PERIPHERAL ANEURYSMS WITH A REVIEW OF THE LITERATURES

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Peripheral artery aneurysms may be defined as a significant widening of a segment of a peripheral artery. They can be classified in two groups: true and false aneurysms. True aneurysms are the result as atheromatous degeneration in the wall of the artery. False aneurysms arise from rupture in the arterial wall not necessarily associated with atheromatous disease.

The availability of recent imaging modalities enables the correct diagnosis of an aneurysm to be easily made. Objectives of our report are :

1. To raise an awareness that a mass at an unexpected location, though rarity, could be an aneurysm, as in our 4 presenting cases.
2. To demonstrate and compare the acuity and practical use of various imaging modalities in detection of a peripheral aneurysm including arteriography, magnetic resonance imaging and angiography (MRI and MRA), and Doppler imaging.

CASE REPORTS

Case 1 : A 66-year-old chinese woman presented with a slow-growing retromalleolar mass of the left ankle of 3 years duration. There was clinical doubt as to whether this represented a ganglion cyst or an aneurysm. Doppler color imaging (DCI) (Fig.1) clearly showed an eccentric vascular mass with calcified wall connecting with the left posterior tibial artery. After aneurysmectomy with end to end anastomosis, an aneurysm was resected and its three composing layers of the wall proves that this mass is a true aneurysm of the posterior tibial artery.

Case 2 : A 15-year-old Thai man presented with a right lower neck mass, associated with right Horner syndrome of 2 weeks duration. Arteriography (Fig. 2A) revealed a 5 cm saccular aneurysm of the second part of right subclavian artery. Surgery was performed by ligation of the neck of the aneurysm with bypass venous graft from the right common carotid artery to the right subclavian artery distal to the lesion. About 2 weeks after operation, DCI was requested for evalution. Unfortunately, a 3 cm recurrent saccular aneurysm was evident originating at the previous location with patent turbulent flow through the bypassed vein. (Fig. 2B)

Case 3 : A 46-year-old Thai woman, with underlying condition of neurofibromatosis, presented with a painful and pulsatile mass below left angle of mandible for 2 months. MRA, arteriography, and DCI (Fig. 3A, 3B, and 3C), all identified a long tortuous segment of fusiform aneurysm of the left internal carotid artery extending from just distal to the left common carotid bifurcation to its entrance to the petrous bone. Operation, aneurysmectomy with saphenous vein graft, was done.

Case 4 : A 58-year-old Thai woman presented with a firm cervical mass below the left

DCI = Doppler Color Imaging

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angle of mandible for 2 years duration. This mass was first thought to be most likely a carotid body tumor due to its location and chance probability. MRI and MRA of the neck (Fig. 4A, 4B, 4C, and 4D) reveal a hypervascular mass near the bifurcation of left common carotid artery. It is still difficult to distinguish between a hypervascular tumor and an aneurysm; thus, arteriography and DCI (Fig. 4E and 4F) were performed. Both of them accurately showed that this mass was a large well defined aneurysm extending from the left internal carotid artery just distal to the bifurcation. After careful preoperative evaluation, aneurysmectomy and repairment of the anastomosis with the left saphenous vein was executed with favorable result and no complication.

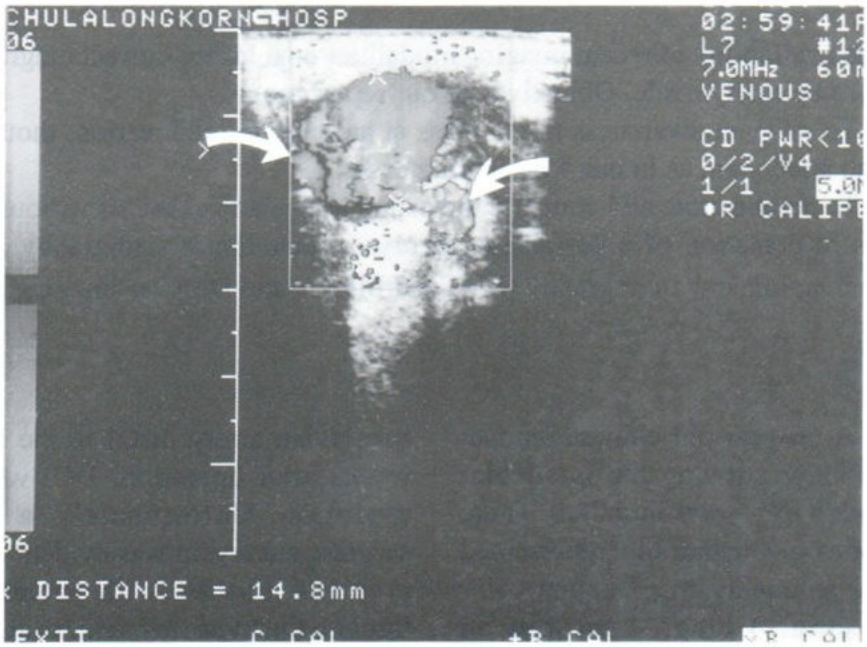


Fig. 1 DCI shows swirling flow pattern within a 2.8 cm mass originating from left posterior tibial artery. Evidence of afferent and efferent vascular dilatation to and fro from this mass is also noted. (arrows)

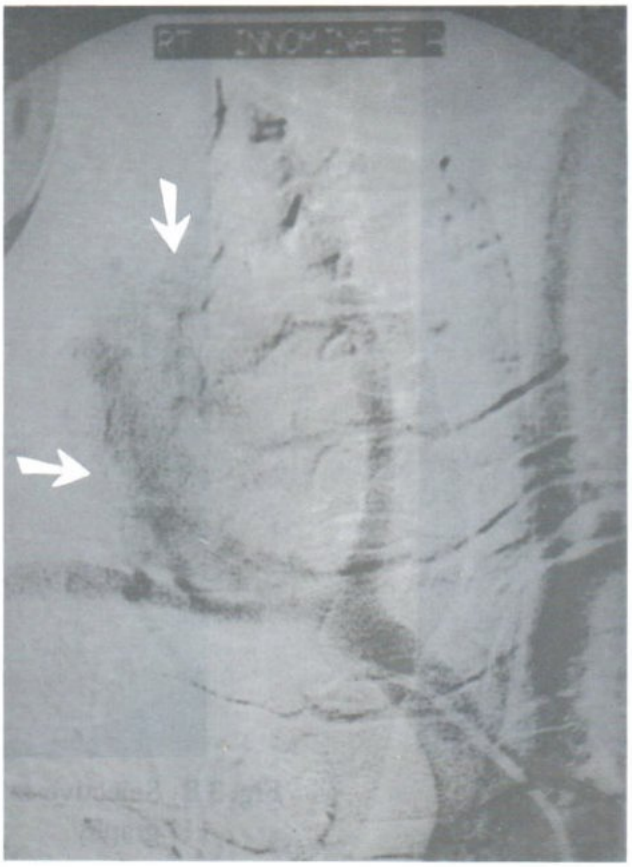


Fig. 2 A Selective right subclavian arteriogram reveals an aneurysm at its second part. (arrows)

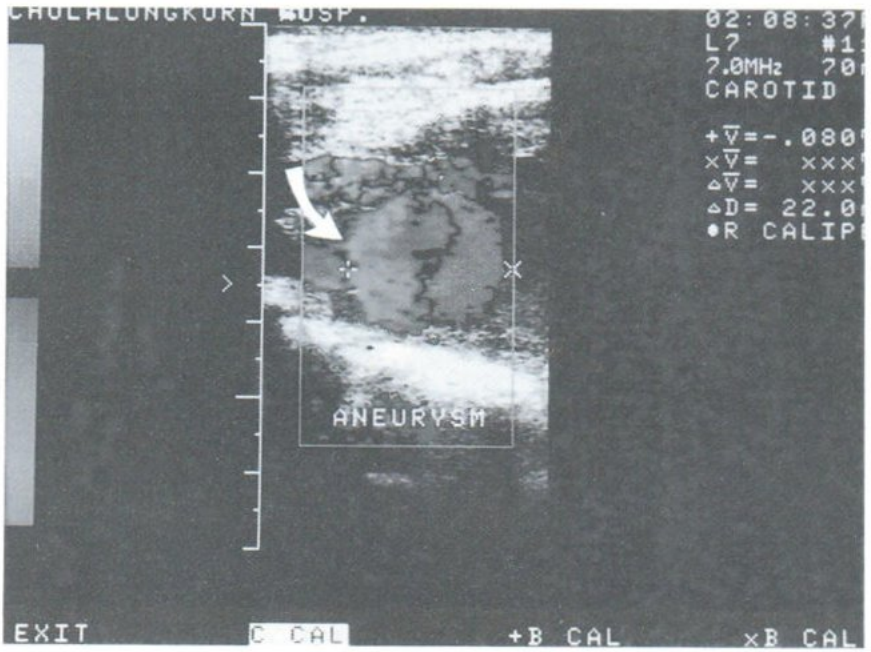


Fig. 2 B DCI performing 2 weeks following ligated neck of the aneurysm of right subclavain artery demonstrates a 3.1 cm aneurysm originating from the right subclavian artery and patent turbulent flow through the bypassed vein, suggestive of a recurrent aneurysm. (arrows)

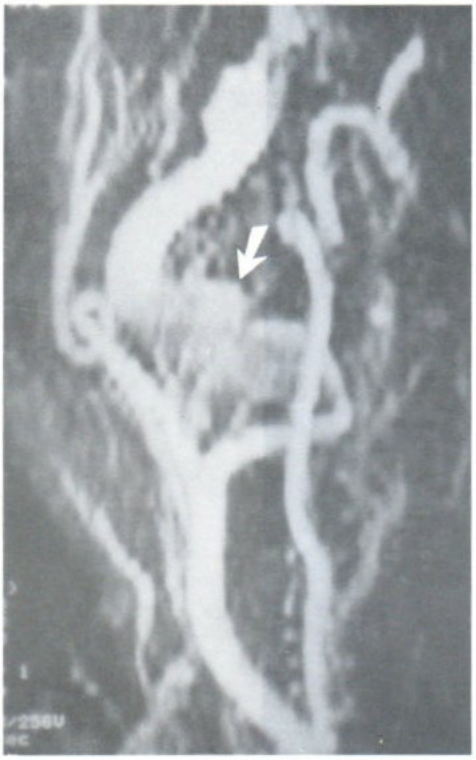


Fig. 3 A MRI lateral view

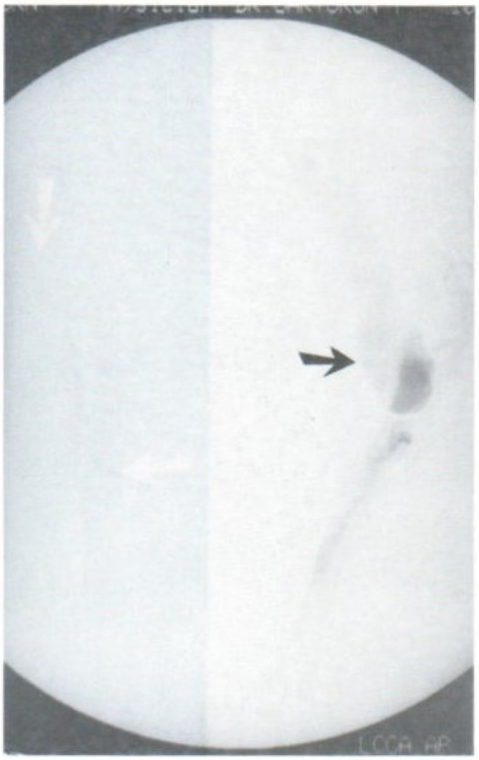


Fig. 3 B Selective left common carotid arteriography

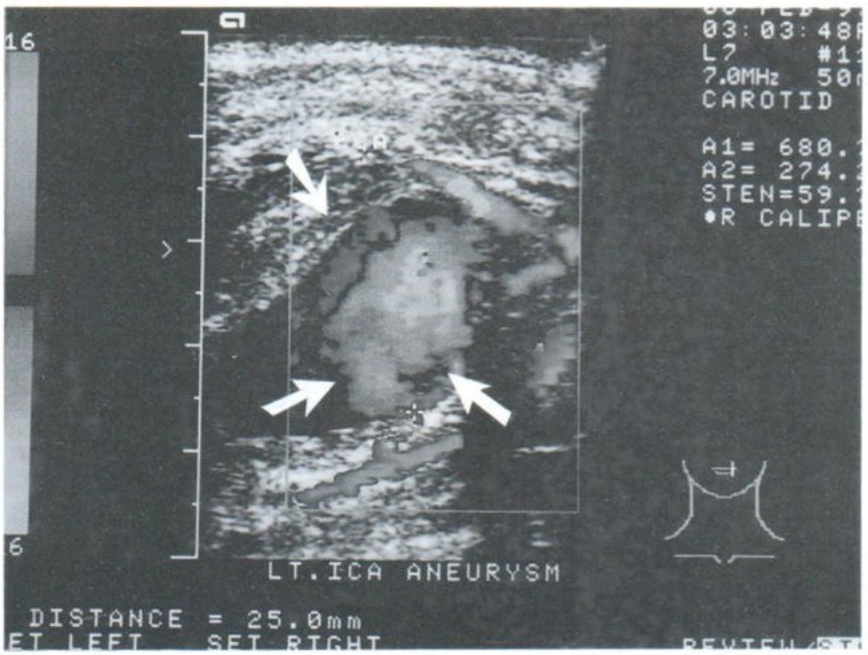
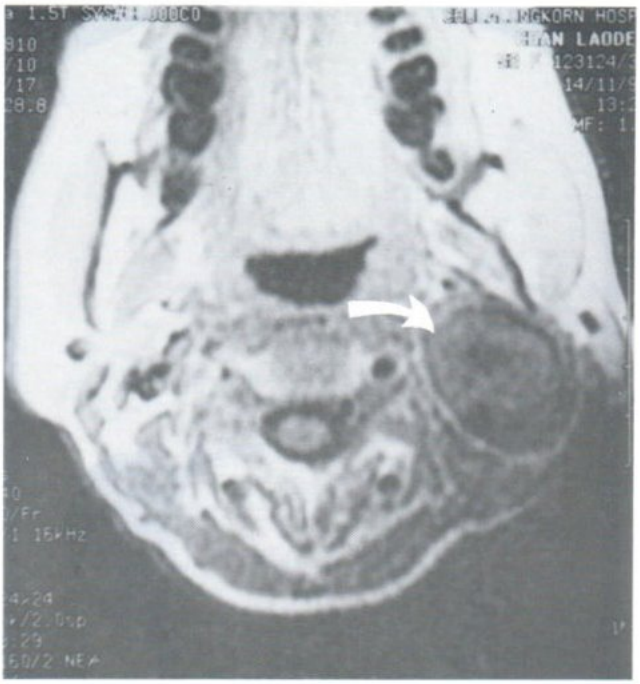
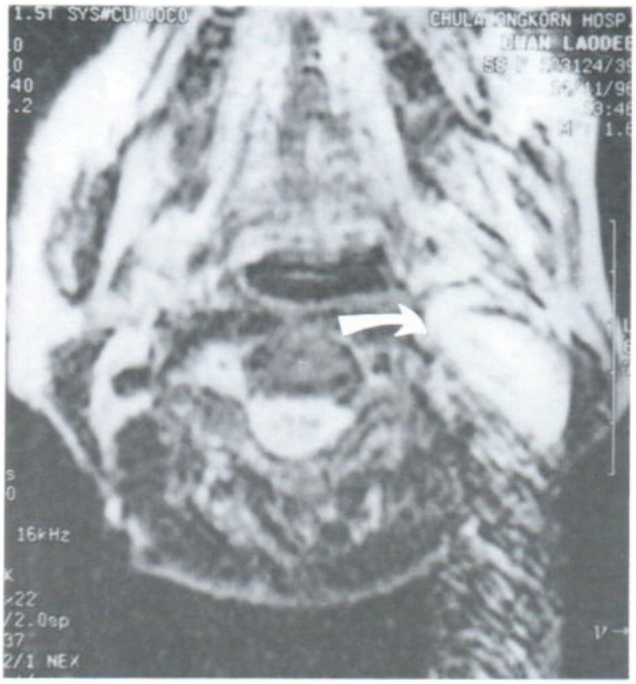


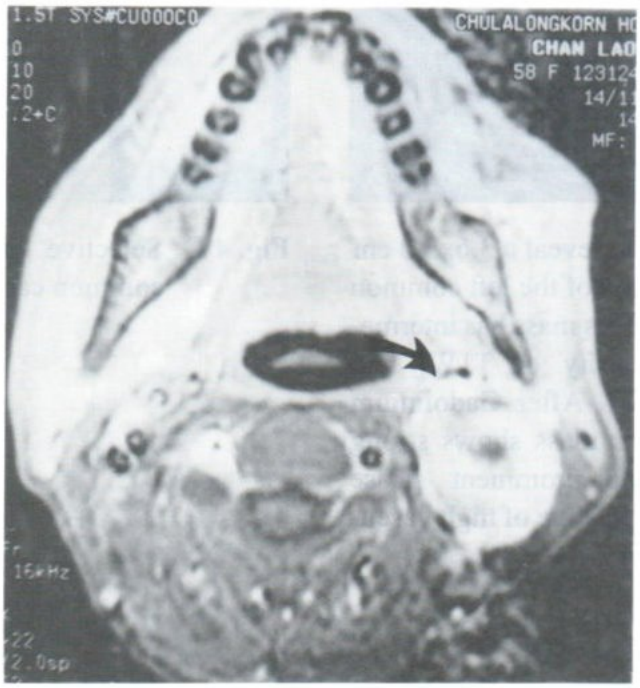
Fig. 3 C DCI, all clearly illustrate that a mass below the left angle of the mandible is a long tortuous segment of a fusiform aneurysm of the left internal carotid artery. Thick wall and internal thrombus are also seen. (arrows)



4A



4B



4C

Fig. 4 A, 4 B, 4 C T1WI, T2WI and T1WI with Gadolinium enhancement and fat suppression of MRI

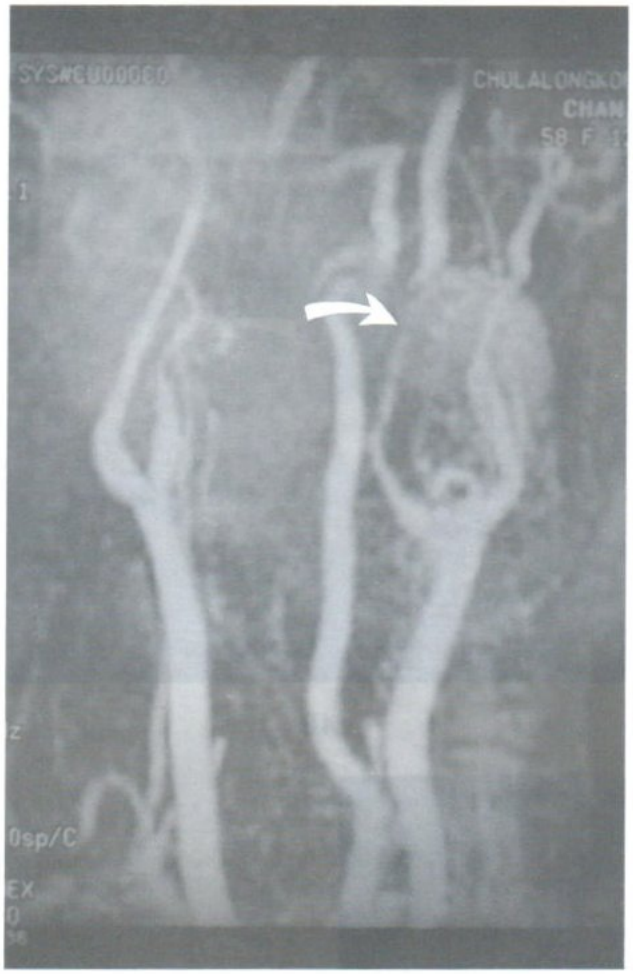


Fig. 4 D MRA of the neck, reveal a 3.6x3.0 cm mass at bifurcation of the left common carotid artery. This mass has intermediate signal intensity on T1WI, and bright SI on T2WI. After Gadolinium enhancement, this mass shows strong enhancement and prominent phase shift artifact, suggestive of high vascular flow of it. (arrows)

Fig. 4 E Selective arteriography of the left common carotid artery.

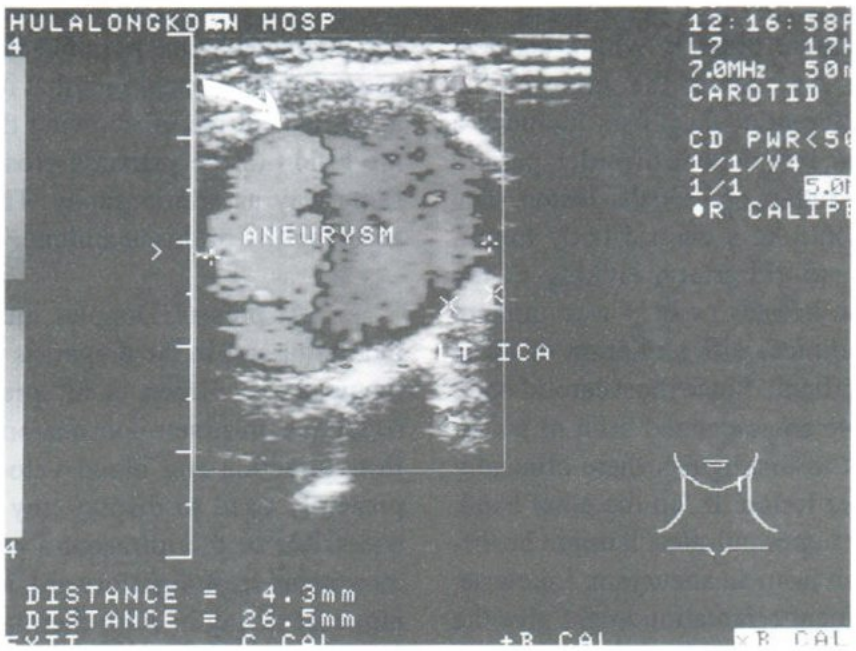


Fig. 4 F DCI, confirm that a large well defined aneurysm has origin from a left internal carotid artery. (arrows)

DISCUSSION

All our 4 presenting cases are rare. Reports of posterior tibial artery aneurysms, as reviewed by Monig et al in 1996, are 6 cases up to that time.[1] Most cases result from trauma. In contrast to traumatic aneurysm, nontraumatic aneurysms are seldom encountered.[1-4] True aneurysms of this artery are very rare and are sporadically reported. To our knowledge, there are 2 reports of true aneurysm of posterior tibial artery. One by Katz et al[2] and the other by Chaillon et al,[3] and both are associated with an underlying systemic disease (one with presence of a lupus-like syndrome and the other with a Behcet's disease). However, a case of us (case 1) showed no obvious evidence of any systemic disease after screening check up. The aneurysms arising in an aberrent subclavian artery are rare; there were 31 cases reported in the literature which had been reviewed by Austin et al in 1985.[5] However, those not arising from a subclavian artery as in a case of us (case 2), also aneurysms of the cervical portion of the internal carotid artery are very uncommon lesions. Beall et al found just 7 aneurysms of the extracranial carotid artery among 2300 procedures for aneurysms performed at Baylor. Raphael et al reported 6 carotid artery aneurysms at the Mayo Clinic from 1936 to 1960.[6] A prospective study of the clinical suspected vascular lesions at the carotid bifurcation by Barry et al,[7] over a 3-year period (1987-1991) of 50 patients revealed just 5 aneurysms. Therefore, our cases illustrate the importance of awareness as well as a high index of suspicion for the diagnosis of peripheral aneurysm, although uncommon.

Peripheral aneurysms may increase in size to cause local symptoms, be a source of distal emboli, thrombose with resulting ischemia of the limb and, occasionally, rupture. The ominous importance of these potential complications justifies emphasis on early recognition and treatment.[8]

When a patient presents with a cervical mass (as in case 2-4) below the angle of the mandible, the differential diagnosis includes a branchial cleft cyst, lymph node disorder, parotid tumor, soft tissue tumor or vascular lesion. The vascular lesion could be a carotid body tumor, aneurysm of the corotid artery, kinking of the carotid bifurcation vessels or only a prominent bifurcation. The clinical differentiation of these lesions could be difficult. Since most carotid body tumors do not have an associated bruit of pulsation, it is difficult to distinguish them clinically from a nonvascular lesion. If, on the other hand, the carotid body tumor pulsates, it might be difficult to distinguish from an aneurysm. Likewise, a kinked or prominent bifurcation might give the clinical impression of an aneurysm.[7] Also, due to the rare incidence of a posterior tibial aneurysm when compares with other possibility such as a more common ganglion cyst, the differentiation of a retromalleolar mass is usually difficult if there is no aid from modern imaging such as noninvasive DCI (as in case 1). Our report shows how various imagings can be used to confirm diagnosis of peripheral aneurysm when clinical doubt exists. Preoperative evaluation is necessary and often involves investigations such as Computer tomography (CT), MRI, MRA, arteriography, fine-needle aspiration biopsy, and Doppler imaging.

Among various helpful modalities, arteriography gives important information about the condition of the proximal arterial branches and the outflow tract, and therefore gives information about possibilities for reconstruction.[1] However, it is considered to be complicated and invasive method. In doubtful cases, CT, MRI, MRA can give further information but they also are expensive investigations. The availability of Doppler imaging provides a noninvasive and relatively inexpensive way of detecting the size and extent of the lesion and, in some institutions, is replacing arteriography[7,9] for those vessels that can be imaged. One possible disadvantage of the use of Doppler imaging is that it does not provide a permanent record showing the relationship of the lesion to the patient's gross anatomy in the same way as arteriography. This may limit the acceptability of this technique.[9]

At present, Doppler imaging is a steadily increasing use in the diagnosis of peripheral soft tissue mass. Green et al[9] presented that this technique illustrates both anatomical detail, blood flow direction and blood velocity spectra. It is presently used to display any arterial segment accessible to the ultrasound probe. DCI makes interpretation straightforward, less time consuming, cost saving in color thermal paper and more reliable, and also is of similar diagnostic value as arteriography.[9] Moreover, the prospective study of Barry et al[7] states that they believe that patients with lesions at the carotid bifurcation of suspected vascular origin should be initially investigated by Doppler imaging and clearly arteriography in these patients can be eliminated. This study found that 11 cases of carotid body tumors have a very high blood flow resulting in a vascular bed with a low resistance. The 'normal' (without a carotid body tumor) external carotid artery supplies a high resistance distal bed. Since a corotid body tumor is primarily supplied by branches of the external carotid artery, its presence would result in reduction of the resistance index in this vessels. Thrombus in an aneurysm might also look like a carotid body tumor but there is no flow in the thrombus. Our experience, as in case 4, advocates this statement. Case 4 of us was underwent almost all vascular imaging modalities. DCI has shown superior data to MRI and MRA which have some problems in discrimination between a high flow of vascular tumor and an aneurysm due to both lesions can cause phase shift artifact and similar signal intensity. Also, DCI is able to give equal information to arteriography but is less invasive and time consuming. Further studies comparing composite Doppler imaging with

arteriography should define the group of patients where invasive diagnosis can be avoided (as in case 1 and 4). Thus, as a trend at present, Doppler imaging might be a favorable first choice for clarifying of a suspected peripheral aneurysm.

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