

MINI-FOCUS ISSUE: PROCEDURAL COMPLICATIONS

ADVANCED

CASE REPORT: CLINICAL CASE

Vertebral Artery Perforation as a Periprocedural Complication of Coronary Angiography



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ABSTRACT

Coronary angiography is a routinely performed intervention, with radial catheterization the recommended approach. We report a unique case of perforation of the right vertebral artery following coronary angiography that was successfully treated by endovascular management. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2022;4:734-737) © 2022 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

HISTORY OF PRESENTATION

A 74-year-old woman was admitted to our hospital (Centre Hospitalier EpiCURA, Hornu, Belgium) with typical chest pain. A diagnosis of non-ST-segment elevation myocardial infarction was made, and the patient underwent coronary angiography with right radial access. The culprit lesion on the right coronary artery was successfully treated by percutaneous coronary intervention (PCI). Three days later, she underwent a second coronary angiogram to treat a

nonculprit lesion. Successful PCI of the left anterior descending artery was performed, despite significant patient agitation during the procedure. Twenty minutes after the end of the intervention, the patient experienced brief syncope for a few seconds without any arrhythmia documented on telemetry. After the episode, she had elevated blood pressure of 190/110 mm Hg. Her heart rate was 90 beats/min, and her oxygen saturation was 99% on room air. The physical examination revealed voluminous swelling in the right supraclavicular region that extended to the neck. She suddenly became somnolent and showed paresis of the right upper limb, without any other macroscopic neurologic deficit. Findings of cardiopulmonary auscultation were unremarkable.

LEARNING OBJECTIVES

- To be aware and recognize the potential complications of coronary angiography, including the exceptional complications.
- To understand the different techniques of endovascular management of an artery lesion.

PAST MEDICAL HISTORY

The patient's medical history was relevant only for arterial hypertension.

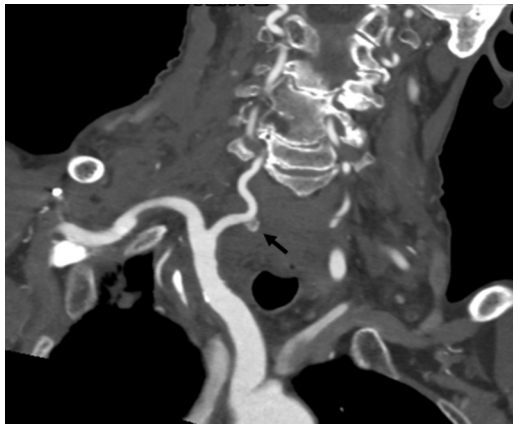
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FIGURE 1 Computed Tomography Angiography of the Head and Neck



The arrow shows extravasation of the iodine contrast agent at the level of the right vertebral artery.

DIFFERENTIAL DIAGNOSIS

The occurrence of syncope after coronary angiography is suggestive of a periprocedural complication. A stroke could be suspected on the basis of the neurologic signs. The other relevant sign present on physical examination was the right supraclavicular

FIGURE 2 Cerebral Angiography



Catheterization of the right vertebral artery shows active bleeding, as indicated by the arrow.

swelling, homolateral to the right radial artery access, which could suggest a vascular complication at the level of the subclavian artery.

INVESTIGATIONS

The electrocardiogram was normal. Bedside transthoracic echocardiography showed normal left ventricular function, no significant valvulopathy, and no pericardial effusion. Urgent computed tomography angiography of head and neck showed perforation of the right vertebral artery with ongoing active bleeding and a retrotracheal hematoma spreading from cervical vertebra C7 to the subcarinal zone that was causing tracheal deviation (Figure 1).

MANAGEMENT

Because of the voluminous swelling of the neck and the concern about unsecured airways, orotracheal intubation was performed, and mechanical ventilation was initiated. The patient then underwent urgent cerebral angiography. After right femoral arterial puncture, diagnostic arteriography performed from the right subclavian artery showed active bleeding on the V1 segment of the right vertebral artery (Figure 2). A 3.5 × 17 mm Low-Profile Visualized Intraluminal Support (LVIS) EVO stent (MicroVention) was successfully deployed (Figure 3). The procedure was performed without any complication, and the patient was successfully extubated a few hours later.

DISCUSSION

Coronary angiography is a routinely performed intervention. Radial access is the recommended standard approach¹ because of the lower complication rates compared with femoral access. The main complications occur at the puncture site and include radial artery occlusion, dissection, perforation, spasm, hematoma, and pseudoaneurysm. Cerebrovascular events such as stroke are very rare. Distal vascular damage is also an uncommon complication and mainly includes coronary artery dissection. Damage of a major central artery is exceptional and includes some reported cases of subclavian artery perforation and brachiocephalic trunk dissection.^{2,3} To our knowledge, a report of perforation of a vertebral artery as a periprocedural complication of coronary angiography has not been published. The procedure was performed by an experienced interventional cardiologist. The patient was agitated as a result of delirium of multifactorial origin, mostly a suspected urinary infection, which in older adults can

ABBREVIATIONS AND ACRONYMS

LVIS = Low-Profile Visualized Intraluminal Support

PCI = percutaneous coronary intervention

FIGURE 3 Cerebral Angiography After Stent Deployment

The 3.5 × 1.7 mm LVIS EVO stent (MicroVention) is deployed around the breach. The **arrows** show the proximal and distal flares of the stent. Abbreviations as in [Figure 2](#).

provoke functional and/or cognitive impairment. This agitation probably favored displacement of the hydrophilic guidewire (Silverway, Asahi Intecc) into the territory of the right subclavian artery, thus leading to the perforation. The hematoma that followed was responsible for the observed swelling and the local neurologic deficit. Vertebral artery injuries are rare and are mostly the result of blunt trauma or surgery-related injuries. The modified Denver screening criteria are used to detect and guide management of high-risk patients for cerebrovascular injury.⁴ Our case could have been managed through different approaches. Considering that a conservative approach was not reasonable, given the active bleeding and the ongoing neurologic deficit, a possible option would have been to perform endovascular coil embolization. This procedure, called the sandwich technique, consists of coil embolization proximal and distal to the arterial breach. This is among the most accepted angiographic management techniques for neurovascular active bleeding.⁵ This treatment was not attempted because of the risk of brain embolism in a major cerebral territory (posterior fossa), as well as the risk of chronic vertebrobasilar insufficiency. Therefore, the chosen option was angioplasty. Given the artery angulation, a balloon-expandable stent was

FIGURE 4 Hematoma of the Neck and Upper Back

The photograph was taken 2 days after cerebral angiography and shows a hematoma of the neck and upper back that disappeared after a few weeks.

avoided because of its higher radial force and risk of dissection. We chose a self-expanding stent, which is usually more flexible. Moreover, the LVIS EVO stent produces a flow diversion effect, reducing the flow in the breach.⁶

FOLLOW-UP

After the procedure, the patient's course was favorable, with resolution of the right upper arm paresis. She left the hospital with double-antiplatelet therapy consisting of aspirin, 80 mg once daily, and ticagrelor, 90 mg twice daily. The neck hematoma ([Figure 4](#)) persisted for a few weeks. She had no neurologic sequelae at the 1-month follow-up visit.

CONCLUSIONS

We report a unique case of perforation of a vertebral artery as a periprocedural complication of coronary angiography that was successfully treated by endovascular management.

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The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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KEY WORDS complication, coronary angiography, percutaneous coronary intervention, stents, vascular disease