

# Digital artery pseudoaneurysm in a patient with previous radial artery harvest

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A post-traumatic pseudoaneurysm in the ulnar digital artery of the thumb in a patient with compromised vascularity due to a previous harvest of the ipsilateral radial artery is reported. To the authors' knowledge, the present case is the first such description of a pseudoaneurysm in the digital artery of a patient with compromised collateral blood flow.

**Key Words:** Digital artery; Pseudoaneurysm

Pseudoaneurysms of the digital arteries are rare, and fewer than 15 cases have been described since Hueston (1) presented the first case in 1973. This is believed to be directly related to the pathophysiology of the formation of a pseudoaneurysm, which requires a partial vascular injury. This occurs rarely in the digital arteries because their small calibre makes them far more susceptible to complete disruption when injured (2-4). Even more rare are pseudoaneurysms of the thumb, a phenomenon rarely described since the first case was reported by Baruch (2) in 1977. The present case involves a pseudoaneurysm in the ulnar digital artery of the thumb in a patient with compromised vascularity due to a previous harvest of the ipsilateral radial artery. The patient had previously undergone an oral cancer resection and reconstruction with a radial forearm free flap. To the authors' knowledge, no cases of pseudoaneurysms of any of the digital arteries have been described in patients who have a single artery as the sole blood supply to the digit.

## CASE PRESENTATION

A 65-year-old woman presented to the emergency room with a tender, pulsatile mass over the ulnar aspect of the metacarpophalangeal joint of the thumb (Figure 1). The patient described having lacerated the area two weeks previously, resulting in significant pulsatile bleeding, which the patient treated at home with pressure and a bandage. The patient was seen two days later in the plastic surgery clinic, and a provisional diagnosis of a pseudoaneurysm of the ulnar digital artery of the thumb was given. An ultrasonographic evaluation was performed, and

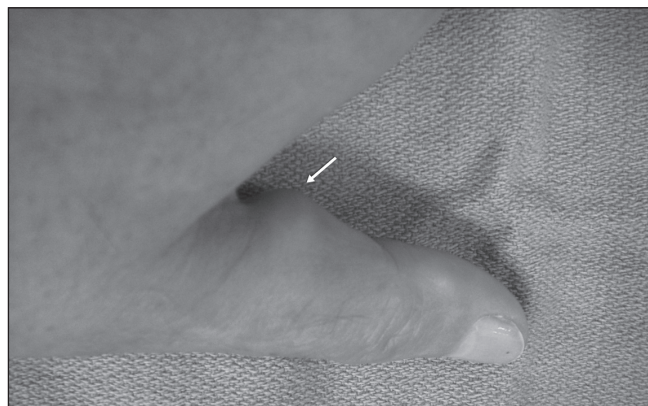


Figure 1) Superficial appearance of mass preoperatively

## Un pseudoanévrisme de l'artère digitale chez un patient ayant déjà subi un prélèvement de l'artère radiale

Les auteurs présentent le cas d'un pseudoanévrisme post-traumatique de l'artère ulnaire du pouce d'un patient dont la vascularité avait été compromise par le prélèvement de l'artère radiale ipsilatérale. En autant que le sachent les auteurs, le présent cas est la première description de pseudoanévrisme de l'artère digitale d'un patient dont le débit sanguin collatéral est compromis.

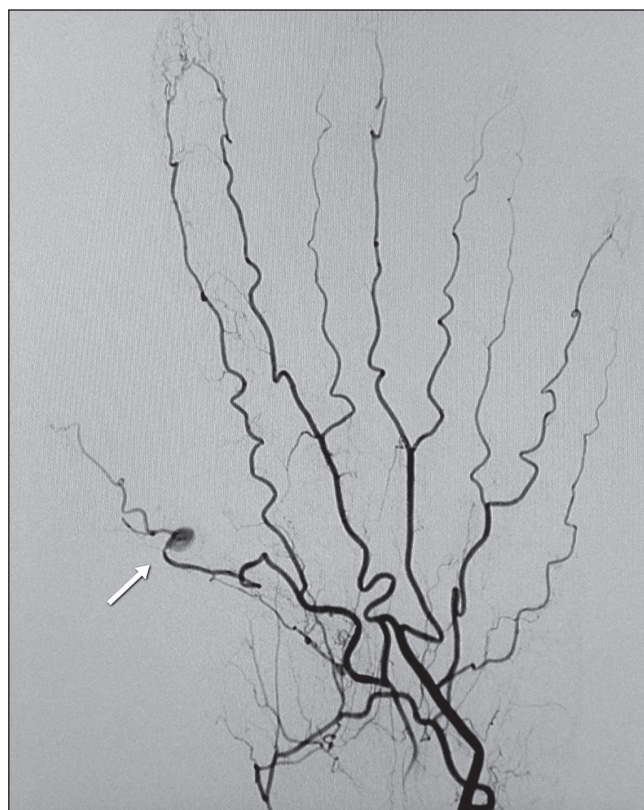


Figure 2) Preoperative angiogram demonstrating aneurysmal dilation of the ulnar digital artery of the thumb (arrow) and lack of radial digital artery perfusion

a partially thrombosed pseudoaneurysm was diagnosed. Excision was planned; however, due to the patient's history of a previous ipsilateral radial artery harvest in the same forearm, a preoperative angiogram was ordered to assess vascularity (Figure 2). This demonstrated that the affected vessel, arising from the remaining ulnar artery, was the sole blood supply to the thumb. The patient was taken to the operating room and, after dissection of the digital artery and pseudoaneurysm, vascular clamps were applied proximally and distally, confirming

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the lack of collateral circulation. The pseudoaneurysm was excised and a direct end-to-end microanastomosis of the digital artery was completed. The pathology report described a saccular dilation of the artery with fragmentation of the elastic and muscular fibres, consistent with a pseudoaneurysm. Hand therapy was initiated two weeks postoperatively and, at six months, the patient had normal perfusion to the thumb, normal sensation and complete recovery of function.

### DISCUSSION

In a patient presenting with a pulsatile mass in the hand, especially following trauma, one must consider the presence of an aneurysmal dilation of a vessel. True aneurysms and pseudoaneurysms are differentiated based on histological examination after excision, with true aneurysms having an intact, but dilated, vessel wall structure – including the elastic and muscle fibres – and pseudoaneurysms exhibiting a loss of this architecture due to replacement with fibrous tissue (2,4-10). The histological composition of the vessel walls is consistent with the mechanism of formation of each of these, and knowledge of these mechanisms can help in determining which of these two processes is more likely to be present in any given patient. True aneurysms generally result from a blunt trauma that leads to a weakening and progressive dilation of the vessel wall, which is why the elastic and muscle fibres remain present on histological examination (2,4,9,10). Pseudoaneurysms generally result from a penetrating trauma, which results in a partial disruption of the vessel wall. This disruption allows extravasation of the blood, with subsequent hematoma formation. Because the vessel is still partially intact, pulsatile flow continues, leading to a recanalization of the hematoma to form a false lumen. Over the next three to six weeks, fibroblast activity leads to the formation of a capsule that becomes lined with endothelium (2,4-11). Patients who present with a pseudoaneurysm will often be able to describe a specific penetrating traumatic event resulting in a significant pulsatile bleed, as was the case with our patient. Although the history is often helpful, imaging is a necessary part of the workup of the pulsatile mass to avoid the significant bleeding incurred with incising the lesion under the assumption that it is a simple abscess. An ultrasound is the preferred initial modality because it is noninvasive, involves no radiation and is widely available (12). In certain cases, however, a more accurate evaluation of the vascular tree is needed for preoperative planning. For this purpose, an angiogram remains the gold standard.

As with the majority of medical and surgical issues, there is some variability in the recommended treatment for both true and false aneurysms of the digital arteries; however, excision is indicated in virtually all cases. This is due to the natural history of aneurysmal dilations, which includes expansion with compression of surrounding structures, potentially resulting in neuropathy (13), and even osseous changes (14). The only case in which conservative management has been advocated is in the instance where the aneurysm is demonstrated to be fully thrombosed on imaging (15). Whether to reconstruct the vessel postexcision is where the disparity occurs, with numerous authors stating that simple excision and ligation is sufficient in the presence of adequate collateral flow (2-7,11-13,16), and others arguing that reconstruction, either using end-to-end anastomosis or reverse interpositional vein graft, should always be attempted when feasible (8-10,17,18). There is no disagreement, however, that in cases such as ours, in which collateral flow is compromised, reconstruction of the artery is absolutely necessary (2,4,8,16,18).

### CONCLUSION

A rare case of a pseudoaneurysm occurring in a patient with a single arterial supply to the thumb was presented. Despite the rarity of these lesions, one must always have a high index of suspicion when encountering a pulsatile mass in the hand. By following a few simple principles, the treating surgeon can easily arrive at a diagnosis and avoid complication in treatment. First, to avoid misdiagnosing an aneurysm as an abscess (and encountering a significant arterial bleed on incision), any



**Figure 3)** Intraoperative view of aneurysmal dilation of the ulnar digital artery of thumb before excision (arrow)

pulsatile mass should be evaluated by ultrasound regardless of the patient's recollection of trauma to the area. Second, if there is any concern for the competency of collateral flow to the affected digit, a dual-phase angiogram should be completed to adequately assess the vascular tree. Third, once the lesion is exposed, the collateral blood supply should be checked by applying vascular clamps to the lesion proximally and then distally, before excision (16). Finally, the lesion should be carefully excised and, if reasonable, a reconstruction should be attempted using end-to-end anastomosis or reverse interpositional vein graft. If collateral flow is adequate and reconstruction appears problematic, then simple ligation is sufficient; however, if collateral flow is impaired, a reconstruction to restore digital blood supply is necessary.

**DISCLOSURE:** All work was performed at the Sunnybrook Health Sciences Centre, Toronto, Ontario. The authors have no financial disclosures or conflicts of interest to declare.

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