

Pseudostenosis Artifact in the Subclavian Artery

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Abstract

Pseudostenosis is a magnetic resonance angiography artifact that mimics arterial stenosis. In early arterial phase magnetic resonance angiography, pseudostenosis artifact of the subclavian artery can be seen due to susceptibility effects caused by residual gadolinium in the subclavian vein. Delayed phase-specific magnetic resonance imaging subclavian scanning shows that suspected pseudostenosis seen in the early arterial phase magnetic resonance angiography is no longer present during the venous phase.

We present our case of a 21-year-old female with complaints of pain, fatigue, and numbness in the left arm that showed severe stenosis of the left subclavian artery in her upper extremity magnetic resonance angiography, but there was not any finding compatible with stenosis in her delayed phase dynamic magnetic resonance imaging with contrast.

Clinicians and radiologists should consider repeating the imaging with contrast injection to the contralateral extremity or using a more special high-resolution delayed dynamic magnetic resonance imaging to confirm suspected true stenosis and avoid misdiagnosis.

Keywords: Magnetic resonance angiography, pseudostenosis artifact, subclavian artery

INTRODUCTION

Pseudostenosis is a magnetic resonance angiography (MRA) artifact that mimics arterial stenosis. Arterial pseudostenosis is a magnetic artifact that is present only during early arterial phase magnetic resonance imaging (MRI) when there is persistent gadolinium in the ipsilateral venous system of the contrast injection site.¹⁻³ Delayed phase-specific MRI subclavian scanning shows that suspected pseudostenosis seen in the early arterial phase MRA is no longer present during the venous phase. In this case report, we aimed to present the findings of a pseudostenosis artifact in the subclavian artery in a 21-year-old female patient.

CASE PRESENTATION

A 21-year-old female patient with no additional disease was admitted with complaints of pain, fatigue, and numbness in the left arm. In her physical examination, the only finding was hypotension. The patient was scheduled for an upper extremity arterial system Color Doppler Ultrasonography (CDUS). Her CDUS examination showed no significant signs of stenosis or impaired flow hemodynamics. Since the patient's complaints persisted, MRI of the subclavian region and dynamic MRI after intravenous injection of contrast material in the left arm was performed. In her upper extremity early arterial phase MRA, severe stenosis was observed in the middle part of the left subclavian artery and there was no significant contrast transition at this level (Figure 1A and B). There was a decrease in artery calibrations in the axillary and brachial arteries at the distal of the stenosis region, more evident in the brachial artery. In delayed phase-specific MRI for the left subclavian region—conventional T1-weighted imaging (T1WI) and fat-suppressed T1WIs—left subclavian vein and subclavian artery calibrations were completely normal. After not seeing any pathological appearance causing compression in the left subclavian artery and vein, it came clear that the stenosis that was detected in the MRA was pseudostenosis artifact (Figure 1C and D).

DISCUSSION

In MRI, susceptibility artifacts may be seen due to metallic objects implanted in the body (e.g., iatrogenic stents and metallic stents).^{4,5} Gadolinium, a typical component of MR contrast agent, has metallurgical features. Gadolinium can cause susceptibility artifacts due to these features. If images are captured in MRA immediately after injection of gadolinium-based contrast into an upper extremity, it is found that high concentrations of gadolinium in the ipsilateral subclavian vein can cause susceptibility artifacts in the subclavian artery nearby. This artifact, which appears in the subclavian artery, can mimic a stenosis, and this false appearance is called pseudostenosis. Pseudostenosis artifact of the arteries of the upper extremities, which always occurs on the same side as the injection site, is focal and typically located in the most distal segment of the subclavian artery just before the axillary artery.⁶⁻⁹ Compared to the right upper extremity, pseudostenosis artifact occurs in the left upper extremity more often possibly due to the longer duration of venous return.¹⁰ Marinelli et al¹ conducted a total of 189 MRA studies in 2019. In this study, the largest of its kind to assess prevalence of pseudostenosis in a cohort of patients using a standardized imaging protocol, an equal prevalence of pseudostenosis was found in the right and left upper extremities. In the carotid and vertebral arteries, pseudostenosis

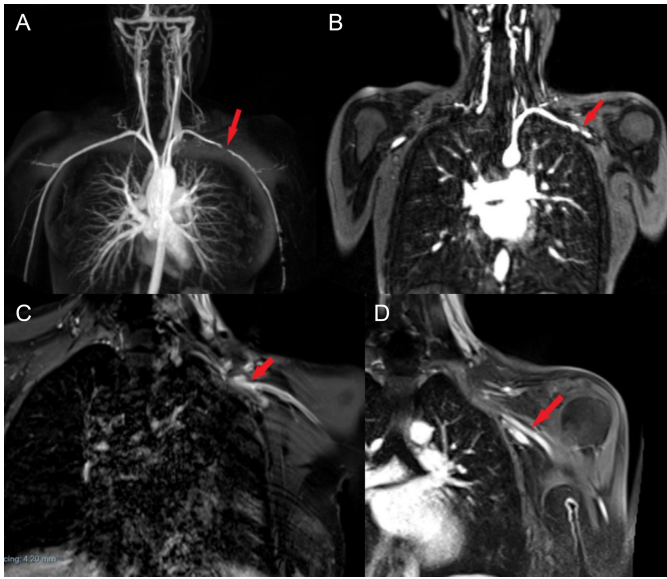


Figure 1. (A) Coronal section, maximum intensity projection reconstruction of an early arterial phase MRA shows a pseudostenosis in the left subclavian artery in a healthy subject (red arrow). (B) In early arterial-phase MRA, severe stenosis was observed in the middle section of the left subclavian artery (red arrow). (C) In the delayed-phase magnetic resonance imaging-fat suppressed T1WI, left subclavian vein and subclavian artery calibrations were normal. There was no pathological appearance that caused the compression of the subclavian artery or the subclavian vein. (D) A delayed-phase magnetic resonance imaging-dedicated subclavian scan shows that the suspected pseudostenosis seen during the early arterial phase magnetic resonance imaging is no longer visualized when imaging the same subject during the venous phase magnetic resonance imaging (red arrow).

has rarely been reported. In early arterial-phase MRA, pseudostenosis artifact of the subclavian artery can be seen due to susceptibility effects caused by residual gadolinium in the subclavian vein. Delayed phase-specific MRI subclavian scanning shows that suspected pseudostenosis seen in the early arterial phase is no longer present during the venous phase.¹²⁻¹⁴ Therefore, clinicians and radiologists should consider repeating the imaging with contrast injection to the contralateral extremity or using more special high-resolution delayed dynamic imaging to confirm a suspected true stenosis and avoid the misdiagnosis.

Informed Consent: Written informed consent was obtained from patient who participated in this study.

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