

Pulsatile pseudoaneurysm: a delayed diagnosed with a risk of limb ischemic in toddler: a case report



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ABSTRACT

Background: Pseudoaneurysm is a vascular injury complication in lower extremity that's rarely been reported, especially in toddlers. Should it not appropriately treated, it can lead to worst conditions and even limb ischemic.

Case description: a 3-year-old toddler, presented in the emergency room (ER) of Dr. Zainoel Abidin General Hospital (RSUZA) with bleed wound in the left limb persistent active bleeding. The shattered glass hit the patient On the physical examination, we found bleeding wound on the medial malleolus region of left limb, a pulsatile mass on the palpation, history of active bleeding was positive. To confirm the diagnosis, we performed CT angiography showing a sac shaped vascular lesion measuring 2.8 x 2.2 x 2.8 cm of proximal segment of the left posterior tibial artery, suggesting a pseudoaneurysm. We performed open surgery with excision procedure and a clot was found in medial malleolus region. As a result of open surgery, the left medial malleolus region is red, indicating a good blood flow and the patient discharged from hospital 4 days after surgery with a good result.

Conclusion: Pseudoaneurysm resulting from vascular injury or iatrogenic injury can lead on various serious complications. If pseudoaneurysm is not appropriately treated, it can even threaten the patient's life.

Keywords: pseudoaneurysm, vascular injury, limb ischemic, open surgery repair.

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INTRODUCTION

Vascular injury is around 3% of traumas occurring in daily life and even in the 21st century with significantly high morbidity and mortality rates. Acute or chronic traumas can cause severe peripheral vessel lesions.¹ Penetrating trauma is common in children and adults. One of penetrating trauma complications that's rarely reported is pseudoaneurysm. A pseudoaneurysm called false aneurysm is an accumulation of extravascular blood in a cavity connected to an artery accompanied by disruption of the lining of the blood vessels.² Pseudoaneurysms of the lower extremities are an occasional but rarely reported clinical outcome.

Lower limb pseudoaneurysms develop after penetrating traumas lead to direct vessel injuries. Pseudoaneurysm of the lower limb is a clinical event that sometimes happens. A penetrating trauma, directed to vessel wall, can cause an acute traumatic pulsatile hematoma by rupturing all the arterial wall layers.³ Hematoma is limited with adjacent tissues

or organs and enlarges until a chronic fibrous wall or rupture surrounds it. A chronic traumatic aneurysm develops by the partial or complete absorption of periarterial hematoma in the fibrous sac, which is covered with adjacent tissues. Generally the term "traumatic aneurysm" is used to refer to pseudoaneurysm.^{4,5} Regardless of whether they are acute or chronic, pseudoaneurysms (PSAs) must be treated as soon as possible after the diagnosis is made with direct surgical procedure. Rupture risk, thrombosis and compression to adjacent structures can be avoided by early operation.⁴

A pseudoaneurysm is characterized by the persistence of a localized hematoma associated with an artery. In daily practice, clinical symptoms often raise suspicion of pseudoaneurysms which can be confirmed by Doppler ultrasound and other non-invasive, such as CT angiography or MR angiography for diagnostic integration, so that the patient can start the appropriate treatment. Doppler ultrasound provides a 94% sensitivity and 97% specificity in diagnosis of the post-traumatic

pseudoaneurysm.⁶ Computerized tomography (CT) angiography confirms

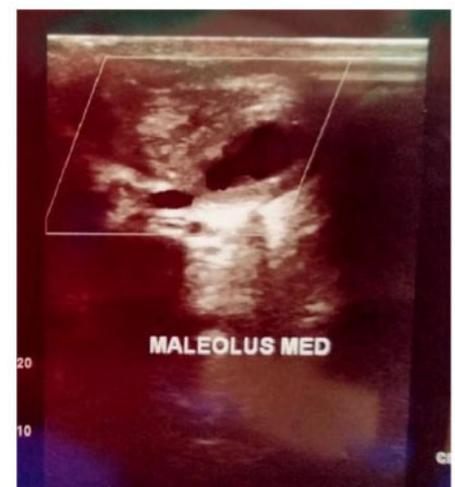


Figure 1. Doppler ultrasound showed a hypoechoic lesion on the medial malleolus region with dilated vessels with a hematoma impression, also occurred yin yan appearance in that region and a pseudoaneurysm was suspected.



Figure 2. CT Angiography showing pseudoaneurysm of left posterior tibial artery (red circle).



Figure 3. CT Angiography (3D) showing pseudoaneurysm of left posterior tibial artery (red circle).

the diagnosis with 90% sensitivity and 100% specificity in traumatic extremities.^{7,8} However, the gold standard diagnostic is angiography with accuracy of 98%, and becomes a part of definitive endovascular repair. Traumatic cases

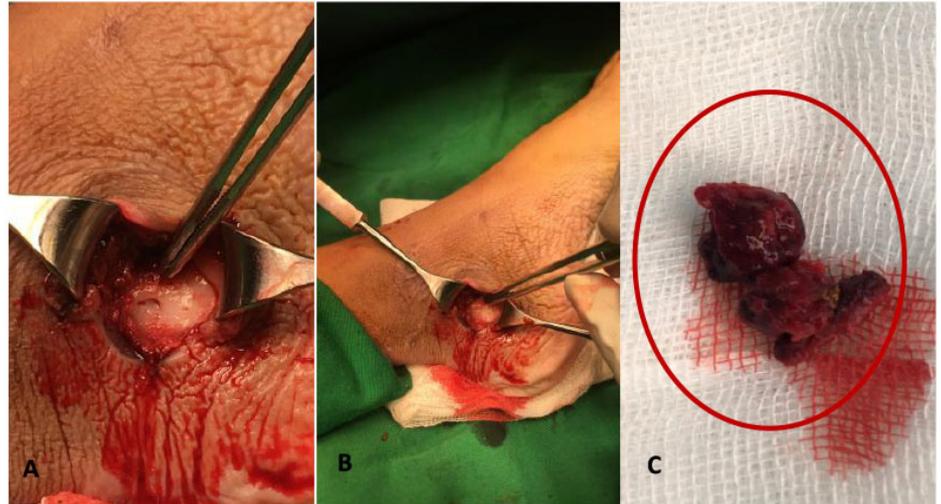


Figure 4. Pseudoaneurysm sac was found by open surgery. (A) The pseudoaneurysm was located at medial malleolus region. (B) The exposed posterior tibial artery pseudoaneurysm (white arrow) revealed as the sac of pseudoaneurysm. (C) (red circle) showed the clot inside the pseudoaneurysm sac.

commonly found in younger than those iatrogenic.⁸ The most common injured lower extremity arterial wall occurs in the popliteal, common femoral, superficial femoral and anterior tibial arteries.⁹ This pseudoaneurysm may occur within days to months following trauma, which initially recognized as a hematoma.¹⁰ The mechanism of injury is traction of the vessels that fixed to long bones.¹¹ The pseudoaneurysm formation close related to organization of the hematoma, with increase of arterial pressure increases the pseudoaneurysm getting larger; clinically found as a pulsatile mass.^{10,12}

The treatment comprises a spectrum from: (1) conservative treatment such as ultrasound-guided compression therapy, (2) invasive surgery with excision or ligation; (3) non-invasive endovascular procedures, such as endograft implantation or coil embolization.^{13,14} Vascular injuries in the endovascular procedure may be limb-threatening, leading to amputation. Any delay in diagnosis correlates to complications. However, complications including pseudoaneurysm rupture, thrombus formation followed by distal emboli, and compartment syndrome following pseudoaneurysm expansion lead the compression to adjacent structures.¹⁵ We report a delayed diagnosis of pseudoaneurysm case in toddler.

CASE REPORT

The patient was a 3-year-old toddler, presented in the emergency room (ER) of Dr. Zainoel Abidin General Hospital (RSUZA) with bleed wound in the left ankle and persistent active bleeding. The shattered glass hit the patient after falling from the window about one month ago before admission. Previously, the wound on the left ankle was sutured at the emergency room of Dr. Zainoel Abidin General Hospital, then the patient went home for the independent dressing. However, 2 weeks later, when changing the bandage, active blood came out from the wound continuously, so the patient was brought back to the ER of Dr. Zainoel Abidin General Hospital for further treatment. The patient has experienced pain and swelling during the last week.

On the physical examination, we found bleeding wound on the medial malleolus region of left limb, a pulsatile mass on the palpation, history of active bleeding was positive. Vascular state of the left limb: pulsation of left femoral and popliteal artery (++) , the left posterior tibial and dorsalis pedis artery (++) .

Doppler ultrasound showing a hypoechoic lesion on the medial malleolus region with dilated vessels with a hematoma impression also occurred yin yan appearance in that region, and a pseudoaneurysm was suspected (Figure 1).

We performed CT angiography to confirm the diagnosis. CT angiography showing a sac-shaped vascular lesion measuring 2.8 x 2.2 x 2.8 cm of proximal segment of left posterior tibial artery, suggesting a pseudoaneurysm (Figure 2 & 3).

With pseudoaneurysm diagnosis on the left posterior tibial artery, we performed open surgery as a surgical treatment option. Pseudoaneurysms sac was excised. During the procedure of open surgery, we explore the sac and then found a clot. The defect of pseudoaneurysm was closed by continuous suture using 6-0 monofilament material. The posterior tibial artery is the source of bleeding with a diameter 3 cm and pulsatile. After the surgery, the left medial malleolus region is red, indicating good blood flow (Figure 4).

DISCUSSION

Pseudoaneurysm referred to a vascular abnormality that infrequently reported to have an association with penetrating trauma or blunt, and exercises.¹⁶ The patients with pseudoaneurysm complain of edema, pain and enlarging pulsatile lump in common.¹⁰ The symptom and sign may be found along with the rupture of involved blood vessels, the artery-venous fistula formation, or the distal segment's ischemia.^{10,17,18} It may rupture if not treated properly, it may rupture, promote thrombus formation and emboli of the distal, compressing the adjacent structures, compartment syndrome and end with limb ischemic.

Zhongjie et al. reported 20 patients in their study, 16 (80%) were injured by sharp instrument or fracture fragment and 4 (20%) by an iatrogenic event.²² Delayed pseudoaneurysm following penetrating trauma in a young patient was reported by Sayit et al. A 13-year-old boy with a palpable slow-growing pulsatile mass in the distal right thigh after a penetrating injury and a surgical excision of the pseudoaneurysm with using a greater saphenous vein interposition graft for vascular continuity. The result post operative, the patient had palpable peripheral pulses in the right leg.²⁴

Pseudoaneurysm is a pulsatile hematoma connected with the artery. It contains substantial thrombus and unlikely to be self-healing. A pseudoaneurysm can

cause local compression or bleeding. And thrombus can induce embolism which may cause lower limb extremity ischemia even necrosis. Pseudoaneurysm is commonly caused by a blow from a sharp instrument or fracture fragments after a traffic accident. In recent years, iatrogenic vascular injury has become an important reason for traumatic pseudoaneurysm. Surgical treatment is preferable for these patients. Therapies for peripheral artery pseudoaneurysm consist of compression, surgery with arterial ligation, blood vessel-transplantation, ultrasound-guided thrombin injection, stent-graft placement, and endovascular coil embolization. The choice of treatment depends not only on the overall size, neck diameter, and location of the pseudoaneurysm, but also on the patient's clinical condition.

Treatment of pseudoaneurysm must be carried out soon as possible as a delay in treatment can cause potentially serious complications (bleeding, peripheral microembolization with ischemia of the limb, skin ulcer, compression of adjacent neurological structures).

The open surgical technique for pseudoaneurysm is a traditional treatment of choice. It consists of primary anastomosis or ligation and interposition graft with a saphenous vein. The procedure should be adjusted to the patient's comorbidities, vascular state, and whether there was blood vessel access on the side with an aneurysm. Both procedures may return arterial blood flow to the lower extremities. Despite that, primary resection and anastomosis may only be performed on a small and clean tibial artery aneurysm. The ligation technique was the third surgical choice and may only be performed if the posterior tibial artery is patent up to the ends of the feet.^{19,20}

Amiri et al. reported a 20 years old male with pseudoaneurysm on the posterior malleolus medial. Duplex ultrasound confirmed the pseudoaneurysm in posterior tibial artery sized 4 cm. The enlarging size was requiring the surgical intervention that was excision and primary artery reconstruction. The aneurysm has a short neck with an irregular margin, and the pathological artery resected about 2 cm, then anastomosed. Aspirin administered for 90 days following

surgery. No postsurgical complication or the sequel.²¹

The open surgery technique shows some benefits compared to endovascular techniques. There are lower costs and shorter use of antiplatelet. In contrast, the open surgery technique followed by some complications. There are the risks related to general anesthesia, bleeding, wound infection, lymphocele formation, radiculopathy, prolonged healing time, perioperative myocardium infarct, and death. There was a paradigm shift in the treatment of pseudoaneurysms; the invasive method shifted to non-invasive ones. However, the open surgical technique remains an essential role in pseudoaneurysm and seen in our patient treatment. Particularly those with local mass effect complications such as ischemia and neuropathy, infected pseudoaneurysm, and cases in which noninvasive techniques met with failure.

A pseudoaneurysm can bring about serious complications such as compression, infection, rupture and hemorrhage, as well as embolism. Both operative and intravascular interventional therapies are positive and effective.²³ Surgical operation is suitable to most pseudoaneurysm cases, but sometimes it will result in larger trauma to the tissue and more bleeding. It also requires longer operating time. Compared to the surgical operation, intervention therapy is less traumatic, and patients have a quicker recovery; however it is much more expensive and there is limitation in the choice of interventional therapy.

CONCLUSION

In toddlers and children with uncomplicated pseudoaneurysm, primary conservative treatment may be considered. Surgery should be reserved for expanding, actively bleeding, or otherwise complicated lesions. Pseudoaneurysm resulting from trauma or iatrogenic injury can bring about various serious complications. If pseudoaneurysm is not treated properly, it can even threaten patient's life.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the manuscript.

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AUTHOR CONTRIBUTION

All authors are contributed equally to the content of the study.

ETHICAL STATEMENT

Patient or legal guardian had received written informed consent regarding publication of their medical data in journal article.

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