Pseudoaneurysm of the Superficial Palmar Arch in a 6-month-old Child: A Case Report

Grzegorz J. Kwiecien, MD*
Anna Garbuzov, BA†
Thanapoom Boonipat, MD†
Matthew T. Houdek, MD‡
Steven L. Moran, MD*†

Summary: Hand aneurysms in infants are extremely rare and, unlike their adult counterparts, cannot be explained by repetitive trauma to the palm. When they occur, they are almost exclusively located in the ulnar artery. Usually there is no history of trauma, and an alternative diagnosis like malignancy must be excluded. Helpful physical findings to aid diagnosis include rapid appearance of a mass over the course of a few days, pulsatile nature, and location along the ulnar side of the hand. These cases can be challenging and excisional biopsy may be required if the lesion is thrombosed and does not have a characteristic appearance on imaging. Aneurysms located in the palmar arch or common digital arteries are usually treated with simple excision, while those located in the ulnar artery often require repair or reconstruction. Here we present a unique case of an infant with a pseudoaneurysm involving the superficial palmar arch on the radial side of the hand with a likely congenital etiology. Diagnostic challenges and treatment options are discussed. (Plast Reconstr Surg Glob Open 2022;10:e4093; doi: 10.1097/GOX.0000000000004093; Published online 9 February 2022.)

Arterial aneurysms of the hand are uncommon pathologies in adults and usually occur in the ulnar artery due to chronic, repetitive blunt trauma causing hypothenar hammer syndrome. A, B Arterial aneurysms of the hand are extremely rare in the pediatric population, and when they occur, they are almost exclusively located in the ulnar artery. Because of its rarity, the presence of an aneurysm, especially on the radial side of a child’s hand, can present a diagnostic challenge. The etiology, optimal treatment, and long-term effects on the growth of the hand are poorly understood. Herein, we present a case of an isolated pseudoaneurysm of the superficial palmar arch in a 6-month-old infant and discuss diagnostic challenges and treatment options.

CASE REPORT

A previously healthy 6-month-old boy was brought to a routine well-child visit with a mass within the right first palmar webspace that appeared acutely 2 days prior. There was no history of amniocentesis, trauma, or other inciting event. The boy had been afebrile without any signs of systemic illness. On physical examination, the mass was pulsatile, nontender, and mobile. Radial and ulnar pulses were palpable and all digits appeared well perfused (Fig. 1). Routine laboratory tests including white blood cell and C-reactive protein were within normal limits.

Ultrasonography was ordered and revealed an indeterminate heterogeneous mass with a large central anechoic space with prominent arterial-type blood flow (Fig. 2). This was not consistent with hemangioma or vascular malformation, and the patient was referred to musculoskeletal oncology and for MRI with a presumptive diagnosis of neoplasm. MRI with and without intravenous contrast revealed a well circumscribed oval mass measuring 1.5 × 0.9 × 1.2 cm surrounded by a 0.8 cm rim of peripheral clot. This mass had rapid arterial filling and was consistent with an aneurysm or pseudoaneurysm of the superficial palmar arch (Fig. 3).

The patient underwent surgical excision through a thenar crease incision (Fig. 4). The aneurysm was bluntly dissected, and the radial and ulnar portion of the superficial palmar arch was clipped as close to the neck of the aneurysm as possible. The deep arch and dorsal metacarpal arterial arcade were unaffected. The common digital nerve to the first webspace was adherent to the deep outer surface of the aneurysm and was dissected free from the capsule (Fig. 4). Following
resection and tourniquet deflation, all digits were well perfused. Microvascular reconstruction was not needed. Pathologic characterization of the resected specimen was consistent with an arterial pseudoaneurysm. The specimen lacked inflammatory infiltrate, which excluded the diagnosis of an underlying vasculitis. The patient was diagnosed with a pseudoaneurysm, likely of congenital etiology, and did not require further workup for vasculitis. He recovered well from the procedure without any functional deficits.

**DISCUSSION**

Aneurysms are described as either true or false. False aneurysms, or pseudoaneurysms, usually occur as a result of penetrating injury with preservation of the luminal communication. In contrast to pseudoaneurysms, all layers of the arterial wall are affected in true aneurysms, and there may be various etiologies. Regardless of the type, they rarely occur in arteries of the hand in adults and are extremely uncommon in the pediatric population. The small-caliber arteries of the hand distend only under high pressures, and in the setting of penetrating trauma, they are much more likely to be fully transected.

Pseudoaneurysms in children almost exclusively occur as a result of a penetrating trauma. True aneurysms occur as a result of repetitive blunt trauma, connective tissue disease, vasculitis, infection, or may be sporadic. Our patient did not have any history of penetrating injury. As he was only 6 months old and nonambulatory, repetitive falls on the hand could not explain other traumatic etiology. There was no family history of predisposing connective tissue diseases such as Marfan or Ehler-Danlos syndromes. Pathology did not reveal any perivascular inflammatory infiltrates, which may have suggested Kawasaki disease. There were no clinical signs of infection and all laboratory markers were within normal limits, which made an infectious etiology unlikely. All clinical and operative findings were thus most consistent with a congenital superficial palmar arch pseudoaneurysm.
Lesion’s rapid enlargement observed 2 days before the presentation was likely the result of acute thrombosis of a preexisting aneurysm.

Similar to adults, the vast majority of nontraumatic true or false aneurysms of the hand in children occur in the ulnar artery. Dean et al reviewed 14 cases of pediatric congenital hand aneurysms published in the literature to date. The median age was 4 years. Locations of the aneurysms included ulnar artery in 10 cases, palmar digital artery in three cases, and superficial palmar arch in one case. Only two cases were infants younger than 1 year. All cases were diagnosed as true aneurysms except one nontraumatic pseudoaneurysm in a 4-year-old girl. None of the reports described a nontraumatic pseudoaneurysm in an infant, as was the case with our patient. In four cases of pediatric hand aneurysms, either agenesis or hypoplasia of one or more arteries within the hand was reported, suggesting congenital predisposition to form an aneurysm. Our patient did not have any associated vascular abnormalities of the involved extremity.

Ultrasound is the most common diagnostic imaging tool utilized but is frequently misleading, and supplemental advanced imaging such as angiogram or MRI is necessary to narrow the diagnosis. In cases of completely thrombosed aneurysms with no flow, the ultrasound may show a well-defined, heterogeneously echogenic, nonvascular lesion resembling a soft-tissue tumor, a tumor-like condition such as fibromatosis, or complex fluid collection such as hematoma or abscess. Similarly, MRI of a thrombosed aneurysm may show heterogeneously high T2-W/STIR signal and peripheral enhancement. These findings could represent abscess, fibromatosis, or aggressive tumor with a necrotic core such as fibrosarcoma, rhabdomyosarcoma, or peripheral nerve sheath tumor. In cases where the flow through the aneurysm is preserved, the diagnosis is somewhat facilitated. Although in our case the ultrasound suggested malignancy, MRI allowed for accurate diagnosis.

Currently, there are no guidelines for managing arterial aneurysms in children due to the rarity of the condition. In adults with hypothenar hammer syndrome, observation may be appropriate as there is a low risk of rupture or finger embolization, but this is rarely done in pediatric patients. Offer and Sully treated a 1-year-old boy with an ulnar artery aneurysm conservatively until the mass became symptomatic a year later, after which they performed excision. Oral medications and intraarterial thrombolytics may be used in adults, but the risks of these therapies in children likely outweigh the benefits. There

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**Fig. 3.** Coronal maximum intensity projection subtraction image of a mass from a bolus-timed MRA.

**Fig. 4.** Intraoperative view of the mass with clipped and transected radial portion of the superficial palmar arch. Common digital nerve to the first webspace is visible in the wound bed.
are multiple surgical options available, including resection alone, resection and repair, and resection and reconstruction. Once the diseased segment is resected, circulation to the fingers must be assessed. Arterial repair or reconstruction is indicated if there is any concern about the adequate perfusion of the fingers. Out of 14 arterial pediatric hand aneurysms reviewed by Dean et al, five required reconstruction. All of them were located in the ulnar artery. None of the lesions involving the common digital artery or the palmar arch required reconstruction, as was the case in our patient.

Steven L. Moran, MD
Division of Hand Surgery, Mayo Clinic
Rochester, , MN 55905
E-mail: moran.steven@mayo.edu

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