

Cystic Adventitial Disease of the Popliteal Artery as Demonstrated by MDCT Angiography: A Case Report¹

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Cystic adventitial disease of the popliteal artery is rare condition, but it is an important cause of peripheral vascular insufficiency in young men. Conventional angiography or MR imaging has traditionally been considered as the study of choice to diagnose this disease. We experienced a case of cystic adventitial disease of the popliteal artery that was diagnosed by 16-slice MDCT angiography, and this imaging modality displayed an accurate diagnostic capability for this disease.

Index words : Arteries, CT
Arteries, popliteal

Cystic adventitial disease is an uncommon condition that accounts for only 0.1% of all vascular disease (1), and it mainly affects young men with intermittent claudication. Conventional angiography has traditionally been the study of choice for diagnosing this disease, but it has recently been suggested that MR imaging is equal in its diagnostic capability (1). 16-slice MDCT angiography has high spatial resolution and it provides excellent depiction of the vessel walls' morphology. Additionally it allows three-dimensional visualization from any angle and in any direction.

We report here on a case of cystic adventitial disease that was demonstrated by performing 16-slice MDCT angiography.

Case Report

A 43-year-old man was referred to our hospital with a 9 month history of pain in his left calf when walking. This sudden onset of claudication had developed only

while walking or playing, and not during rest. The patient had a history of a motorcycle accident 9 months ago. He did not smoke and he was very fit. The arterial ultrasonography of the lower extremities obtained from the local clinic showed left popliteal artery stenosis. All his peripheral pulses were present, but there was a decreased pulse on the left dorsalis pedis. Nerve conduction study and electromyography were done and the ankle-brachial index was checked by the clinician; all the tests results were in the normal range.

16-slice MDCT (Philips, Medical Systems, Cleveland, OH) angiography of the lower extremity was performed to evaluate the lower extremity arterial system (Figs. 1A - 1D). Smooth tapered eccentric narrowing of the left popliteal artery was shown on this study. This popliteal artery was compressed by a nonenhancing structure that was related to the arterial wall, and the structure had values of approximately 40 HU. The smooth margins of the stenotic site suggested an extraluminal mass. There was no evidence of post-stenotic dilatation or atherosclerotic disease. These findings were best shown on the curved multiplanar reconstruction images. Ultrasonography with using a 10 - 12 MHz linear transducer was also performed on the same day. It depicted a short segmental arterial stenosis of the left popliteal artery with a surrounding anechoic cystic lesion that

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contains no flow (Fig. 1E).

On the operation field, a 2 cm long, fusiform cystic mass in the left popliteal artery was revealed and the arterial lumen was collapsed (Fig. 1F). Resection of the affected arterial segment and placement of a greater saphenous vein interposition graft was performed; this included removal of the cystic structure based on the presumed diagnosis of cystic adventitial disease. A low-power photomicrograph of the specimen depicted a multiloculated subadventitial cyst, which was compatible with cystic adventitial disease.

The patient was discharged after a brief hospitaliza-

tion. He was symptom-free and maintained a normal pulse on the follow-up physical examination.

Discussion

Cystic adventitial disease is an uncommon condition and it usually involves young men in their mid-40s who present with intermittent claudication. The popliteal artery is the most common location (85% of cases), but other investigators have reported involvement of the external iliac, common femoral, radial and ulnar arteries (1). Early recognition of this disease is important be-

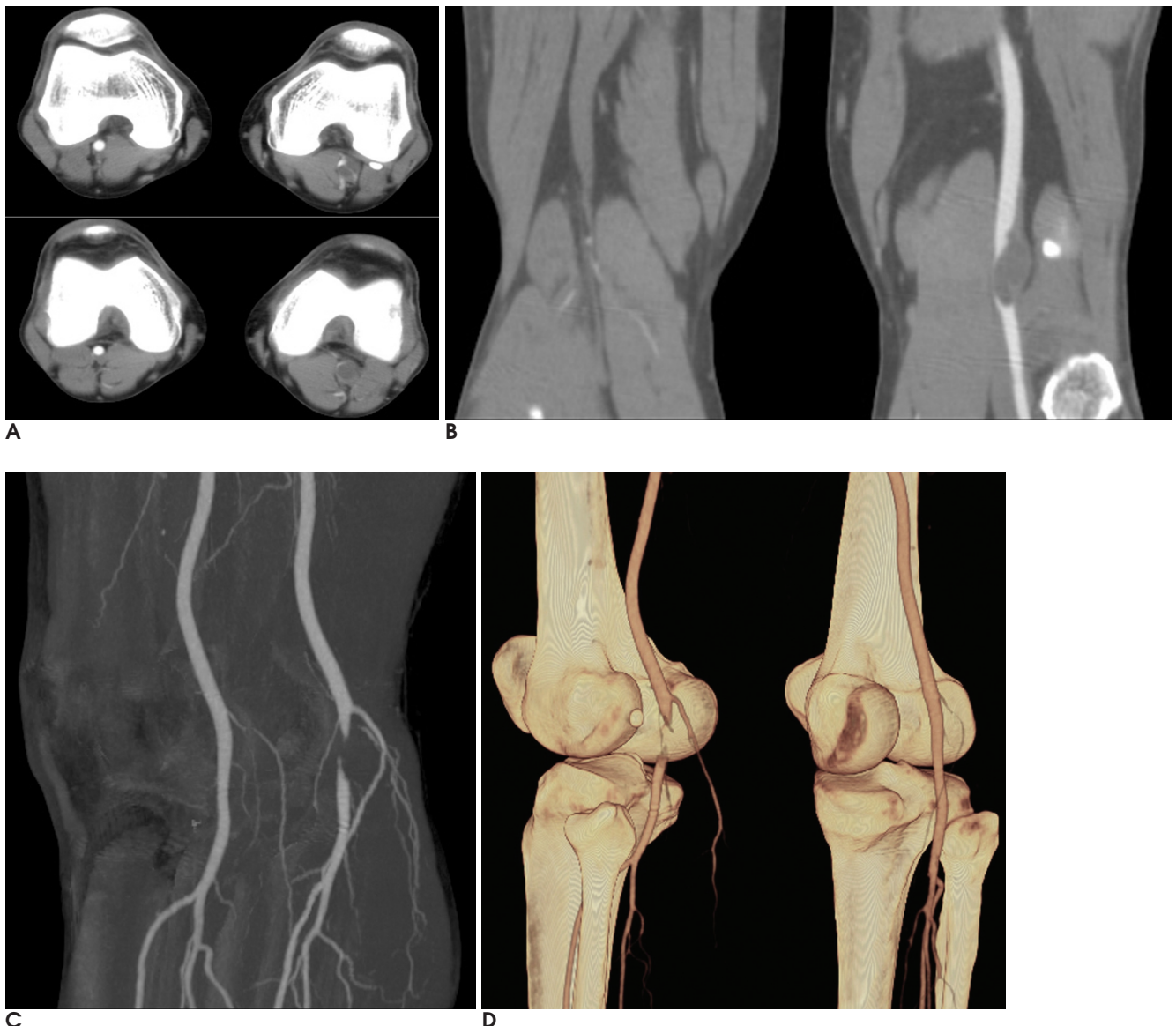
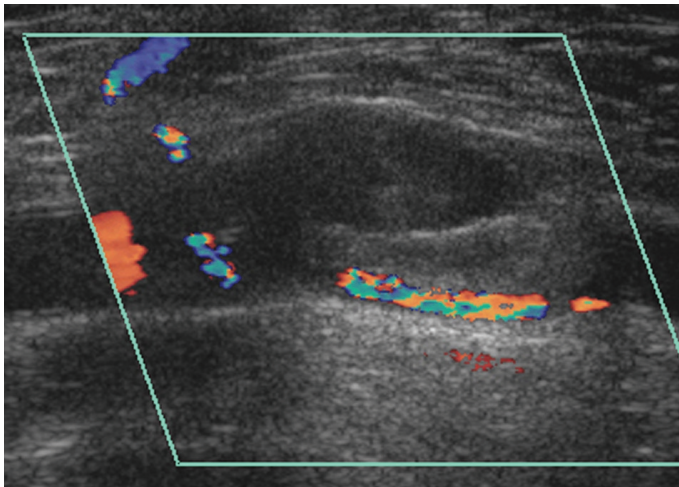
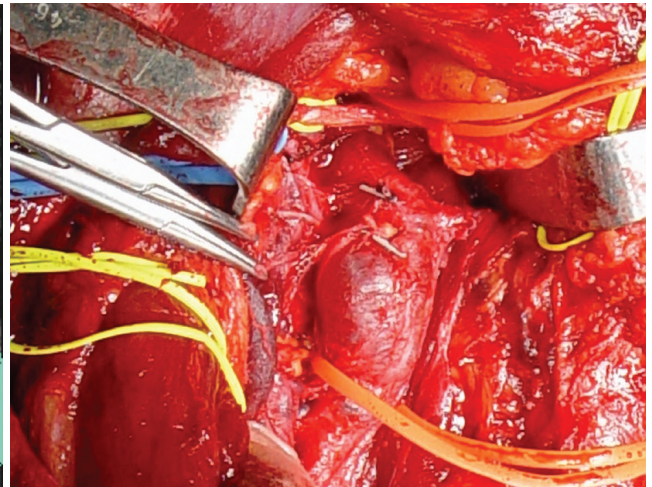


Fig. 1. **A.** Contrast-enhanced axial CT scan shows a low attenuated septated mass related to the arterial wall of the left popliteal artery. The compressed left popliteal artery is also seen.
B. The same finding is shown on the coronal image.
C, D. MIP and the volume rendering CT scan show a smooth, crescentic stenosis of the left popliteal artery; this is the classic "scimitar sign".



E. Ultrasonography of lower extremity reveals compression of the left popliteal artery and the surrounding cystic mass that contains no flow.



F. On the operation field, approximately a 2 cm long, fusiform cystic mass was found in the wall of the left popliteal artery.

cause it often rapidly progresses. In addition, treatment of this condition before it progresses to popliteal arterial occlusion is associated with less morbidity (2). The exact cause of cystic adventitial disease is unknown. Leven and Benn (3) have discussed four theories about the causes of cystic adventitial disease, and these include (a) a myxomatous systemic degenerative condition associated with a systemic disease, (b) repeated trauma, (c) cysts arising from synovial ganglia that migrate into the adventitia, and (d) mucinous cysts arising from mucin-producing mesenchymal cells that are incorporated into the vessel wall during the development of disease.

Conventional angiography has traditionally been the study of choice for making the diagnosis. Yet this study is invasive and expensive for the evaluation of a peripheral artery, and there are frequently complications. As alternative diagnostic imaging tool, MR angiography is considered an important imaging tool with excellent diagnostic capability (1). However, in our experience, 16-slice MDCT angiography rivals or exceeds MRI's depiction of the vascular anatomy, even for the most state-of-art MR angiographic techniques (4). 16-slice MDCT angiography has superior spatial resolution compared with that of MR angiography, and it is also substantially less expensive. Additionally, it allows three-dimensional visualization from any angle and in any direction. As a matter of course, MDCT angiography provided the same information as conventional angiography regarding the lumen of the popliteal artery, but it also provides additional information regarding the vessel wall (the presence or absence of calcification, and the presence

and extent of adventitial cystic disease) and on the involvement of adjacent structures (5).

In our case, the cyst was manifested as eccentric stenosis of the vessel lumen, which is known as the classic "scimitar sign". If the cyst is concentric, the stenosis will have an "hourglass" appearance (1). The location of the stenosis or occlusion in the upper portion of the popliteal artery, the absence of poststenotic dilatation and an otherwise normal arteriogram are also typical findings. Color Doppler sonography is the initial imaging technique for most patients with suspected popliteal abnormality because the popliteal fossa is ideally situated for ultrasonography. Color Doppler sonography is useful for identifying cystic formation and it can demonstrate the intramural cyst and the popliteal artery stenosis. However, assessment of the distal circulation is rarely possible if the artery is occluded (6). In addition, the specificity of ultrasound is dependent on the dimensions of the mass as well as the skill of the operator, so an ultrasound examination is sometimes inconclusive and somewhat misleading (7).

Several treatment options have been proposed for cystic adventitial disease. Cystic aspiration has been described, but the cysts may re-occur after this treatment. Surgical evacuation of the cysts with maintenance of the native artery appears to be the preferred treatment. Occasionally, the artery cannot be preserved and a vein graft is required (1).

In conclusion, cystic adventitial disease should be considered in the differential diagnosis of young patients suffering with an acute onset of intermittent claudica-

tion. 16-slice MDCT angiography provides excellent depiction and high diagnostic accuracy for the assessment of the cystic adventitial disease of the popliteal artery with its high spatial resolution and multi-projection imaging display. (Ed note: good study and it read very well after the revision. I made many changes, so check the revised paper carefully. My name is Kevin Condren and if I can help you, then contact Harrisco, the editing service in Seoul.)

References

1. Wright LB, Matchett WJ, Cruz CP, James CA, Culp WC, Eidt JF, et al. Popliteal artery disease: diagnosis and treatment. *Radiographics* 2004;24:467-479
2. Cassar K, Engeset J. Cystic adventitial disease: a trap for the unwary. *Eur J Vasc Endovasc Surg* 2005;29:93-96
3. Levien LJ, Benn CA. Adventitial cystic disease: a unifying hypothesis. *J Vasc Surg* 1998;28:193-205
4. Katz DS, Hon M. CT angiography of the lower extremities and aortoiliac system with a multi-detector row helical CT scanner: promise of new opportunities fulfilled. *Radiology* 2001;221:7-10
5. Beregi JP, Djabbari M, Desmoucelle F, Willoteaux S, Wattinne L, Louvegny S. Popliteal vascular disease: evaluation with spiral CT angiography. *Radiology* 1997;203:477-483
6. Miller A, Salenius JP, Sacks BA, Gupta SK, Shoukimas GM. Noninvasive vascular imaging in the diagnosis and treatment of adventitial cystic disease of the popliteal artery. *J Vasc Surg* 1997; 26:715-720
7. Foster MT, Collins JT, Morgan JP. Intravascular ultrasound diagnosis of cystic adventitial degeneration of the popliteal artery: a case report. *Catheter Cardiovasc Interv* 2001;53:527-529

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