CLINICS 2010;65(3):341-4

LETTER TO THE EDITOR

GIANT THROMBOSED VENOUS ANEURYSM IN THE CALF: MRI CHARACTERISTICS AND THE TARGET SIGN

doi: 10.1590/S1807-59322010000300017

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INTRODUCTION

Primary venous aneurysms are not as common as arterial aneurysms. Venous aneurysms have been described in the popliteal, jugular and saphenous veins but are rarely observed in other veins such as the visceral veins.[1-3]

A popliteal venous aneurysm (PVA) is occasionally characterized by local signs and symptoms and notably may cause fatal complications, such as pulmonary embolism and other thromboembolic episodes, if it remains undiagnosed or untreated.

Although many cases of popliteal venous aneurysms have been reported, to date, there have been no previous descriptions of the MRI features of PVAs. The present case study describes a giant thrombosed venous aneurysm in the calf that simulated a soft tissue mass in its clinical presentation. The thrombosed venous aneurysm presentation, as observed via MRI, showed characteristics that could represent potential pitfalls resulting in a misinterpretation of the lesion as a peripheral nerve tumor.

CASE REPORT

A 24-year-old woman presented with calf pain over a period of ten days. Upon physical examination, a calf mass was observed, and the patient was subsequently referred to an emergency unit. There were no respiratory or cardiovascular complaints.

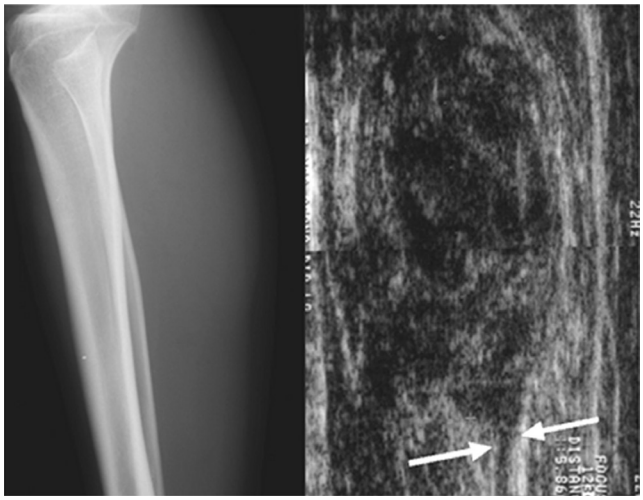

Figure 1 - A giant thrombosed venous aneurysm in the calf. Lateral radiography showed only questionable and nonspecific soft tissue enlargement. Ultrasound images demonstrated the continuity between the mass and the neurovascular bundle in the longitudinal axis. The soft tissue mass was heterogeneous based on ultrasound images.

The X-ray images revealed a nonspecific soft tissue prominence in the middle third of the calf, and ultrasound revealed a heterogeneous, predominantly hypoechoic, soft tissue mass (Figure 1).

Furthermore, analysis of the MRI images revealed a soft tissue tumor with a tubular structure entering and exiting the mass (Figure 2). Retrospective evaluation of the ultrasound images also demonstrated that the mass was contiguous with a hypoechoic tubular structure. The transition between the lesion and this tubular structure of the neurovascular bundle had a contour aspect suggestive of a lesion that originated from the respective neurovascular element (Figures 1, 2A and 2B).

A discrete target sign was identified in the tumoral lesion on the T2-weighted images that was characterized by a very

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Figure 2 - A giant thrombosed venous aneurysm in the calf as viewed by sagittal MRI sections. A. T1-weighted image before contrast injection. B. T1-weighted and fat-saturated images post-contrast injection. C. T2-weighted and fat-saturated images. D. T2* echo gradient image. The thinner white arrows indicate the neurovascular bundle, and the thicker white arrows indicate a low-signal rim present only on the T2-weighted and fat-saturated and T2* echo gradient images.

bright periphery and relatively low signal in the central region. The pre- and post-contrast T1-weighted images showed a marked target pattern both with and without fat saturation (figures 2 and 3).

Surgery was then performed to biopsy the soft tissue mass, and the resulting intra-operative evaluation suggested a giant thrombosed venous aneurysm, which was confirmed pathologically.

The low-signal central region observed in the MRI

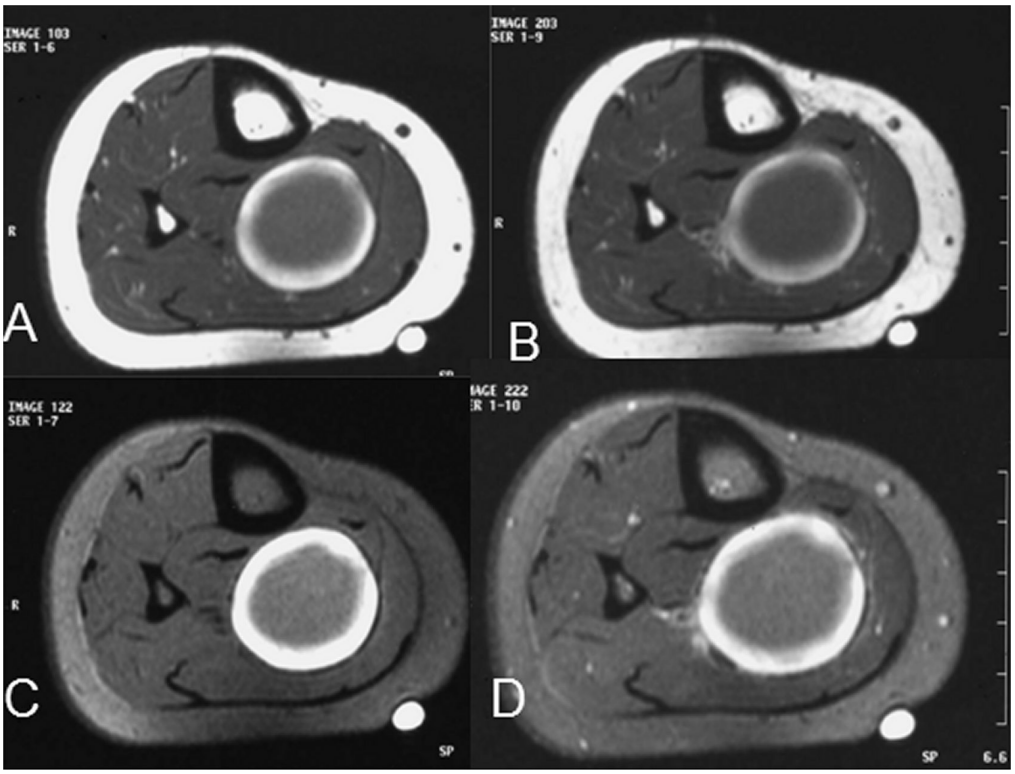

Figure 3 - A giant thrombosed venous aneurysm in the calf as viewed by axial MRI sections. A. T1-weighted before contrast injection. B. T1-weighted post contrast injection. C. T1-weighted and fat-saturated images before contrast injection. D. T1-weighted and fat-saturated images post contrast injection.

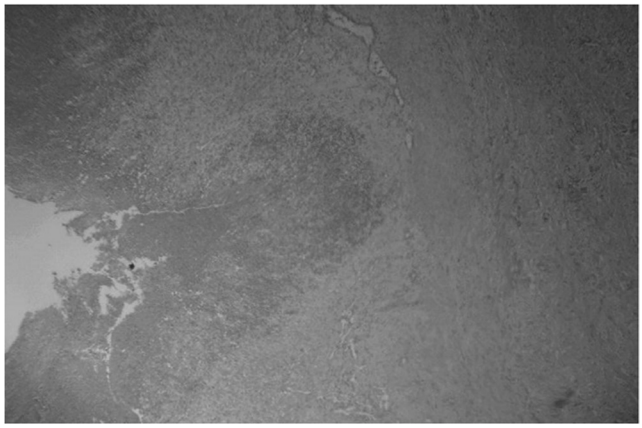

Figure 4 - A giant thrombosed venous aneurysm in the calf. Histological analysis showed vascular dilatation and luminal thrombus.

images correlated well with the area of the central thrombi that was verified by histology (figure 4). Both the T2-weighted fat-saturated fast spin-echo and the T2* echo gradient images of the soft tissue lesion had a thin low-signal rim related to the magnetic susceptibility of hemosiderin. It is also important to note that, because of the hemosiderin deposition, the T2* echo gradient images revealed the target sign significantly better than the T2-weighted fat-saturated fast spin echo.

DISCUSSION

Popliteal venous aneurysm is considered a rare condition, but it is a potentially fatal vascular disorder. The true incidence of this type of aneurysm may be underestimated in the literature because there is a group of patients who are known to be asymptomatic. Physician awareness, in addition to access to an ultrasound examination, may allow for an early diagnosis prior to the occurrence of any thromboembolic or other major complication. These aneurysms are more common in females and occur more frequently in people over 40 years of age.[4-7]

A retrospective analysis of 25 patients identified that 24% of cases involved pulmonary embolism, and 76% of PVAs were discovered during an investigation for chronic venous disease.[7] With the widespread use of venous duplex scanning, PVAs are increasingly found in patients with deep or superficial vein insufficiency.

Previously, popliteal venous aneurysms have been reported to mimic soft tissue popliteal masses.[8,9] In this case study, the thrombosed venous aneurysm also presented clinically as a mass.

The thrombosed venous aneurysm in the calf showed a target sign on both the T2-weighted and T1-weighted images. In this case, the low-signal central region was correlated to the area of the central thrombi verified during the histological analysis. It is interesting to note that the pre-contrast T1-weighted images already showed a marked target pattern. Moreover, due to hemosiderin deposition, the T2* echo gradient images better demonstrated the target sign than the T2-weighted fat-saturated fast spin echo.

Neurogenic neoplasms represent approximately 10% to 12% of all benign soft-tissue neoplasms, while the most common peripheral nerve tumors are neurofibromas and schwannomas.[10,11] The MRI diagnosis of a peripheral nerve tumor may be suggested by the lesion location along a typical nerve distribution,[12,13] and the identification of a fusiform mass with an entering and exiting nerve is considered one of the most important imaging features suggestive of a peripheral nerve neoplasm.[11,14,15] This sign has been reported in 88.2% to 94% of cases of benign peripheral nerve tumors.[12,13]

Analysis of MRI images has revealed that the signal intensity of peripheral nerve sheath tumors (PNSTs) may be nonspecific. Heterogeneity may be present and in such cases would reflect hypocellularity, hypercellularity, fibrous tissue, xanthomatous changes, cystic degeneration, necrosis and hemorrhage.[11,12-14,16]

In some cases of neurofibroma and schwannoma, it is possible to detect a characteristic target pattern on the T2-weighted images using a bright signal (myxomatous tissue) at the lesion periphery and a low to intermediate signal at the central region (fibrocollagenous tissue). Although it has not been precisely identified, this target sign has been described as typical of peripheral nerve neoplasms.[11,17] A target sign may also be present in benign peripheral nerve tumors imaged using high-resolution ultrasound.[18]

The imaging aspect of normal veins and of thrombosic veins on MRI is extremely variable, with many factors contributing to the signal intensity of the vessels.[19] Precise anatomical landmarks eventually may be necessary to unequivocally differentiate the vessels from the nerve in the same neurovascular bundle.

The thrombosed venous aneurysm in the calf described here presented as a soft tissue mass in continuity with an element from the neurovascular bundle and also showed a target sign upon MRI analysis. Therefore, these signs could not be considered separately from clinical information and from other imaging signs; otherwise, they may lead to an incorrect diagnosis of a benign peripheral nerve tumor. The authors emphasize that cautious evaluation of the anatomical landmarks from the neurovascular bundle and the comparative analysis of the pre- and post-contrast images are important to avoid such diagnostic confusion. The T2* echo gradient images may also be important in demonstrating the magnetic susceptibility related to blood product degradation.

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