arrows, lower panel). (b) Three-dimensional reconstruction showing the aberrant right subclavian artery (arrows) and the aortic dissection with the poorly perfused right kidney.

clinicians are unfamiliar with this uncommon variant.⁷ Thus, the procedural success rate is quite low in patients with an aberrant right subclavian artery.¹ Moreover, extensive manipulation in the setting of an aberrant right subclavian artery can cause severe procedural complications. Iatrogenic intramural hematomas and dissection of the aberrant right subclavian artery during transradial coronary angiography have been previously reported.⁸ The iatrogenic aortic dissection that occurred in this case is probably the worst complication in the setting of an aberrant right subclavian artery and has not been reported before. Thus, clinicians should be vigilant for this anatomic variant during right transradial coronary interventions.

When confronting an aberrant right subclavian artery during right transradial coronary angiography, clinicians may switch to the left transradial approach or femoral artery approach. However, reports suggest

that abandoning the right transradial approach is unnecessary and that the procedure can be continued, although it may be technically difficult.^{2,4}

The treatment of iatrogenic aortic dissections has not been standardized. A conservative approach is frequently used, especially for uncomplicated DeBakey type III aortic dissections.⁹ Spontaneous healing with conservative treatment has been observed in most iatrogenic aortic dissections, while rupture is exceedingly rare.⁹ Endovascular aortic repair should be initially considered, although surgery may be considered to restore malperfusion of visceral arteries according to the European Society of Cardiology guideline.⁹ For our patient, endovascular aortic repair might have been a better choice than medical therapy alone because of the poor perfusion of the right kidney as indicated by the MDCT scan. Unfortunately, the patient refused

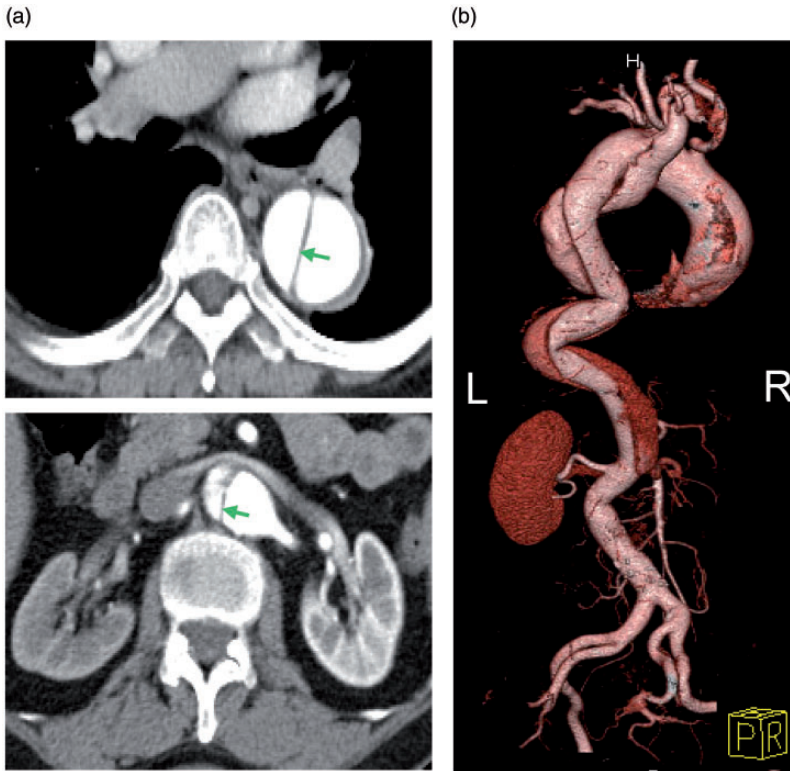


Figure 2. Eight-month follow-up. (a) Multidetector computed tomography scans showing aortic dissection (arrows, upper panel) with right renal artery involvement (arrows, lower panel). (b) Three-dimensional reconstruction showing the aortic dissection with the poorly perfused right kidney.

endovascular repair. However, the aortic dissection remained stable with apparently normal renal function during follow-up.

Conclusion

Clinicians should be vigilant for an aberrant right subclavian artery during right transradial coronary angiography and ensure gentle manipulation of wires and catheters to avoid complications.

Authors' contributions

PW and PZ planned the research; PW, QW, and CB collected the data; PW wrote the manuscript; and all authors read and approved the manuscript.

Availability of data and material

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Consent to publish

The patient provided written consent to publish her clinical materials.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

Ethics approval

The study was approved by the ethics committee of the Department of Cardiology at the First Affiliated Hospital of Chengdu Medical College.

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