



Endovascular treatment of occluded popliteal aneurysm

Pierfrancesco Veroux

Popliteal Artery Aneurysms(PAAs)

- PAA, despite is the most prevalent peripheral aneurysm, is an uncommon disease
- PAA natural history demonstrates 1-year complication rate of 24% increasing to 68% at 5 years



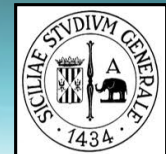
Dawson I, Sie R, van Baalen JM, et al. Asymptomatic popliteal aneurysm: elective operation versus conservative follow-up. *Br J Surg* 1994;81:1504-1507.



Treatment of PAAs

In asymptomatic patients, elective repair of PAAs >20 mm is generally undertaken to prevent clinical complication such as: distal embolization, thrombosis, and less frequently rupture of the aneurysm.

Galland RB, History of the management of popliteal artery aneurysms. *Eur J Vasc Endovasc Surg* 2008; 35:466-472.



Open repair of PAAs

- The open repair of PAA offers better long-term results than EV repair.
- The results are better in asymptomatic patients, those undergoing elective surgery with good runoff.
- Saphenous vein bypasses showed better primary patency at 24 months than ePTFE (94.9% vs 79%; $P = .04$)
- Poor runoff is an independent factor for worse primary patency

Serrano Hernando FJ, Comparison of popliteal artery aneurysm therapies. *J Vasc Surg.* 2014 Dec 8.

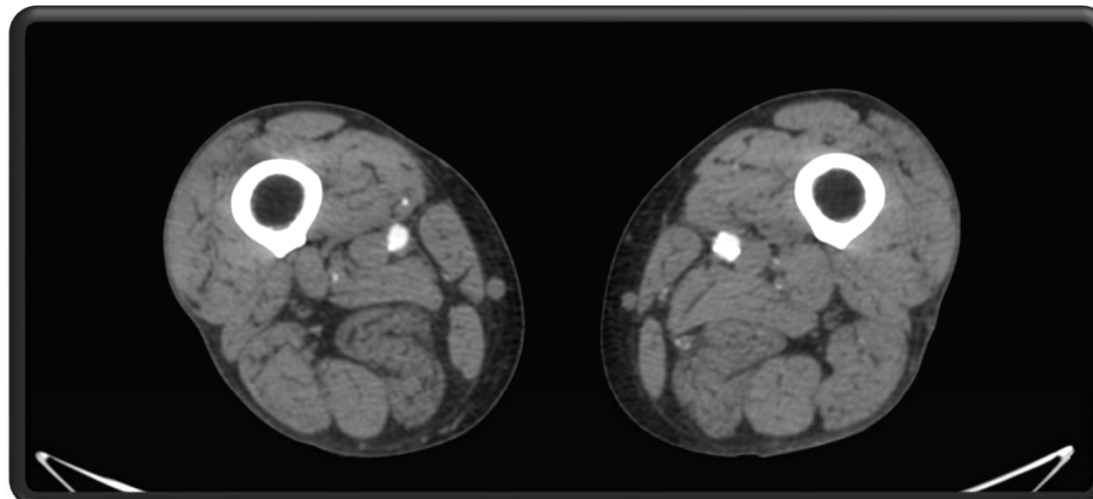


Endovascular repair of PAAs

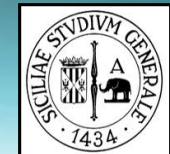
5 years FU

Primary patency	76%
Limb salvage	98%
Survival rate	82%
Significant sac volume shrinkage	

24 months FU



Piazza M. et Al, long term outcomes and sac volume shrinkage after endovascular popliteal artery aneurysm repair. [Eur J Vasc Endo Vasc Surg. 2014 Aug.](#)

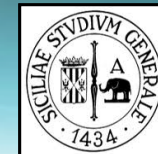


Thrombosis of PAAs

The mechanisms leading to thrombosis of PAA are not completely understood. Anatomic and hemodynamic factors are probably involved:

- Enlargement and severe angulation of aneurysm
- Absence of patent collateral arising from the sac
- Distal embolization and /or BTK occlusive diseases can determine high resistance and flow disturbance in the PAA segment

Galland RB, History of the management of popliteal artery aneurysms. *Eur J Vasc Endovasc Surg* 2008; 35:466-472.

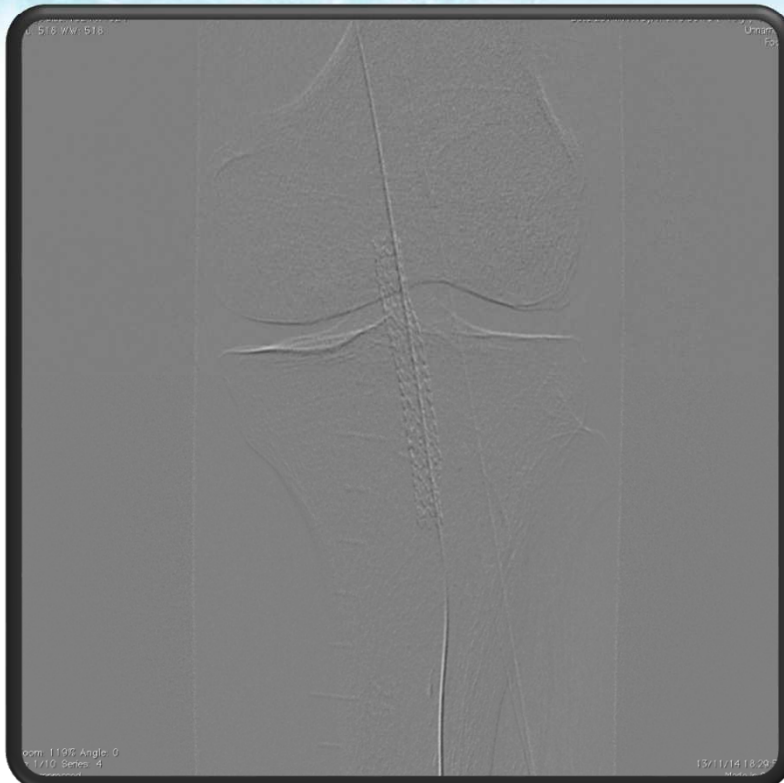


pre-occlusion of PAAs due to thrombus mobilization



Endovascular exclusion of PAAs

MEET 2015
MULTIDISCIPLINARY EUROPEAN
ENDOVASCULAR THERAPY



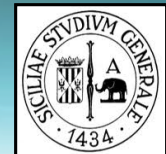
Vascular Surgery and Organ Transplant Unit - University of Catania



Treatment of chronic occlusion of PAAs

- Management and treatment are complex and the results are significantly worse than in asymptomatic patients, with an early major amputation rate > 10%
- Distal saphenous vein by-pass is probably the first line of treatment of chronic occlusion of PAAs in patients with CLI

But.....



Open repair of chronic occlusion of PAAs

Limitations

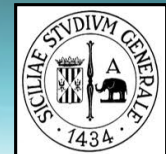
- Older patients with severe comorbidity
- No availability of adequate great saphenous vein, especially in case of the aneurysm involve the distal popliteal artery
- Poor run-off: progressive deterioration due to distal embolization or BTK chronic peripheral diseases



Endovascular repair of chronic occlusion of PAAs

Personal experience-January 2011-June 2013

- 532 patients with CLI were treated using endovascular procedures
- 11 patients(2 %) with chronic occlusion of PAAs.
- Rutherford-Becker categories 4(8 patients) and 5(3 patients)
- Male 11/11
- Age 74 ± 5 years
- Severe comorbidity 9/11

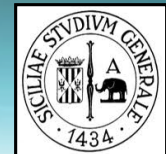


Endovascular repair of chronic occlusion of PAAs

Diagnostic assessment

DUS investigation was performed to assess:

- Access site,
- Size and extension of PAA,
- Stent graft landing zones diameters
- BTK occlusive diseases



Endovascular repair of chronic occlusion of PAAs

All procedures were performed under local anaesthesia and were approached from an ipsilateral antegrade common femoral artery puncture using DUS guidance and introducer sheaths of appropriate size



Endovascular repair of chronic occlusion of PAAs

Key points

MEET 2015
MULTIDISCIPLINARY EUROPEAN
ENDOVASCULAR THERAPY

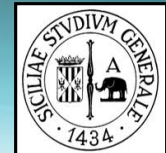
Cross the target occluded aneurysm

Prevent distal embolization

Avoid compression and kinking of covered stent graft



Vascular Surgery and Organ Transplant Unit - University of Catania



Endovascular repair of chronic occlusion of PAAs

Technical overview

1) Cross the target occluded aneurysm, trying to maintain a line as straight as possible to the patent distal vessel

2) BMS placement at the site of thrombus

3) Standard Viabahn delivery

4) Simultaneous BTK treatment to achieve at least one vessel line to the foot



Endovascular repair of chronic occlusion of PAAs

MEET 2015
MULTIDISCIPLINARY EUROPEAN
ENDOVASCULAR THERAPY



In the majority of cases (10/11) the distal true lumen was achieved by an antegrade approach.
In 1 patient an anterior tibial artery retrograde approach was needed to cross the target aneurysm.



Vascular Surgery and Organ Transplant Unit - University of Catania



Endovascular repair of chronic occlusion of PAAs

MEET 2015
MULTIDISCIPLINARY EUROPEAN
ENDOVASCULAR THERAPY

Stent implantation

Once the guide wire crossed the lesion, a self-expandable bare metal stent, 1 mm larger than planned stent graft, was delivered at the site of aneurysm. No balloon dilatation was performed after stent release



Endovascular repair of chronic occlusion of PAAs

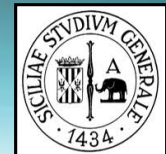
Intent of use of BMS

MEET 2015
MULTIDISCIPLINARY EUROPEAN
ENDOVASCULAR THERAPY

- Avoid pre-dilatation to prepare the lumen for stent graft
- **Contain the thrombus before restoring the flow to prevent distal embolization**
- Facilitate the Viabahn stent graft progression and delivery
- **Provide an external scaffold for the Viabahn** in the aim to improve radial stiffness thus avoiding compression of stent graft due to the biomechanical forces present in the popliteal region that can be amplified in cases of large aneurysm.



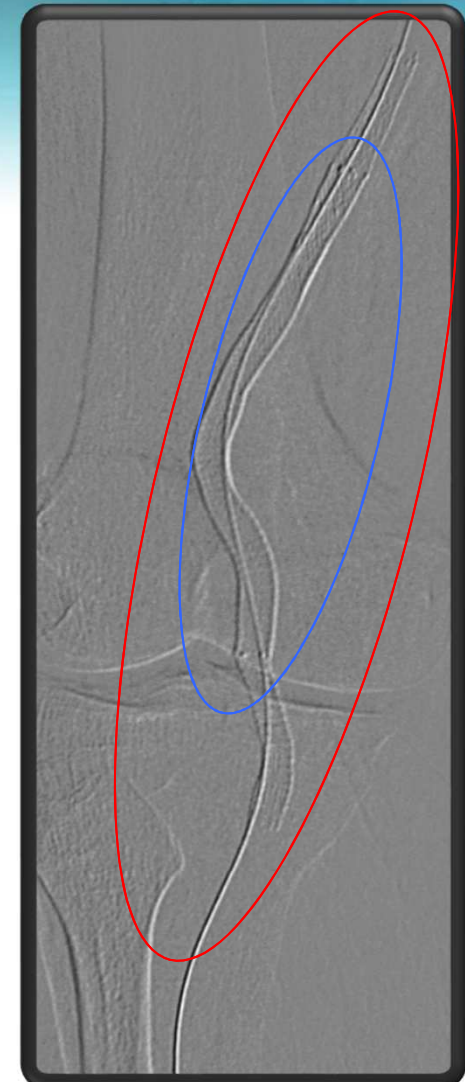
Vascular Surgery and Organ Transplant Unit - University of Catania



Endovascular repair of chronic occlusion of PAAs

Stent implantation – Viabahn delivery

MEET 2015
MULTIDISCIPLINARY EUROPEAN
ENDOVASCULAR THERAPY



Vascular Surgery and Organ Transplant Unit - University of Catania



Endovascular repair of chronic occlusion of PAAs

Final results

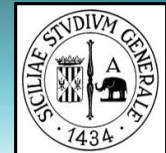
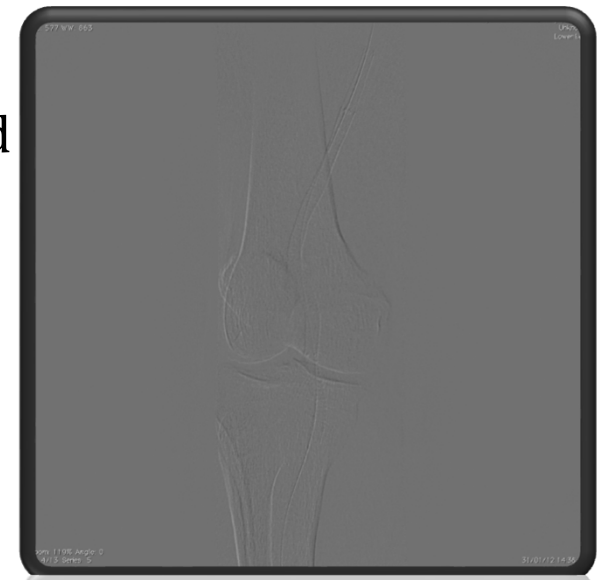
MEET 2015
MULTIDISCIPLINARY EUROPEAN
ENDOVASCULAR THERAPY

Case 1

Case 2



The aneurysms were excluded covering the occluded target popliteal segments using a standard delivery of covered stent grafts.
Flow was finally restored



Distal landing zone of stent graft

• Proximal popliteal segment (P1)	0/11	0%
• Knee joint-flexion line (P2)	3/11	27%
• BTK popliteal segment (P3)	8/11	73%

BTK run off

• 1 vessel line	6/11	55%
• 2 vessel line	5/11	45%
• 3 vessel line	0/11	0%



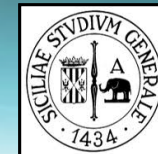
Early Results

Immediate Success	100%
Immediate Embolization	9% (1/11)
BTK revascularization	36% (4/11)
Early Mortality	0%



Mid-term Results

24 months primary patency	82%(9/11)
24 months secondary patency	91%(10/11)
24 months Major Amputation	0%



Conclusions

Critical limb Ischemia due to thrombosis of PAA , is more common than expected

In older and high risks patients, endovascular exclusion of chronic occlusion of PAA seems a feasible and safety technique, showing promising primary patency and freedom for mayor amputation rates

To prevent distal embolization is mandatory to restore flow only when the thrombosed popliteal segment is completely covered with the stent graft.

External scaffold to stent graft and BTK revascularization seems improving mid-term results

