

Management of Posttraumatic Arteriovenous Fistulas of the Limbs in a Sub-Saharan Country

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Abstract

Original Research Article

Introduction: Post-traumatic arteriovenous fistulas of the limbs most often occur after trauma but can be iatrogenic since the advent of interventional methods. **Materials and methods:** This is a retrospective study which took place at the thoracic and cardiovascular surgery department / FANN in Dakar, Senegal over a period from 2006 to 2021. **Results:** Seven patient files identified were been collected. All were male with an average age of 21 years. The mechanism and the topography of the predominant traumatism being a stabbing attack on the thigh and the average consultation time is 71 days. The limb vessel ultrasound and CT angiography can confirm the diagnosis. All patients underwent open surgery. The outcome was favorable in all patients. **Conclusion:** Post-traumatic arteriovenous fistulas of the limbs are rare, the diagnosis is clinical and open surgery retains its place in the management.

Keywords: Arteriovenous fistula, Traumatism, Limb.

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1. INTRODUCTION

Post-traumatic arteriovenous fistulas are permanent abnormal communications between a vein and an artery, developed in the context of trauma to a localized vascular axis [1]. Hemorrhagic ruptures, preceded or not by a pseudoaneurysm and ischemia by compression or following vascular steal syndrome, make urgent diagnostic and therapeutic of these arteriovenous fistulae that can engage the functional and / or vital prognosis of the patient [1, 2]. Their diagnosis, often unrecognized, must be systematically evoked in certain situations of traumatism to the limbs. The objective of our work is to make our contribution to diagnostic and therapeutic care; and also, to demonstrate the place of open surgery in countries with limited resources, with the various possible procedures, despite the rise in endovascular surgery.

2. MATERIALS AND METHODS

This is a retrospective study, carried out in the thoracic and cardiovascular surgery department / FANN in Dakar, Senegal. All patients who presented with post-traumatic arteriovenous fistula of the limbs with or without pseudoaneurysm, treated in the department from 2006 to 2021, were included in the study. All incomplete records, acquired non-traumatic arteriovenous fistulas and post-traumatic arteriovenous fistulas not localizing to limbs are excluded from this study. Data collection and analysis was done on Excel 2007 software from patient records.

3. RESULTS

We had collected 7 patients. All were male with an average age of 21 years (4-32 years). The mechanism and topography of the trauma are specified in Table 1.

Table-1: Mechanism and topography of the traumatism

Mechanism of traumatism	Topography	Number
Stabbing assault	Thigh	3
Firearm	Knee	1
Circulation accident	Thigh	1
Iatrogenic cause (Venipuncture, femoral catheter placement for dialysis)	Elbow crease, Thigh	2

The mean consultation time was 71 days +/- 67.6 [7-210] and 6 cases / 7 had for consultation the pain of the affected limb. The clinical examination on admission revealed a mass with vascular characteristics

in 4 patients, and 3 presented signs of limb ischemia associated with absolute functional impotence for 2 patients. Vascular Doppler ultrasound was performed in 5 out of 7 patients (see Table 2).

Table-2: Results of vascular ultrasound of limbs

Patients	Topography of lesions
Patient 1	Thrombosed aneurysm of the right superficial femoral artery measuring 64mm x 45mm axially for a height of 88mm with an arteriovenous fistula between the superficial femoral artery and the superficial femoral vein.
Patient 2	Presence of 2 arteriovenous fistula, one of which is between the superficial femoral artery and the superficial femoral vein, and the other between the right popliteal artery and the popliteal vein.
Patient 3	False aneurysm of superficial femoral artery measuring 17mm with an arteriovenous fistula between the superficial femoral artery and the superficial femoral vein
Patient 4	Arteriovenous fistula between the superficial femoral artery and the superficial femoral vein
Patient 5	Subcutaneous hematoma associated with arteriovenous fistula between the superficial femoral artery and the superficial femoral vein

CT angiography of the limbs was performed in 4 out of 7 patients (see Table 3).

Table-3: Results of CT angiography of the limbs

Patients	Topography of lesions
Patient 1	- Arteriovenous fistula between the supra-articular popliteal artery and the supra-articular popliteal vein, - Right tibio-peroneal arteriovenous fistula with a satellite vein - Shards of bullet in the thigh and bone fragments in the right knee.
Patient 2	Sacciform aneurysm located in the middle third of the right superficial femoral artery with early opacification of the superficial femoral vein suggesting a femoro-femoral arteriovenous fistula
Patient 3	False aneurysm located in the middle third of the superficial femoral artery with the presence of an arteriovenous fistula between the superficial femoral artery and the superficial femoral vein.
Patient 4	Arteriovenous fistula between the superficial femoral artery and the superficial femoral vein with a 3.4mm diameter collar



Fig-1: CT angiography of the limbs showing an arteriovenous fistula between sus articular popliteal artery and sus articular popliteal vein

Open surgery was performed in all patients. General anesthesia was performed in 3 patients and the other four underwent locoregional anesthesia. An intraoperative arteriography was performed in a single

patient, showing two arteriovenous fistulas, one in the tibio-peroneal trunk with its satellite vein and the other in the supra-articular popliteal artery with its satellite vein.

Table-4: Results of surgical exploration

Number of patients	Results
5	Arteriovenous fistula between superficial femoral artery and superficial femoral vein
1	Arteriovenous fistula between the radial artery in its upper portion with a median branch of the basilic vein associated with false aneurysms
1	Arteriovenous fistula between the tibio-peroneal trunk with its satellite vein and another between the supra-articular popliteal artery and the supra-articular popliteal vein

The surgical technique consisted of a direct section-suture on the artery with closure of the neck on the venous side in 4 patients. Two patients benefited from a direct closure of the neck on the arterial and venous side. In one patient, arterial resection was performed with the interposition of an inverted saphenous vein graft and direct closure of the neck on the venous side. The postoperative follow-up was straightforward in all patients. Postoperative Doppler ultrasound did not show an arteriovenous fistula and the vascular axes were permeable. The average follow-up time is 305 days +/- 245 (30-730) with an unremarkable clinical examination, no objectified residual arteriovenous fistula, no sign of limb ischemia, pulse and flow perceived up to distality.

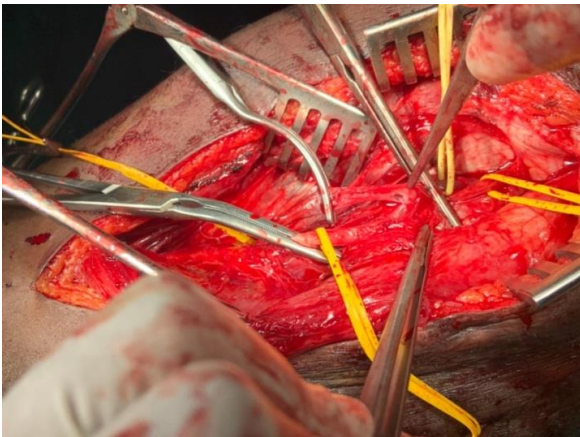


Fig-2: Operative view showing an arteriovenous fistula between superficial femoral artery and superficial femoral vein

4. COMMENTS

Post-traumatic arteriovenous fistula mainly occurs in adults [1], rarely in children. The mechanism of the trauma is in the majority of cases a stab wound as mentioned in the literature [3, 4]. Other mechanisms can be cited such as gunshot wounds, traffic accidents or iatrogenic causes which represent 28.5% in our study [2, 3, 5, 6]. Currently, there is a predominance of iatrogenic arteriovenous fistula with the development of endovascular techniques [1, 4]. Diagnosis is difficult in non-specialized centers, explaining the delay in treatment with an average consultation time of 71 days. The main element that makes it possible to make the diagnosis is swelling on the course of the vessels with vascular characteristics, in particular systolo-diastolic murmur and thrill [2, 4]. Often, the diagnosis is made on the basis of evidence of limb ischemia due to vascular theft [6, 7]. Doppler ultrasound of the limb

vessels or CT angiography confirms the diagnosis and contributes to therapeutic management [1, 3, 4, 6]. Post-traumatic arteriovenous fistulas are often associated with pseudoaneurysms [3-5]. Despite the development of endovascular techniques [2, 8], open surgery is still relevant in most countries with good results [3, 4, 7]. The main technique used is resection followed by direct suture anastomosis. Other techniques such as direct closure of the necks or the interposition of a saphenous venous graft remain possible on a case-by-case basis as described in other studies [1, 6]. The postoperative follow-up was straightforward in all patients with a favorable outcome over an average follow-up period of 305 days with the control of the absence of residual arteriovenous fistula and the integrity of the vascular axes. This demonstrates the importance of open surgery in the management of post-traumatic arteriovenous fistulas in our countries where endovascular treatment often remains limited. Arteriography is rarely performed for diagnostic purposes, supplanted by CT angiography of the limbs. It is most often performed intraoperatively as part of endovascular treatment or control of the procedure performed.

CONCLUSION

Post-traumatic arteriovenous fistulas of the limbs are rare and serious vascular pathologies. A good diagnostic approach is necessary for early detection, aided by additional examinations which allow confirmation. Several therapeutic modalities are available in the therapeutic management of these arteriovenous fistulas, in particular in endovascular surgery. Open surgery still has a place. Early diagnosis and management help minimize the risk of vital and functional complications.

REFERENCES

1. Kassabian, E., Sleilaty, G., & Jebara, V. (2005). Fistules artérioveineuses acquises. *EMC-Cardiologie-Angéiologie*, 2(4), 523-530.
2. Togo, S. Fistule artério-veineuse traumatique récidivante du membre inférieur traitée par voie endovasculaire: le premier cas au Mali.
3. Zizi, O., Naouli, H., Jiber, H., & Bouarhroum, A. (2017). Fistule artérioveineuse poplitée post-traumatique associée à un faux anévrisme. *JMV-Journal de Médecine Vasculaire*, 42(1), 46-49.
4. Christen, Y. (2001). Fistules artério-veineuses acquises: y penser pour les diagnostiquer. *Angiologie/hémostase. Médecine et hygiène*, 59(2331), 183-186.

5. Imai, D., Mii, S., Tanaka, K., Matsumoto, T., & Maehara, Y. (2014). High-output heart failure due to post-traumatic peroneal arteriovenous fistula. *Journal of vascular surgery*, 59(4), 1121-1122.
6. Yousuf, K. M., Bhagwani, A. R., & Bilal, N. (2013). Management of chronic traumatic arteriovenous fistula of the lower extremities. *European Journal of Trauma and Emergency Surgery*, 39(4), 393-396.
7. Suknaic, S., Erdelez, L., Skopljanac, A., Sef, D., & Novačić, K. (2012). Chronic ischaemic leg ulcer as a late complication of post-traumatic arteriovenous fistula. *Phlebology*, 27(3), 124-127.
8. Grandi, A., Melloni, A., Chiesa, R., & Bertoglio, L. (2021). Endovascular embolization of a lower limb arteriovenous fistula using a vascular plug deployed with a through-and-through arteriovenous access. *Catheterization and Cardiovascular Interventions*, 97(6), E847-E851.