

Case Report

Hybrid management of lower limb huge pseudoaneurysm with arteriovenous fistula presenting 8 years after gunshot injury

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Received: October 30, 2022 Accepted: January 05, 2023 Published online: January 20, 2023

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Abstract

All over the world, except during the war period, firearm injuries are encountered in daily life at varying rates depending on the region and country. In addition, late-term vascular complications may occur in injuries with a less traumatic appearance. In this present case report, we aimed to evaluate the hybrid treatment of giant pseudoaneurysm and arteriovenous fistula (AVf) in the left superficial femoral artery (SFA), which developed in a patient who had a pellet shot on his left thigh eight years ago. Postsurgical management was straightforward; the patient received antibiotherapy with ampicillin and sulbactam acid for 7 days, acetylsalicylic acid 100mg per day, and anticoagulant treatment with low molecular weight heparin for 1 month. The patient was examined in the cardiovascular surgery polyclinic on the 5th day after discharge uneventfully. Although endovascular treatment methods are widely used today in the treatment of vascular injuries, surgery still maintains its importance. In some special patient groups, a combination of these two treatment methods may be preferred.

Keywords: Injury, gunshot, late-term complication

INTRODUCTION

All over the world, except during the war period, firearm injuries are encountered in daily life at varying rates depending on the region and country. These injuries differ according to the characteristics of the weapon type. Firearms used at the present have high kinetic energy and they affect the surrounding tissues besides the injury site [1]. However, injuries with pellets can also cause traumatic injuries at different rates depending on the number of shots and the distance [2].

Depending on these injuries, complications such as major

bleeding, arteriovenous fistula, and pseudoaneurysm may occur at the time of injury. In addition, late-term vascular complications may occur in injuries with a less traumatic appearance [3]. Endovascular techniques can be used in proper patient groups in the treatment [4].

In this present case report, we aimed to evaluate the hybrid treatment of giant pseudoaneurysm and arteriovenous fistula (AVf) in the left superficial femoral artery (SFA), which developed in a patient who had a pellet shot on his left thigh eight years ago.

CITATION

Engin M, Guvenc O, Aydin U, Ata Y. Hybrid management of lower limb huge pseudoaneurysm with arteriovenous fistula presenting 8 years after gunshot injury. Turk J Vasc Surg 2023;32(1):51-4.



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Case Presentation

A 59-year-old male patient was admitted to our outpatient clinic with left lower extremity pain and swelling. He had a history of gunshot injury in the left thigh region 8 years ago, which was managed at another clinic without any intervention. There were no pathological findings in routine blood tests. Physical examination revealed a blood pressure of 130/72mmHg, a heart rate of 76/minute, and a body temperature of 36.5°C. A grade 3-4 pan systolic murmur was audible and a huge pulsatile mass (14x10 cm) was detected in the left thigh region (Figure 1A). Computed tomography angiography (CTA) of the lower limbs demonstrated an abnormal arteriovenous communication between the right SFA and femoral vein (FV) with a huge arterial pseudoaneurysm (14.1x12.5cm) (Figure 1B, 1C, 1D and 1E). A pellet of gunshot injury was seen in the left thigh region subcutaneously. Antibiotic treatment (Ampicillin and Sulbactam) was started due to the infected appearance of the pseudoaneurysm (Figure 1F).

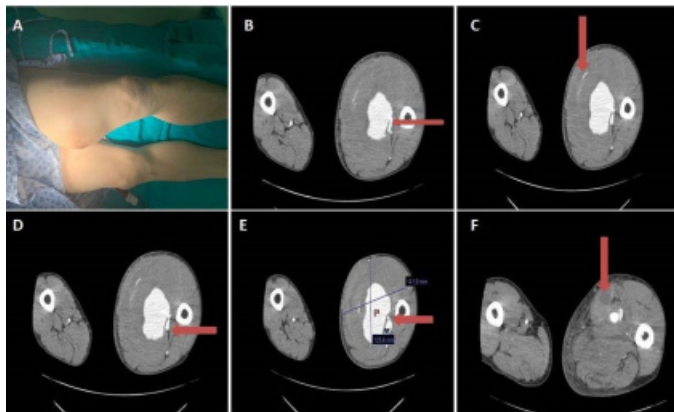


Figure 1. (A) Huge pulsatile mass in the left thigh region (B) Pseudoaneurysm mouth opening to sac (C) Arrow shows the contrast filling (D) Arrow shows the femoral vein inflow (E) Pseudoaneurysm sac (p), femoral vein (v), arrow shows the popliteal artery in the middle line (F) Arrow shows the infected hypodense appearance of the pseudoaneurysm

Five days later, digital subtraction angiography was performed through left femoral artery antegrade catheterization for further assessment and definite management. As a result of imaging, a fistula and giant pseudoaneurysm between SFA and FV were observed (Figure 2A). Intravenous heparin was administered as a single bolus (5000 IU) followed by continuous infusion (1000 U in 1 L normal saline). Balloon-expandable polytetrafluoroethylene coated stent graft (32 mm x8mm; Advanta V12 Endovascular Stent Graft, Atrium Medical Corporation, USA) was initially deployed through the fistulous site in the SFA (Figure 2B). Post-procedural angiogram revealed complete obliteration of the fistula without evidence of any early draining vein (Figure 2C). Distal vessels were patent. After the procedure, the patient was followed up in the cardiovascular surgery outpatient clinic. Surgery was planned to drain the hematoma area and pseudoaneurysm sac.

Three days after the intervention, under general anesthesia, after

the vertical incision was made into the pseudoaneurysm sac, the hematoma area was evacuated (Figures 2D and 2E). No active bleeding focus was observed during surgery. Hemovac drains were placed and the surgical incision was primarily repaired. He was discharged on the third day postoperatively. Postsurgical management was straightforward; the patient received antibiotherapy with ampicillin and sulbactam acid for 7 days, acetylsalicylic acid 100mg per day, and anticoagulant treatment with low molecular weight heparin for 1 month. The patient was examined in the cardiovascular surgery polyclinic on the 5th day after discharge uneventfully (Figure 2F).

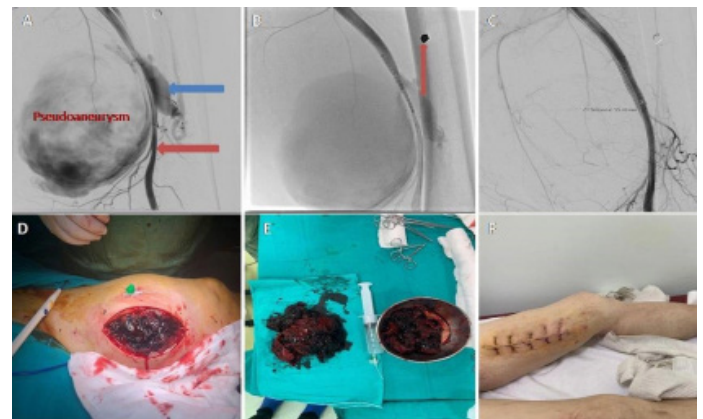


Figure 2. (A) Digital subtraction angiographic image of the pseudoaneurysm, red arrow shows the native popliteal artery, blue arrow shows the femoral vein (B) Balloon-expandable polytetrafluoroethylene-coated stent graft on the defect site, arrow shows the pellet (C) Polytetrafluoroethylene-coated stent graft was initially deployed through the fistulous site in the superficial femoral artery and no leakage was detected in control angiography (D) Skin incision was made parallel to the pseudoaneurysm sac (E) Hematoma removed from the sac (F) Seventh day control after the operation

DISCUSSION

Traumatic lower extremity injuries are important injuries that can lead to limb loss due to accompanying nerve, bone, and tissue damage in addition to vascular injury [5]. Arteriovenous fistula and pseudoaneurysm events developed in the same case as a result of injury have been reported. In a review by Ozişik et al. examining pseudoaneurysm cases due to gunshot injuries, the median delay in diagnosis was found to be 75 days [6]. In another study involving 49 patients, delayed diagnosis of up to two years was reported in cases of trauma-related arteriovenous fistula [7]. The literature review showed a delayed presentation of femoral artery pseudoaneurysms from 2 weeks to 54 years. In this current case, we presented the successful hybrid treatment of a case of AVf accompanying a giant pseudoaneurysm due to a single pellet injury that developed 8 years ago.

Bullets may sometimes cause vascular adventitial-medial damage in gunshot wounds. In this type of injury, there is no active bleeding in the early period and the continuity of the vascular bed is observed in the imaging studies. However, this may lead to

the development of pseudoaneurysm in some patients in further follow-up. In a study by Woolgar et al., 7 cases of pseudoaneurysm due to trauma were reported. In this study, the median diagnosis period of the patients was given as 1.5 months (1-24 months). All cases were treated surgically [3]. In a case report published in 2020 by Ramakrishnan et al., a case of superficial femoral artery pseudoaneurysm was diagnosed 45 years after the injury was reported. This case suffered a bullet injury that was surgically removed 45 years ago. In the current CTA, a 15.5×14.5×5.9cm pseudoaneurysm was detected in the right thigh region. This case was surgically treated with a patch of saphenous vein harvested from the contralateral limb [8]. In our case, unlike these cases, there was also AVf with pseudoaneurysm. Eight years after the injury, hybrid treatment was applied in our case.

The mechanism in AVfs developing due to trauma is based on the simultaneous damage to two adjacent vascular structures and the formation of a connection between them [9]. Various cases of AVf secondary to trauma have been reported in the literature. In the case reported by Lebreton et al., a 22-year-old male patient developed a popliteal arteriovenous fistula due to a fall, which was diagnosed immediately after trauma and treated surgically [10]. Kalender et al., also reported a case of trauma-related late-term AVf in a 52-year-old male who had a gunshot injury 5 years ago and complained of swelling in the right lower extremity. Here, the fistula between the right superficial femoral artery and vein was surgically repaired [11]. Gorski et al. also reported successful endovascular treatment of av fistula between the superficial femoral artery and common femoral vein, which was diagnosed 8 years after multiple pellets of gunshot injury in a 27-year-old male patient in 2019 [12]. In our case, there was also a giant arterial pseudoaneurysm, which was different from these cases. In our case, while the AVf and pseudoaneurysm were closed with a covered stent, the pseudoaneurysm sac was surgically evacuated.

In some patients, both AVf and pseudoaneurysm may occur after trauma. A 27-year-old male patient who developed swelling and pain in the right thigh region 1 year after a gunshot injury was reported by Daniel et al. In the examination of this case, a large mass located on the right thigh measuring 12×9cm; palpable thrill located in the internal surface of the right thigh in the upper third was detected. This case was treated surgically by ligation of the fistula and repair of the artery with the saphenous vein [13]. Franz and Jump reported a case of AVf accompanying a pseudoaneurysm of approximately 5cm in the popliteal artery in the third month after the injury. This case was also treated with an endovascularly covered stent [4].

In recent years, endovascular treatment methods have come to the fore in the treatment of many vascular diseases [14]. However, the use of hybrid methods in trauma patients also offers various advantages. The most important of these advantages are surgical site safety and bleeding control. In addition, when these

operations are performed in the hybrid room in the same session, possible early complications can be diagnosed immediately [15]. In our case, we first closed the AVf and pseudoaneurysm with a single covered stent. We found that the stiffness in the patient's mass decreased in the follow-ups. We took the patient to surgery three days later. Bleeding was minimal on the evacuation of the hematoma area as the venous pressure was reduced. No blood products were used after surgery. Our case differs from the cases in the literature [4,10-13] when the time elapsed since the injury, the size of the mass, the simultaneous presence of pseudoaneurysm and AVf, and the treatment approach are combined.

CONCLUSION

Even if there are no signs of vascular injury at the time of admission, patients with gunshot wounds should be followed closely for possible late complications for a certain period. Late vascular complications may occur in these injuries. Although endovascular treatment methods are widely used today, surgery still maintains its importance. In some special patient groups, a combination of these two treatment methods may be preferred.

Patient Consent for Publication: Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: All authors contributed equally to the article.

Conflict of Interest: The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding: The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. Saylam N, Uyanik B, Buz M, Buyukyilmaz T, Demir Y, Aldegik Gürsoy D. Firearm injuries due to terrorist attack. *Anatolian J Emerg Med* 2019;2;18-23.
2. Ignatiadis IA, Mavrogenis AF, Igoumenou VG, Polyzois VD, Tsiampa VA, Arapoglou DK, Spyridonos S. Gunshot and blast injuries of the extremities: a review of 45 cases. *Eur J Orthop Surg Traumatol* 2019;29:295-305.
3. Woolgar JD, Reddy DS, Robbs JV. Delayed presentation of traumatic popliteal artery pseudoaneurysms: a review of seven cases. *Eur J Vasc Endovasc Surg* 2002;23:255-9.
4. Franz RW, Jump MA. Endovascular repair of post-traumatic, concomitant popliteal artery pseudoaneurysm and arteriovenous fistula. *Int J Angiol* 2009;18:41-4.

5. Mullenix PS, Steele SR, Andersen CA, Starnes BW, Salim A, Martin MJ. Limb salvage and outcomes among patients with traumatic popliteal vascular injury: an analysis of the National Trauma Data Bank. *J Vasc Surg* 2006;44:94-100.
6. Ozisik K, Dural K, Okcu O, Han S, Yildirim E, Sakinci U. Pseudoaneurysms of the popliteal and tibioperoneal arteries after gunshot injuries. *J Trauma* 2003;55:485-8.
7. Megalopoulos A, Siminas S, Trelopoulos G. Traumatic pseudoaneurysm of the popliteal artery after blunt trauma: Case report and a review of the literature. *Vasc Endovasc Surg* 2007;40:499-504.
8. Ramakrishnan P, Vaswani P, Hote MP, Choudhary SK. Delayed presentation of superficial femoral artery pseudoaneurysm 45 years following gunshot injury. *Indian J Thorac Cardiovasc Surg* 2020;36:526-9.
9. Chen JK, Johnson PT, Fishman EK. Diagnosis of clinically unsuspected posttraumatic arteriovenous fistulas of the pelvis using CT angiography. *AJR Am J Roentgenol* 2007;188:W269-73.
10. Lebreton G, Uzel AP, Celerien J, Roques F, Deneuille M. Popliteal arteriovenous fistula due to a gunshot injury. *Ann Vasc Surg* 2010;24:952.e17-21.
11. Kalender M, Baysal AN, Dagli M, Gokmengil H. Chronic leg swelling and palpitation as a late complication of post-traumatic arteriovenous fistula: A case report. *Trauma Case Rep* 2016;2:16-20.
12. Gorski U, Agarwal V, Savlania A, Behra A, Sandhu MS. Endovascular Management of Lower Limb Arteriovenous Fistula Presenting 8 Years After Gunshot Injury. *Vasc Endovascular Surg* 2019;53:670-3.
13. Daniel HE, Firmin A, Angele PO, Esthelle MN, Freddy B, Bernadette NN. Giant Pseudoaneurysm Associated with Arteriovenous Fistula of the Brachial and Femoral Arteries following Gunshot Wounds: Report of Two Cases. *Case Rep Vasc Med* 2015;2015:454713.
14. Spirito R, Trabattini P, Pompilio G, Zoli S, Agrifoglio M, Biglioli P. Endovascular treatment of a post-traumatic tibial pseudoaneurysm and arteriovenous fistula: case report and review of the literature. *J Vasc Surg* 2007;45:1076-9.
15. Tan H, Zhang LY, Guo QS, Yao YZ, Sun SJ, Wang T, Li YC, Xiong KL. "One-stop hybrid procedure" in the treatment of vascular injury of lower extremity. *Indian J Surg* 2015;77:75-8.