True digital artery aneurysm of the ring finger: a case report

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INTRODUCTION

True aneurysms of the digital artery are very rare. Only 13 cases, caused by chronic trauma from occupational or sports-related overuse, have been reported.\(^1\text{--}^{10}\) We report the first case of a true aneurysm of the digital artery of the left ring finger caused by chronic repetitive trauma from a wedding ring.

CASE REPORT

In April 2005, a 44-year-old teacher presented to the Changi General Hospital, Singapore, with a mass on the left ring finger. The mass had been present for 4 years and had arisen on the radial side of the finger just distal to where the wedding ring sat. She had not sought treatment earlier as the mass was small and asymptomatic. During the months preceding presentation, the mass progressively increased in size and caused some discomfort. The mass became tender to touch and she had to stop wearing the ring.

Physical examination revealed a 1.5-cm subcutaneous mass on the radial aspect of the proximal phalanx of the left ring finger, just proximal to the proximal interphalangeal joint. The skin over the
mass was normal and the mass felt firm and non-pulsatile. The capillary return and range of movement of the finger were normal and there was no sensory loss.

An excision biopsy of the mass was performed under a digital nerve block. An oblique incision was made over the lump. A 1-cm pulsatile mass continuous with the radial digital artery was identified. The appearance was consistent with a true aneurysm of the radial digital artery. The radial digital nerve was normal and preserved. The digital artery was clamped and the capillary refill was deemed to be good. With the patient’s consent, excision of the aneurysm and ligation of the radial digital artery were performed. There was good capillary return to the finger after ligation.

Microscopic examination of the excised specimen confirmed the diagnosis, revealing a true aneurysm with the lumen filled with an organising thrombus. On microscopy, the vessel was seen complete with fibromuscular walls, parts of which were dilated.

The patient recovered uneventfully, with the wound healing well, sensation remaining intact and brisk capillary return maintained.

DISCUSSION

An aneurysm is defined as a permanent dilatation of an artery with a 50% increase in its normal diameter. Aneurysms can be classified by cause as traumatic and non-traumatic. Non-traumatic causes of peripheral artery aneurysms may be atherosclerotic, mycotic, inflammatory, and idiopathic. Traumatic aneurysms in the upper extremity may be further divided into false and true aneurysms.

False aneurysms or pseudoaneurysms occur following penetration of the vessel wall, haemorrhage and extravasation. The resultant haematoma in the soft tissue organises, fibroses and seals the original point of injury. Eventual recanalisation of the fibrosed haematoma results in an encapsulated false aneurysm whose lumen remains in continuity with the vessel. Histological examination shows an organised thrombus with a fibrous wall that lacks arterial wall components.

True aneurysms are rare and often result from blunt trauma. This can be explained by Laplace’s law: the higher arterial pressures needed to distend the small calibre digital arteries, lead to aneurysmal formation. However, the pressures in the digital circulation are comparatively low. Thus, it is believed that blunt repetitive trauma weakens the arterial wall and is the pathomechanism that dilates the arterial wall. The occurrence of true aneurysms in superficially located parts of the arterial circulation subject to repetitive trauma supports this theory. In our patient, the digital artery was relatively unprotected in its course over the condylar eminence of the phalanges and therefore subject to repetitive trauma from the ring.

Histological examination showed arterial wall elements, including muscle and elastin fibres in the aneurysm wall; all 3 layers of the arterial wall could be seen (Fig. 1). Macroscopically, a true aneurysm is more uniform in shape as opposed to the sac-like appearance of a false aneurysm (Fig. 2). The Table summarises previous case reports of true digital artery aneurysms and their suggested pathomechanisms. True aneurysms have been reported in all 5 digits, the commonest being the thumb (n=4), followed by the index and ring fingers (n=3 each). All these aneurysms have been attributed to occupational or sports-related overuse.

A digital artery aneurysm usually presents as a painful, growing mass. In most cases, there is an initial relatively asymptomatic period followed by a shorter period of acute discomfort. This onset of acute discomfort is presumably due to the development of thrombosis within the vessel. Sensory disturbance may be seen in cases where there is localised pressure on the digital nerve. The masses were pulsatile in only half of the previous case reports. In the other cases, the organising thrombus within the aneurysm caused the masses to be non-pulsatile. Many digital masses that eventually turned out to be true digital artery aneurysms were not diagnosed preoperatively. This was so in our case where the diagnosis was not made preoperatively, nor was imaging such as ultrasonography or angiography performed. Many
such masses are misdiagnosed as epidermoid cysts, arteriovenous fistulas, foreign body granulomas, ganglions, or neurilemmomas.

Plain radiographs are not usually helpful unless the aneurysm has been present for some time causing erosive bony changes. The use of ultrasonography with a real time linear transducer at a frequency of 7.5 mHz has assisted preoperative diagnosis.\footnote{4,8} When the diagnosis is suspected, preoperative angiography has been used for preoperative confirmation and planning in some cases.\footnote{10}

Our patient is the first to be documented with a ring finger digital artery aneurysm caused by repetitive trauma from wearing an ill-fitting wedding ring. She had been wearing the ring for 19 years and felt that the ring was getting tighter as her fingers increased in size due to gradual weight-gain. The ring also altered shape, going from a normal circular shape to an elliptical shape. This led to increased pressure on the volar side of the finger, predisposing her to the development of a digital artery aneurysm. As the aneurysm gradually increased in size (putting pressure on the surrounding tissues) and the intraluminal thrombus developed, the patient experienced pain at the site of the lump. The presence of the intraluminal thrombus seen on microscopy may account for the lack of pulsation in the mass.

In most cases with good collateral circulation, these aneurysms can be excised using proximal and distal ligation without compromising the finger circulation. In other cases, end-to-end anastomosis and an autogenous reversed interpositional vein graft\footnote{10} are performed after excision of the aneurysm.

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REFERENCES