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Case Report

# Hybrid imaging of a pseudoaneurysm of the descending thoracic aorta induced by a dorsal osteophyte: The silent killer ☆,☆☆

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ABSTRACT

Vertebral osteophytes are the result of intervertebral disc degeneration and can occasionally damage the aorta located in their proximity. This paper describes the case of a 69-year-old woman with a pseudoaneurysm of the descending thoracic aorta caused by a progressively growing dorsal osteophyte. The patient was asymptomatic as the pseudoaneurysm was an incidental finding diagnosed with an $^{18}$F-FDG PET/CT and computed tomography angiography (CTA) performed during follow-up for breast cancer. The comparison between the latest $^{18}$F-FDG PET/CTA performed and previous exams was crucial for the diagnosis. In fact, the authors were able to demonstrate the progressive growth of the osteophyte and the subsequent development of the pseudoaneurysm. Both morphological features and metabolic behaviors supported the diagnosis. The pseudoaneurysm was successfully treated with thoracic endograft.



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## Introduction

Aortic injuries may occur after a blunt or penetrating trauma. A few cases of aortic injuries induced by osteophytes following acute trauma have been described [1–5]. In older patients, disc degeneration leads to osteoarthritis, which is often associated with osteophyte growth on vertebral bodies. Osteophytes' growth commonly occurs between the T4 and T10 vertebrae and few studies show that increase in age is a predisposing factor [6]. Two types of osteophytes can form on the anterior aspects of the vertebrae: claw, traction and fusion types. In particular, the claw type can sometimes form a sharp edge [7]. With age, large arteries' walls are less flexible and more susceptible to erosive action of osteophytes. The stress occurring from osteophytes may render the overlying aortic wall ischemic and thus more vulnerable to infection or perforation [5]. Aortic injuries caused by a vertebral osteophyte without major trauma have not previously been described. We report a case of pseudoaneurysm of the thoracic aorta caused by dorsal osteophyte detected with $^{18}$F-fluorodeoxyglucose positron emission tomography/computed tomography angiography ($^{18}$F-FDG PET/CTA). The patient was not symptomatic and did not recall any kind of physical trauma. To confirm the relationship between the pseudoaneurysm and the osteophyte, we demonstrated first the appearance, then the progressive growth of the osteophyte and finally the development of the pseudoaneurysm by re-evaluating the previous $^{18}$F-FDG PET/CTA scans performed during patient's oncological follow-up.

### *Case report*

A 69-year-old woman performed $^{18}$F-FDG PET/CTA scan as her regular follow-up for breast cancer. She underwent right mastectomy 5 years before, for infiltrating ductal breast carcinoma (pT2pN1M0 Stage IIb, G3) and has been on therapy with ribociclib and fulvestrant. She was asymptomatic, with no previous cardiovascular events, nondiabetic. She also reported hypertension under treatment. The patient did not report any physical trauma. The $^{18}$F-FDG PET/CTA scan revealed a focal uptake (maximum standardized uptake value (SUVmax) 5.6) at the postero-medial wall of the descending thoracic aorta, located at T5-T6 level, in close proximity to a claw spinal osteophyte. The osteophyte took contact with the vessel wall (Figs. 1A and B), and at the same level the CTA scan showed an aortic pseudoaneurysm (Figs. 1C and D). Six months earlier, the $^{18}$F-FDG PET/CTA scan revealed a bony spur at the T5-T6 level with lower tracer uptake (SUVmax 4.7) without significative atheroma or pseudoaneurysm at the level of the descending thoracic aorta (Fig. 2). The revision of previous CT scans proved first the absence, then the progressive growth and modification of osteophyte density and shape (Fig. 3). Based on the radiological and metabolic features and considering the development of the pseudoaneurysm in only 6 months, the In-

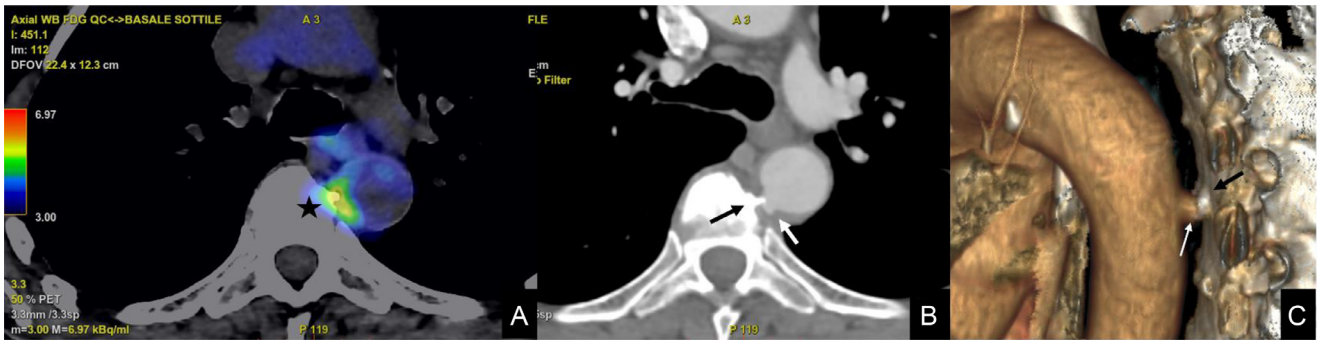


**Fig. 1 – $^{18}$FDG-PET/CT (A), contrast-enhanced CT (B) and 3D volumetric rendering (C) images show a focal uptake (asterisk in A) of the posteromedial descending thoracic aortic wall at the level of a spinal claw osteophyte located at the T5-T6 plane (black arrow in B and C) contacting the pseudoaneurysm wall (white arrow in B and C).**

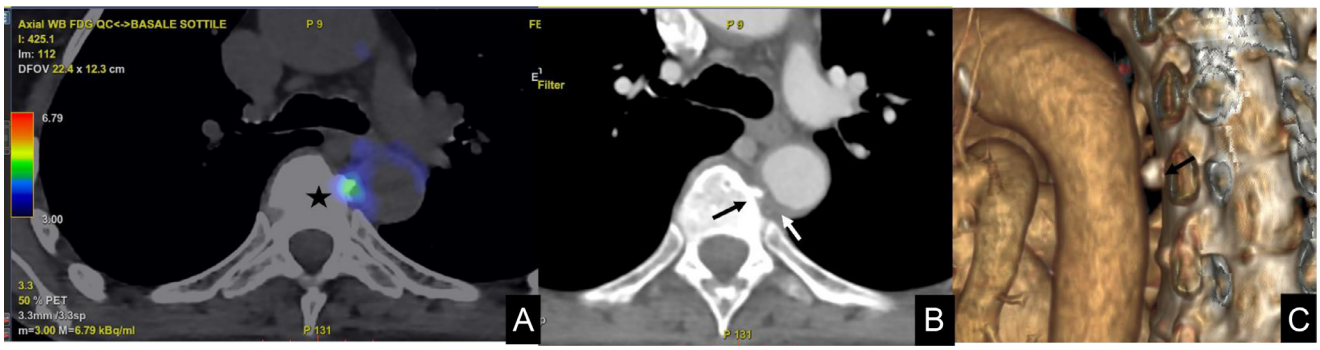


**Fig. 2 – Follow-up FDG-PET/CT performed 6 months before the images in Figure 1. $^{18}$FDG-PET/CT (A), contrast-enhanced CT (B) and 3D volumetric rendering (C) images show a bony spur (black arrow in B and C) at the level of T5-T6 with low tracer uptake (asterisk in A) without pseudoaneurysm at the level of the descending thoracic aorta.**

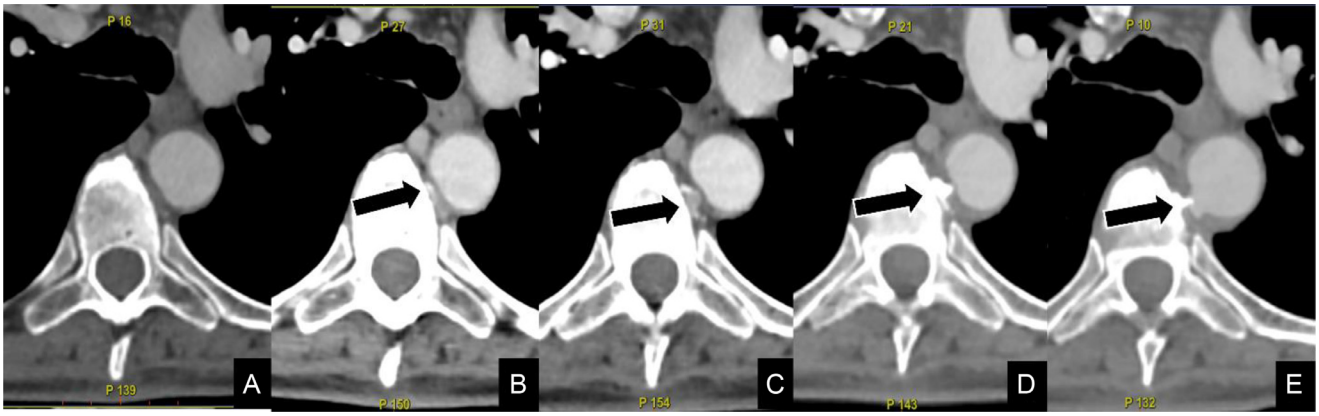


**Fig. 3 – Follow-up CT images showed the absence of osteophyte (A), the progressive growth (B and C), and modification of osteophyte density (D) and shape (E).**

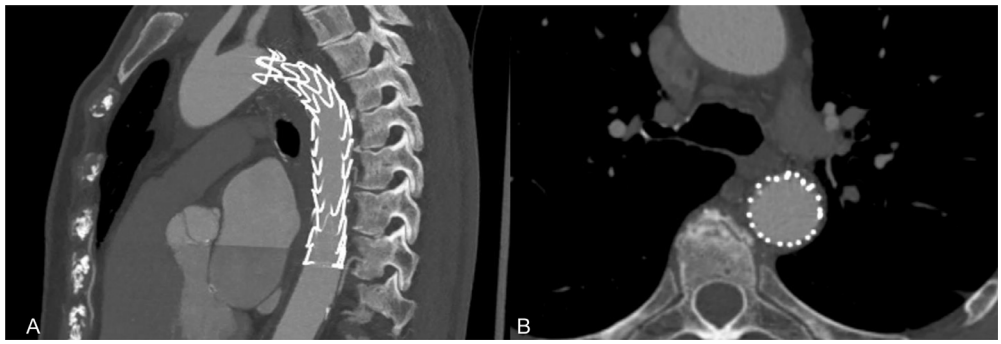


**Fig. 4 – Parasagittal (A) and transverse (B) contrast-enhanced CT showed good placement of custom-made thoracic endoprosthesis covered the aortic pseudoaneurysm.**

terventional Vascular Radiologist decided to treat the aortic pseudoaneurysm with the placement of a custom-made endoprosthesis (Fig. 4). The postoperative course was uneventful, and the patient left the hospital the day after the procedure.

## Discussion

This case is interesting for 2 reasons. First, it is the first case to our knowledge in which the use of hybrid imaging was able to demonstrate the progressive growth of an osteophyte that caused potentially fatal injury to the thoracic aortic wall. The patient was asymptomatic, with no history of trauma, and through the re-evaluation of $^{18}$F-FDG PET/CTA performed for breast cancer follow-up, the authors demonstrated the formation and development of the osteophyte and finally the damage produced on the descending thoracic aortic wall. There are only 8 cases in the literature in which thoracic or abdominal aortic injuries have been related to osteophytes. The causes of the injuries were major trauma in 3 cases [1–3], minor trauma in 1 case [4], repeated minor occupational trauma in 1 case [5], and unknown in 3 cases [8–10]. Secondly, it is the first case of a potential complication in the thoracic aorta due to osteophytes diagnosed by $^{18}$F-FDG PET/CTA in an asymptomatic patient. The patient was treated with an endoprosthesis in consideration of the morphologic features of the pseudoaneurysm, its metabolic findings (increased metabolic rate) and the relatively short time of development (6 months). The pseudoaneurysm was promptly treated with endovascular prosthesis to avoid potential traumatic aneurysm rupture induced by the osteophyte despite the lack of symptoms. Only in another case [10] was endovascular treatment mandatory because of the potential high risk of rupture produced by the continuous trauma of the aorta against the osteophyte. Referring to the most recent guidelines regarding acute and chronic syndromes of the aortic organ, our scenario is not described [11]. While there are no established $^{18}$F-FDG PET/CT criteria, a higher risk of rupture has been described for aneurysms with focal wall $^{18}$F-FDG uptake [12]. Furthermore, Huang et al. [13] recently described the correlation between structural stress, inflammation and $^{18}$F-FDG PET/CT scan-defined inflammation, which is also applicable to our case.

## Conclusion

This case highlights a rare case of nontraumatic pseudoaneurysm of the thoracic aorta caused by a dorsal osteo-

phyte in an asymptomatic patient diagnosed with $^{18}$F-FDG-PET/CTA. Considering the previous reports and our case, nuclear medicine physicians and radiologists should pay attention to the aorta in front of the vertebral bodies regardless of the mechanism of injury when an $^{18}$F-FDG PET/CTA scan shows an osteophyte.

## Patient consent

Informed consent was obtained from the patient included in the study.

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