

Scientific Journal of the Faculty of Medicine in Niš 2011;28(4):245-249

Case report ■

Surgical Procedure in Isolated Traumatic Arteriovenous Fistula Between External Iliac Artery and Vein

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SUMMARY

Arteriovenous fistula (AVF) between the external iliac artery (AIE) and external iliac vein (VIE) after trauma is rare. Rarely, it occurs that fistula is accompanied by an aneurysm of external iliac artery. Two thirds of AVF occur after stab wounds, one third after puncture wounds and only one percent after blunt injuries.

A 32-year-old male visited a vascular surgeon because of the swelling on his right leg and severe pain in his thigh. Three years before, he was admitted to Surgical Clinics (Clinics of Neurosurgery, Orthopaedic and Plastic Surgery) after a fall from a motorbike, when he sustained a pelvic distortion with a haematoma on the right thigh. On admission, the patient was conscious and oriented. The right leg was swollen and painful to touch in the upper thigh region. At the level of surgical scar, a thrill was verified by palpation, and subsequently confirmed by Doppler sonography, on the occasion of which the presence of aneurysm in the iliac region and indirect signs of arteriovenous fistula were found. Angiography revealed the presence of AVF between the right AIE and VIE. After confirming the diagnosis, the patient was operated. The postoperative course passed uneventful. Control MSCT was performed after a month, when a patient graft was verified, as well as the absence of AVF.

Traumatic arteriovenous fistulas are rare. Unless they are recognized in time, they over time lead to arterial and/or venous insufficiency, impeding the definite treatment. In order to set an early diagnosis, especially in multiple injuries and polytraumas, diagnostical CT with CT angiography is the method of choice. As a rule, the treatment of AVF is surgical, and postsurgical recovery justifies the treatment method. Aneurysm that accompanies AVF has to be resected during AVF treatment, as it progresses over time.

Key words: arteriovenous fistula, external iliac artery, external iliac vein, aneurysm, trauma

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INTRODUCTION

Arteriovenous fistula (AVF) between the external iliac artery (AIE) and external iliac vein (VIE) after trauma is rare.

Rarely, it occurs that fistula is accompanied by an aneurysm of the external iliac artery. The reason for this is anatomical protection of external arteries and veins from injuries. The injuries can result from traumas or can be iatrogenic in origin. Two thirds of AVF occur after stab wounds, one third after puncture wounds and only one percent after blunt injuries (1).

The existence of arteriovenous fistula between AIE and VIE, accompanied by an aneurysm on AIE, is an absolute indication for a surgical intervention (2, 3). Unless the aneurysm is treated cranially from AVF, it becomes progressive, which frequently leads to rupture (4).

CASE REPORT

A 32-year-old male visited vascular surgeon because of the swelling on his right leg and severe pain in his thigh.

Three years before, he was admitted to Surgical Clinics (Clinics of Neurosurgery, Orthopaedic and Plastic Surgery) after a fall from a motorbike, when he sustained a pelvic distortion with a haematoma on the right thigh.

At the Clinic of Orthopedics and Traumatology, the procedure performed included the incision of haematoma with drainage. Due to further skin necrosis and failure of the primary wound closing, the defect was repeatedly covered by free skin Thiersch's graft and after 40 days the patient was released from hospital and sent to home treatment.

On admission, the patient was conscious and oriented. The right leg was swollen and painful to touch in the upper thigh region. At the level of surgical scar, a thrill was verified by palpation.

Doppler sonographic examination of the right inguinal region showed an aneurysm in the iliac region and existence of indirect signs of arteriovenous fistula. The level of communication between the external iliac artery and vein was shown by arteriography. Angiography showed the presence of AVF between the right AIE and the right VIE (Figure 1).

The right suprainguinal retroperitoneal procedure took proximal control above the aneurysm and AVF, while the right inguinal procedure identified the iliac blood vessels. On the right AIE, a 5 cm big aneurysm was identified (Figure 2), and upon the opening, a 0.5 cm big fistular canal on VIE was identified (Figure 3).

The fistular canal was resected. After resection of the aneurysm, Dacron graft was interposed (Silvergraft) 8 mm (Figure 4) 5 cm long. Proximal and distal anastomoses were sewn up according to T-T type, using a continuous suturing, prolene 5-0.

Postsurgical recovery was regular. Previous symptoms regarding swellings and pain in the patient's legs vanished after the third postsurgical day. After one month, a control MSCT was performed, when a patent graft was identified with no signs of remained arteriovenous fistula (Figure 5).



Figure 1. Angiography showing the presence of AVF between the right AIE and the right VIE

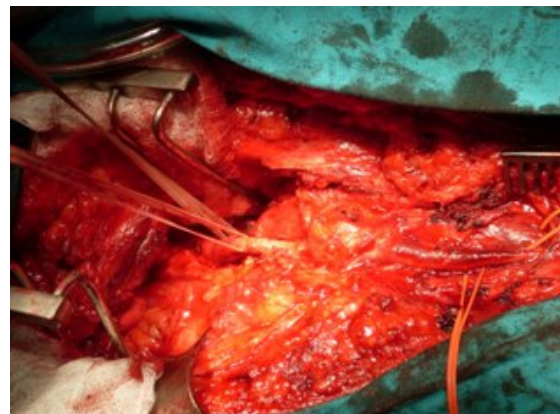


Figure 2. Aneurysm AIE

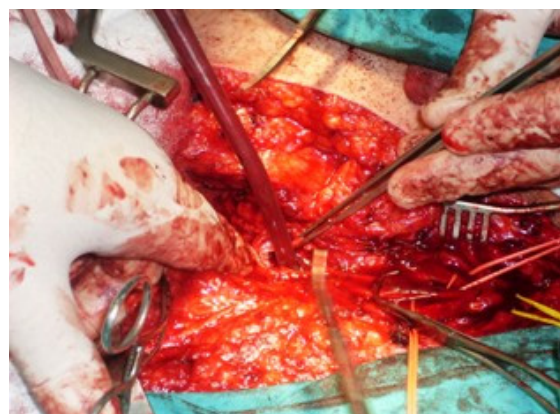


Figure 3. Resected AIE with present fistula canal

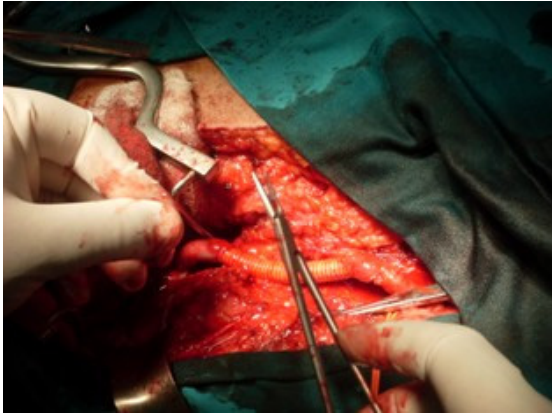


Figure 4. Interposed Dacron graft of 8 mm



Figure 5. Control MSCT

DISCUSSION

In 1762, Hunter was the first to describe the existence of arteriovenous fistula. The largest series were published by surgeons who managed war wounds during World War II, wars in Korea, Vietnam but also on the territory of the former Yugoslavia. Posttraumatic arteriovenous fistula AIE can occur after penetration, blunt injuries or as a result of medical manipulation (iatrogenic).

Penetration AVF are accompanied by injuries of the adjacent organs, whereby the internal or external bleeding can frequently be associated, demanding occasionally the surgical treatment. As a rule, periphery AVFs are more frequent and are found on arteries and veins of the neck, upper and lower extremities, while the so-called central AVF found on the chest and abdominal aorta or supra-aortal branches are rather rare (1).

Diagnosis of traumatic AVF is set according to anamnesis, clinical examination and application of non-invasive and invasive diagnostic methods. Clinical examination concerning the existence of arteriovenous fistulas shows a pathognomonic triad: palpable tumefac-

tion, thrill above the change and auscultatory continuous systolic-diastolic murmur above the tumefaction. Doppler sonography findings identify the existence of AVF, but planning surgical procedure demands arteriography or multislice computed tomography (MSCT). In case of AVF with poor flow, diagnostic arteriography can be followed by therapy, including some of the endovascular interventions (1).

In case of the patient presented, the dominant neurosurgical injury complicated the complete diagnostic procedure which would include the MSCT and angiography. After the treatment received at the Clinic of Orthopedics and Traumatology, pelvis injury was treated according to x-ray findings, along with incision of haematoma with drainage. Because of the skin necrosis and impossibility of primary closure of the surgical wound, free skin transplant was repeatedly used and turned partially successful. The problem of the defect that would not heal and rejection of the transplant was due to increased vein pressure which slowed down normal granulation and wound healing. The fact that the patient was hospitalized at several clinics, without receiving an adequate diagnosis, points to the necessity of timely diagnosis at the moment of the injury sustaining. Performing CT examination of the whole body, with additional CT angiography which is a standard procedure in most trauma centers, would certainly indicate the external femoral artery injury and presence of arteriovenous fistula.

Increased vein pressure distal to AVF can lead to vein standstill which is manifested by unpleasant feeling of heavy legs, vein dilatation and even venous ulcers (5, 6). Distal to AVF, there can be registered the signs of arterial "steal phenomenon" leading to arterial ischemia which can be manifested as claudication, pain at rest and arterial ulcers (7).

The artery carrying blood to AVF can dilate, especially in long-term AVF. Melliere et al. reported that in case of AVF exclusion, the artery dilatation can progress to arterial aneurysm (8).

Long - term existence of AVF can lead to numerous systemic complications (2, 3).

Increased blood supply over AVF with wide communication can lead to venous strain of the heart and consequent coronary insufficiency (2).

Treating AVF in case of a fistula with poor flow can be performed by using endovascular methods in the form of a stent graft of the corresponding diameter, whereby the communication between the artery and vein is occluded intraarterially (9). The communication from the side of the vein develops thrombosis over time. In case of communication with more intensive flow between the artery and vein, surgical treatment is necessary (10). Even large vascular centers consider open surgical treatment of AVF the only right treatment method. The artery defect can be treated by using a lateral suture, sewing up a patch, resection of artery with termino-terminal anastomosis or by graft interposing. Reconstruction of the

vein expands from side suture, venous patch or vein reconstruction using a panel graft, PTFE graft.

CONCLUSION

Traumatic arteriovenous fistulas are rare. Unless they are recognized in time, they over time lead to arterial and/or venous insufficiency, impeding the definite

treatment. In order to set an early diagnosis, especially in multiple injuries and polytraumas, diagnostical CT with CT angiography is the method of first choice. Treatment of AVF is as a rule surgical, and postsurgical recovery justifies the treatment method. Aneurysm that accompanies AVF has to be resected during AVF treatment, as it progresses over time.

References

1. Jack L. Cronenwett, K. Wayne Johnston. Rutheford`s Vascular surgery 7th edition. Philadelphia: Elsevier; 2010.
2. Yared K, Baggish AL, Wood MJ. High-output heart failure resulting from a remote traumaticarteriovenous fistula. *Can J Cardiol* 2009; 25(4): 143-4.
3. Chaudry M, Flinn WR, Kim K, Neschis DG. Traumatic-arteriovenous fistula 52 years after injury. *J Vasc Surg* 2010; 51(5): 1265-7.
4. Meliere D, Barres S, Saada F, Becquemin JP. Late arterial aneurysm proximal to corrected post-traumatic arteriovenous fistula. *J CardiovascSurg (Torino)* 1987, 28(5):510-5
5. Chaudry M, Flinn WR, Kim K, Neschis DG. Traumatic arteriovenous fistula 52 years after injury. *J VascSurg* 2010; 51(5): 1265-7.
6. Weyrich G, Beck A. Traumaticfistula between internal iliac artery and external iliacvein. *Radiat Med* 1990; 8(6): 215-8.
7. Davidović LB, Banzić I, Rich N, Dragaš M, Cvetković SD, Dimić A. False traumatic aneurysms and arteriovenous fistulas: retrospective analysis. *World J Surg* 2011; 35 (6): 1378-86.
8. Mellièrè D, Saada F, Becquemin JP. The risk of aneurysm. Another reason to treat traumatic arteriovenous fistulas surgically. *J Mal Vasc* 1987; 12(3): 277-9.
9. Spirito R, Trabattoni 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(5):1076-9.
10. Erkut B, Karapolat S, Kaygin MA, Unlü Y. Surgical treatment of post-traumatic pseudoaneurysm and arteriovenous fistula due to gunshot injury. *Ulus Travma Acil Cerrahi Derg* 2007; 13(3): 248-50.

HIRURŠKO ZBRINJAVANJE IZOLOVANE TRAUMATSKE ARTERIO-VENSKE FISTULE IZMEĐU SPOLJAŠNJE BEDRENE ARTERIJE I VENE

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Sažetak

Arteriovenska fistula (AVF) između spoljašnje bedrene arterije (AIE) i sopljašnje bedrene vene (VIE) nakon traume je retka. Udruženost sa aneurizmom spoljašnje bedrene arterije je izuzetno retka. Dve trećine AVF nastaju nakon ubodne rane, jedna trećina nakon prostrelnih rana a samo jedan procenat nakon tupe povrede.

32 godine star muškarac javlja se u ambulantu vaskularne hirurgije zbog otoka desne noge i jakih bolova u natkolenici. Pre tri godine zbrinut na hirurškim klinikama (neurohirurškoj, ortopedskoj i Klinici za plastičnu hirurgiju) zbog pada sa motora, pri čemu je došlo do distorzije karlice sa hematomom desne natkolenice.

Na prijemu bolesnik svestan, orijentisan. Desna noga otečena, na dodir u natkolenoj regiji bolna. U visini operativnog ožiljka palpatorno se verifikuje tril. Dopler sonografski ispitan, pri čemu je nađena aneu-

rizma u bedrenoj regiji i prisustvo indirektnih znakova za arteriovensku fistulu. Angiografija je pokazala prisustvo AVF između desne AIE i istostrane VIE. Nakon dijagnostike bolesnik je operisan. Postoperativni tok je protekao uredno. Urađen je kontrolni MSCT nakon mesec dana, pri čemu je konstatovan prohodan graft i odsustvo znakova zaostale AVF.

Traumatske arteriovenske fistule su retke. Ukoliko se ne prepoznaju na vreme, vremenom dovode do arterijske i/ili venske insuficijencije, i njihovo definitivno zbrinjavanje je otežano. U cilju rane dijagnostike, naročito kod postojanja multipnih povreda i politraume, dijagnostički CT sa CT-angiografijom je metoda izbora. Zbrinjavanje AVF je po pravilu hirurško i postoperativni tok opravdava takav način lečenja. Aneurizma koja prati AVF mora se tokom zbrinjavanja AVF recesirati jer vremenom dolazi do njene progresije.

Ključne reči: arteriovenska fistula, spoljašnja bedrena arterija, sopljašnja bedrena vena, aneurizma, trauma

