Case Report

Radial artery pseudoaneurysm after transradial cardiac catheterization: A case presentation

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ABSTRACT

Cardiac catheterization through the radial artery has reduced the percentage of complications seen previously in the femoral approach. Computed tomographic angiography is a noninvasive technique that can accurately diagnose pseudoaneurysms and other vascular pathologies.

A 93-year-old female presented to the emergency department with pain and swelling of her right distal arm and wrist after a transradial cardiac catheterization procedure, as part of a transcatheter aortic valve replacement evaluation for severe aortic stenosis.

Angiography is the standard diagnosing technique for aneurysms and pseudoaneurysms, but it is an invasive procedure. We show this case in order to highlight the importance of computed tomographic angiography as a noninvasive approach in diagnosing uncommon complications in the clinical setting.

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Introduction

Computed tomographic angiography (CTA) was first introduced in 1994 as a noninvasive diagnostic technique for detection of vascular pathology and it has gained popularity in the past few years. It has been widely used for detecting pathologies that vary from neoplasms to changes in the vessels across the body. However, CTA has not been commonly used to diagnose pseudoaneurysms despite the many advantages it has over other techniques such as angiography, an invasive modality, and other noninvasive studies such as MRI and ultrasound (US).

Transradial cardiac catheterization has become a popular procedure in recent years due to better outcomes and fewer complications as compared to the transfemoral approach. Nonetheless, it has been shown that some of these complications include radial artery occlusion, radial artery spasm, and, in fewer cases, forearm hematoma with or without compartment syndrome, fistula, radial artery perforation, nerve damage, granuloma formation, and pseudoaneurysms [1].

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Fig. 1 – CTA of right upper extremity with cinematic rendering showing patent radial and ulnar arteries as well as the pseudoaneurysm.

Fig. 2 – CTA of right hand with cinematic rendering showing a distal radial pseudoaneurysm of 2.6 x 1.2 x 1.7 cm, with no extravasation.

Fig. 3 – Coronal MIP showing the radial artery pseudoaneurysm

Cinematic rendering is a recently described 3D rendering technique that can potentially improve visualization of vascular pathology and assist in treatment planning.

Case presentation

A 93-year-old female with a medical history significant for severe aortic stenosis (EF 60-65%) and scheduled for transcatheter aortic valve replacement, presented to the ED complaining about pain and swelling in her right wrist after a transradial cardiac catheterization performed as part of transcatheter aortic valve replacement evaluation. In addition to aortic stenosis, the patient has a medical history of colon cancer (S/P hemicolectomy), melanoma, and osteoarthritis. She denied taking any blood thinners other than 81 mg of aspirin daily.

The patient presented with ecchymosis/discoloration of right digits as well as right wrist pain and swelling (10/10) that had been worsening, with no motor or sensory changes.

A CTA of the upper extremity was performed and showed patent brachial, radial, and ulnar arteries. It also showed a distal radial arterial pseudoaneurysm measuring 2.6 x 1.2 x 1.7 cm with no active extravasation (Figs. 1-4).

The patient was admitted to cardiology service for symptomatic pain management with hydromorphone, due to allergy to acetaminophen and intolerance to initial oxycodone, as well as manual pressure and assessment for possible thrombin injection.

After the cardiology assessment, the patient did not receive the thrombin injection due to the finding of a short and wide neck on the pseudoaneurysm, which could lead to clot propagation. She was anticoagulated with 5000 units of IV heparin, after stopping the aspirin for 2 days, and underwent the planned surgery without further complications.

Discussion

Although there are many imaging techniques used to diagnose aneurysms and pseudoaneurysms, CTA is a minimally invasive alternative that offers detailed and precise images for the diagnosis. We believe it is important to highlight this option in order to reduce the incidence of complications after the use of diagnostic techniques, such as angiography, while maintaining ease of diagnosis [2].

Although MRI and US are also noninvasive techniques, CTA is faster and less operator dependent, and it also allows for 3D postprocessing that can improve detection and provide important information for treatment planning [3]. Cinematic rendering is a recent approach inspired by the photorealism of motion pictures, that has the potential to improve visualization of vascular pathology [4,5]. Cinematic rendering can potentially improve visualization of small vessels and fine vascular detail, such as the neck of a pseudoaneurysm.

In the current case, the patient’s elderly age and aspirin use are contributing factors that increase her risk of com-
grouping together voxels from 2D datasets acquired on MDCT, adding a specific color and opacity to each isotropic voxel and projecting light through the dataset [8].

The lighting model used in CR is an algorithm based on the global illumination model and path tracing methods, instead of the ray casting methods used in volume rendering, incorporating the paths of billions of photons traveling through the volumetric dataset and its interactions with adjoining voxels, thus modeling the physical propagation of light and resulting in a highly realistic 3D image [9].

The management of a radial artery pseudoaneurysm may vary according to the patient and the size of the pseudoaneurysm. Management will typically start by applying manual pressure proximal to the pseudoaneurysm in order to restrict the inflow of blood [9]. If this does not result in thrombosis of the pseudoaneurysm, a thrombin injection should be considered or surgery as a last measure [10].

Thrombin injections have been shown to lead to better and faster results, thus obviating a more invasive procedure and resolving the pseudoaneurysm more efficiently [11]. Nonetheless, when presented with the specific anatomy of the pseudoaneurysm, such as a short or wide neck, there is a potential risk of clot propagation, making an open repair the best option.

This case report demonstrates the presentation, diagnosis with CTA, assessment, and rapid management of a rare complication in order to help others achieve a more practical and focused approach when facing such a case.

**Conclusion**

Our case shows a rare complication of a common procedure, such as a cardiac catheterization through the radial artery, and details the steps taken during the management and treatment of this diagnosis.

This particular case shows the advantages of using CTA as the preferred method to diagnose pseudoaneurysms by efficiently providing critical information in treatment planning.

With the help of CR, we are able to see the detail and characteristics of the anatomy, including the proper visualization of the pseudoaneurysm, which in this case led to an easier and faster decision for management.

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