Case Report

A Complicated Radial Artery Pseudoaneurysm

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Abstract

This report presents a case of right radial artery pseudoaneurysm complicated by arterio-venous fistula and absence of ulnar artery. The patient had history of deep vein thrombosis 18 months earlier and was receiving oral warfarin anticoagulation therapy. Doppler study and angiography finding showed poor collateral supply to distal arterial bed. The etiology of this complication and its treatment is controversial.


Keywords: Arterio-venous Malformation " Pseudoaneurysm " Radial Artery " Thenar Mass

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**Introduction**

The radial artery is the most frequently used arterial line access with relative safety. Pseudoaneurysm (PA) is a rare complication, and there are reports that it can develop in the setting of the arterial line infection (Ref). Other complications include rupture with bleeding, dissection, thrombosis, hematoma, distal embolization, hand ischemia, local infection, and bactremia (Ref). Arteriovenous malformations have the presence of arteriovenous shunts in multiple capillary beds both on the skin but also involving internal organs (Ref). They are usually accompanied by a bruit and hyperemia with prominent venous out flow.

**Case Reoprt**

A 45 year old woman presented with a painful mass in her right palm. She complained of pain at the same site that worsens by usual daily activity. She had a history of deep vein thrombosis (DVT) 18 months ago and was receiving oral anticoagulation since then. She didn't have other medical illness in her past medical history. She complained of pain upon applying pressure on the thenar side of the palm, resulting limitation in ordinary daily activities. There was no history of penetrating trauma, which is usually the cause of a PA. On the other hand, true aneurysms are mostly associated with repeated mechanical trauma. On examination a swollen mass could be seen over the thenar side of the palm. This diffuse pulsatile swelling was palpable in thenar at the palmar and dorsal side. Sensation of all the fingers was normal. Color Doppler of the right hand showed an evidence of pulsatile flow into the swelling mass in connection with the deep palmer arch suggestive of PA and multiple abnormal tortuosity of the vessels between thenar and intrinsic muscles. In angiography the ulnar artery was cut from origin and radial artery was the main supplying vessel of the hand. Radial artery in distal point was connected to a 3 to 4 cm PA and connected to an abnormal tortuous arteriovenous (A-V) fistula. Cephalic vein was filled immediately through the A-V fistula. Filling defects in the PA suggested the presence of thrombus in it.
Discussion

PA is a pulsatile hematoma in communication with an artery, via disruption of the vessel wall. PAs are well documented complications after surgery, arterial puncture and trauma, and develop after any procedure that causes partial disruption of vessel wall\(^1\). Radial artery PAs are being increasingly reported because of widespread use of invasive monitoring\(^2,3\). Symptoms occur either due to mass effect by the aneurysm, digital ischemia or nerve suppression. A traumatic PA begins as a sac-like outpouching of the arterial wall. This often starts as an extra-arterial hematoma that undergoes organization. Typically, there is a thinner intimal layer, with fibrosis and decreased vasculature within the medium. This weakened artery is more susceptible to rupture than is the native vessel. Acute exploration of a penetrating injury prevents the formation of a PA by obliterating the site of penetration. The most common causes of radial PA in children and adolescents are penetrating trauma and iatrogenic arterial injury\(^4\). This creates an abnormal low-resistance circuit that steals from the high-resistance normal capillary bed. Flow in the afferent artery and efferent vein increases, causing dilatation, thickening, and tortuosity of the vessels. The parasitic circulation causes decreased arterial pressures in the distal capillary beds and can cause tissue ischemia. The increased flow into the venous circulation does not necessarily cause higher venous pressures. However, it can cause vessel wall abnormalities such as thickening of the media and fibrosis of the wall. These changes are known as arterialization. Clinically, PA simulates subcuticular abscess and hematoma and high index of suspicion is necessary to diagnose this condition. Allen’s test and its modifications are widely performed to evaluate adequacy of collateral hand circulation\(^5\). The examiner compresses both radial or ulnar arteries for about one minute, while the patient closes both hands as tightly as possible to exanguinate the hands. Subsequently, the patient extends his or her fingers while the examiner maintains compression of the artery. The return of colour to the hand indicates absence of lesions in the artery not compressed. Unfortunately, the traditional Allen’s test carries significant false positive and false negative results, and additional studies are needed to define the accuracy of some innovative non-invasive tests\(^6\). Therefore, the gold standard investigation to assess an efficient collateral flow is still angiography, which is invasive and expensive. Contrast enhanced computerized tomography, conventional angiography and high-resolution duplex color Doppler are useful to confirm the diagnosis. Arteriography is an excellent means of defining the arterial anatomy. Duplex color Doppler has been the only noninvasive investigation of choice with a sensitivity and specificity of 100% in differentiating PA from periarterial hematoma. The blood flow into the venous circulation causes turbulence, which is responsible for the palpable thrill. The thrill is dependent on the geometry of the fistula and does not represent volume of flow accurately. Most radial artery aneurysms are asymptomatic. Known risk factors to the development of PA are abnormal state of the vessel wall (atherosclerosis), multiple attempts at cannulation, hematoma formation, and infection at the cannulation site. Infection lasting more than 48 hours and infection with the bacterium S. Aureus correlate strongly with PA formation\(^7\). Some authors support simple ligation of radial artery and excision of the PA if adequate collateral flow can be shown. This treatment strategy is considered satisfactory even in the paediatric population. Indeed, studies on lacerations of the arteries at the wrist, and radial artery harvesting for coronary artery bypass, have shown that the radial artery can be safely sacrificed in adults. Available non-surgical measures rely on thrombus formation, and include ultrasound guided compression repair, reapplication of a compression bandage, and clinical observation of the natural course\(^8\). Ultrasound guided compression repair is a non-invasive technique characterised by manual compression of the PA with the transducer probe, maintained for 10 minute intervals, after which time the PA is rechecked for occlusion\(^9\). If flow is still present, compression is quickly re-established for additional 10 minute intervals, until occlusion is achieved\(^10,11\). Furthermore, restriction of physical activity alone may be curative. Surgery may be reserved for expanding, actively bleeding, or otherwise complicated lesions.
References