Pseudoaneurysm of the Dorsalis Pedis Artery in a Child, Treated by Ligation of the Artery: Case Report

Çocukta Dorsalis Pedis Arter Psödoanevrizması, Arter Ligasyonu ile Tedavi

Hakan ARTAŞ, MD,[a]
Erkin OĞUR, MD[b]

[a]Radiology Clinic,
Elazığ Training and
Research Hospital,
[b]Department of Radiology,
Fırat University Faculty of Medicine,
Elazığ

Geliş Tarihi/*Received:* 28.12.2008
Kabul Tarihi/*Accepted:* 31.03.2009

This case report was presented as a poster at 29th National Radiology Congress (TÜRKRAD 2008) (November 01-05, 2008, Antalya/Turkey).

Yazışma Adresi/*Correspondence:*
Hakan ARTAŞ, MD
Elazığ Training and
Research Hospital,
Radiology Clinic, Elazığ,
TÜRKİYE/TURKEY
hakanartas@yahoo.com

ABSTRACT Pseudoaneurysm of the dorsalis pedis artery is a very rare condition and occurs after penetrating injury, infection, aspiration, fracture, blunt trauma, or surgical intervention. A traumatic pseudoaneurysm may occur when a penetrating injury of the arterial wall results in partial transaction. Color Doppler ultrasonography is the ideal noninvasive diagnostic modality to distinguish between a vascular and a nonvascular soft tissue mass. Surgical treatment options include ligation, primary repair, ultrasound guided compression repair, and percutaneous thrombin injection therapy. In most of the reported cases of pseudoaneurysms of the dorsalis pedis artery, surgical treatment was selected because the aneurysms caused pain and discomfort in daily life, such as difficulty in wearing shoes. In this report, we described 12-year-old child with a posttraumatic pseudoaneurysm of the dorsalis pedis artery that was easily diagnosed by color Doppler ultrasonography and successfully managed by ligation of the artery and resection of the aneurysm.

Key Words: Foot; aneurysm, false; arteries; ultrasonography, Doppler, color; child

ÖZET Dorsalis pedis arter psödoanevrizması oldukça nadir bir durum olup penetran yaralanmalar, enfeksiyon, aspirasyon, fraktür, künt travma veya cerrahi girişimler sonrasında görülebilir. Travmatik psödoanevrizmalar, penetran yaralanmanın arter duvarında kısmi kesisine bağlı oluşabilir. Renkli Doppler ultrasonografi, yumuşak dokunun vasküler-non vasküler kitlelerinin ayrımında kullanılan ideal non-invaziv bir görüntüleme metodudur. Cerrahi tedavi seçenekleri arteriyel ligasyon, primer tamir, ultrasonografi eşliğinde kompresyon tedavisi ve perkutanöz trombin enjeksiyonunu içermektedir. Literatürde bildirilen dorsalis pedis arter psödoanevrizma olgularının çoğunda cerrahi tedavi tercih edilmektedir, çünkü anevrizmalar ağrıya neden olmakta ve ayakkabı giymeyi zorlaştırmak gibi günlük yaşamı etkilemektedir. Burada renkli Dopppler ultrasonografi ile kolayca tanı konan ve anevrizma rezeksiyonu ve arter ligasyonu ile başarılı bir şekilde tedavi edilen 12 yaşındaki erkek çocukta dorsalis pedis arter psödoanevrizması sunulmuştur.

Anahtar Kelimeler: Ayak; psödoanevrizma; arter; renkli Doppler ultrasonografi; çocuk

Turkiye Klinikleri J Cardiovasc Sci 2009;21(3):489-92

Pseudoaneurysms of the dorsalis pedis artery (DPA) occur uncommonly and are usually caused by a traumatic injury or an iatrogenic intervention. Pseudoaneurysms can be life-threatening due to rupture and bleeding. Therefore, they are considered as emergency and prompt and accurate diagnosis essential.[1] Color Doppler ultrasonography (CDUS) is the ideal noninvasive diagnostic modality to distinguish between a vascular and a nonvascular soft tissue mass.[2]

We report the case of a child with a posttraumatic pseudoaneurysm of the DPA that was easily diagnosed by CDUS and successfully managed by ligation of the artery and resection of the aneurysm.

CASE REPORT

A 12-year-old boy came to our department with a pulsatile and hyperemic mass on the dorsal aspect of his left foot, which had gradually grown larger and more painful in the preceding 10 days. His history included a stab wound on the dorsum of foot 20 days ago and primary suturing at the emergency service. He said he continued his daily life in spite of the wound. Clinical examination showed a 2.5 x 2 cm hyperemic, pulsatile mass with tenderness on the dorsum of foot (Figure 1). Gray-scale ultrasonographic examination perfomed with a 5-7.5 MHz linear-array transducer (Schimadzu SDU 2200 Kyoto/Japan), showed a cystic structure surrounded by an irregular hypoechoic wall (Figure 2). CDUS demonstrated pulsatile flow in cystic mass and revealed the characteristic "yinyang" flow pattern within the pseudoaneurysm (Figure 3). Pulsed wave Doppler image shows arterial signal in the central region of the cystic mass (Figure 4). These CDUS and pulsed wave Doppler findings were all consistent with a diagnosis of a pseudoaneurysm. Magnetic resonance angiography was planned for evaluation of the pedal arch, but the patient presented himself to the emergency service with acute bleeding from his foot due to rupture of a pseudoaneurysm one day after sonographic examination. The patient underwent an aneurysmectomy after proxi-

FIGURE 1: Photograph shows a hyperemic mass on the dorsum of foot.

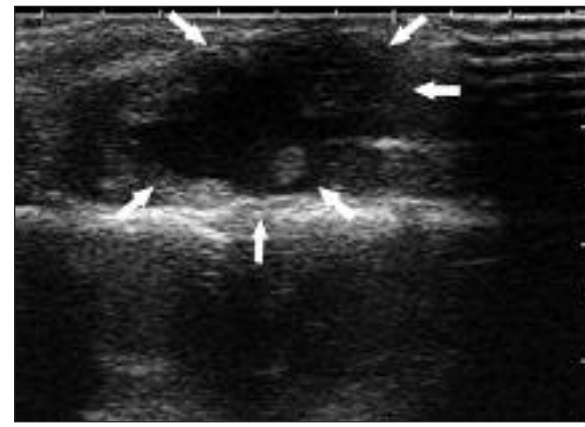

FIGURE 2: Gray-scale sonography shows a cystic structure with thrombus surrounded by a irregular hypoechoic wall (arrows).

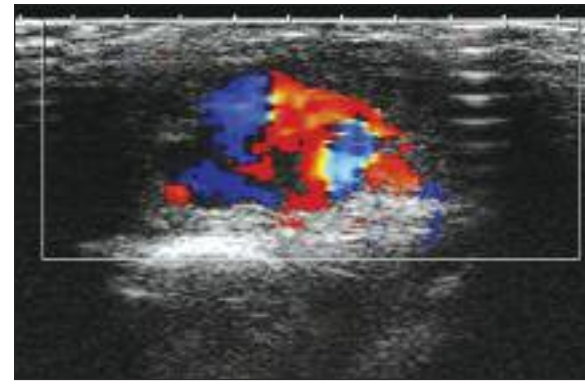

FIGURE 3: Color Doppler sonogram shows the characteristic "yinyang" flow pattern within the pseudoaneurysm.

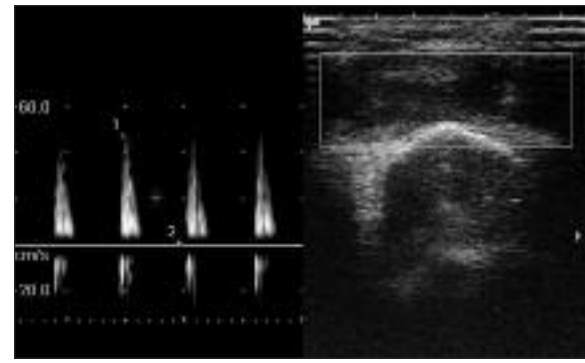

FIGURE 4: Pulsed wave Doppler image shows arterial signal in the central region of the cystic mass.

mal and distal ligation of the artery. His post operative course was uneventful with no ischemic symptoms or signs in the foot. A histological study showed the aneurysmal sac to consist of fibrous inflammatory granulation tissue with no arterial structure.

Written informed consent was obtained from the parent for publication of this case report.

DISCUSSION

Pseudoaneurysm of the DPA is a very rare condition and occurs after penetrating injury, infection, aspiration, fracture, blunt trauma, or surgical intervention.[3] A traumatic pseudoaneurysm may occur when a penetrating injury of the arterial wall results in partial transection. Hemorrhage and formation of a local hematoma allow persistent communication with the vessel lumen through a tract, or a neck of variable length. As the hematoma organizes, the wall of the pseudoaneurysm thins, with gradual luminal dilatation from arterial pressure.[1] The interval between injury and development of the pseudoaneurysm has ranged from 10 days to 2 years.[4,5]

The symptoms comprise usually a pulsatile and painful mass on the dorsum of the foot. Physical examination often reveals a pulsatile mass that is synchronous with cardiac systole. However pulsations may be absent, too weak to be palpated, or masked by hematoma or thrombus formation.[3]

Several techniques can be used for the diagnosis of pseudoaneurysms, including gray-scale ultrasonography and CDUS, computed tomography angiography, magnetic resonance angiography, and digital subtraction angiography. CDUS is noninvasive and less expensive than other techniques, does not require the use of contrast agents, and is easy available. CDUS readily distinguishes pseudoaneurysms from other pulsatile masses because it permits the detection of a vascular mass connected to an artery by a neck or tract. During systole, anterograde flow passes into the pseudoaneurysm through its neck, and during diastole, the increased pressure in the pseudoaneurysm in relation to that in the underlying artery results in retrograde flow out of the pseudoaneurysm through its neck and back into the artery. This results in a characteristic "to-and-fro" pulsed Doppler pattern in the neck of the pseudoaneurysm and produces a characteristic "yin-yang" swirling color flow pattern within its body.[2,6] In our case, the use of CDUS allowed us to diagnose the pseudoaneurysm of the DPA.

Differential diagnosis of pseudoaneurysm includes arteriovenous fistula, abscess, hematoma, lipomas, cyst, hemangioma, arteriovenous malformation, varices, and sarcoma.[7,8] Doppler ultrasonography readily distinguishes differential diagnosis between aneurysmal lesions and other soft tissue masses of the extremity.[8]

Treatment options for pseudoaneurysms include ligation, arterial repair or reconstruction, ultrasound-guided compression repair, and percutaneous thrombin injection therapy.[2,5,9] In most of the reported cases of pseudoaneurysms of the DPA, surgical treatment was selected because the aneurysms caused pain and discomfort in daily life, such as difficulty in wearing shoes.[2] Some authors have described simple resection without reconstruction because the arcuate artery was patent and they considered the DPA to be non essential.[3,10] However, reconstruction and preservation of the functioning dorsalis pedis artery might be critical if the patient develops arteriosclerotic or diabetic changes later in life.[4] Given the recent advances in small-vessel arterial reconstructive techniques, reconstruction might be recommended in children, young adults, and diabetic patients.[3]

In conclusion, pseudoaneurysm of the DPA is clinically recognized as a pulsatile mass and CDUS is an ideal noninvasive diagnostic test that can help the clinician distinguish between a vascular and a nonvascular soft tissue mass.

REFERENCES

1. Franklin JA, Brigham D, Bogey WM, Powell CS. Treatment of iatrogenic false aneurysms. J Am Coll Surg 2003;197(2):293-301.
2. Taylor DT, Mansour MA, Bergin JT, Reyes CV, Stuck RM. Aneurysm of the dorsalis pedis artery -- a case report. Vasc Endovascular Surg 2002;36(3):241-5.
3. Yamaguchi S, Mii S, Yonemitsu Y, Orita H, Sakata H. A traumatic pseudoaneurysm of the dorsalis pedis artery: report of a case. Surg Today 2002;32(8):756-7.
4. Chairman EL, Uricchio JN. Traumatic aneurysm of the dorsalis pedis artery. A review of the literature and case report. J Am Podiatry Assoc 1982;72(1):41-3.
5. Nishi H, Miyamoto S, Minamimura H, Ishikawa T, Katoh Y, Shimizu Y. Pseudoaneurysm of the dorsalis pedis artery causing neurological deficit. Ann Vasc Surg 2004;18(4):487-9.
6. Ozdemir H, Mahmutyazicioğlu K, Ozkökeli M, Savranlar A, Ozer T, Demirel F. Pseudoaneurysm of the dorsalis pedis artery: color Doppler sonographic and angiographic findings. J Clin Ultrasound 2003;31(5):283-7.
7. Maydew MS. Dorsalis pedis aneurysm: ultrasound diagnosis. Emerg Radiol 2007;13(5): 277-80.
8. Goksu E, Kucukyilmaz O, Soyuncu S, Yigit O. Pseudoaneurysm of the anterior tibial artery detected by emergency medicine physician performing bedside ultrasound. Am J Emerg Med. 2009;27(1):129.e3-4.
9. Taylor BS, Rhee RY, Muluk S, Trachtenberg J, Walters D, Steed DL, et al. Thrombin injection versus compression of femoral artery pseudoaneurysms. J Vasc Surg 1999;30(6): 1052-9.
10. McKee TI, Fisher JB. Dorsalis pedis artery aneurysm: case report and literature review. J Vasc Surg 2000;31(3):589-91.