

## Background:

Patients with Popliteal Artery Aneurysm (PAA) at increased infection risk or lacking suitable autologous vein for classic bypass surgery, are treated using a prosthetic graft or an endovascular stent-graft. All treatment modalities have limited short- and long-term durability<sup>1,2</sup>.

In 2016, the Vascular Surgery Unit at Haukeland University Hospital, Bergen, Norway, published a pilot study<sup>3</sup> with five PAA patients lacking suitable autologous vein for bypass surgery. All patients were treated using the spiral vein-graft technique. The results were encouraging.

**Aim:** To evaluate the spiral vein-graft technique as a surgical treatment option for PAA.



Figure 1: constructing the spiral vein graft.

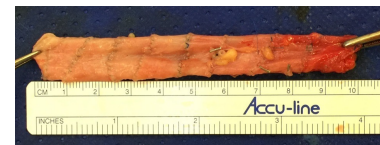


Figure 2: finished spiral vein graft (ex situ)

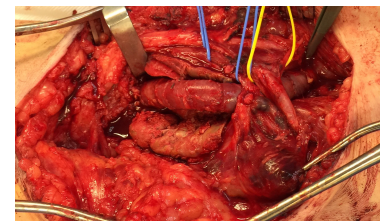


Figure 3: finished spiral vein graft (in situ) after anastomoses.

## Methods

From October 2016 to April 2019, 16 patients underwent elective surgery for PAA using the spiral-vein technique (Table 1). 17 bypasses were made. One patient were operated bilaterally. The PAA diameters varied from 20 – 60 mm (Table 1).

The ipsilateral great saphenous (n=15) and/or small saphenous vein (n=2) were harvested, and in two cases, combined with the superficial accessory vein. In all patients at least 2 of 3 crural arteries were verified open on preoperative CT.

The spiral vein-grafts were constructed using the harvested vein split longitudinally and sutured in a spiral fashion around a sterile plastic syringe (2.5 mL, 8 mm diameter) by continuous polypropylene 6.0 sutures (Fig. 1). The length of the spiral vein-graft was matched the need in each case (Table 2).

The posterior approach to the popliteal artery was used. A cutaneous lazy S incision was performed in the popliteal fossa. The aneurysm sac was incised longitudinally and the supra- and/or infragenicular arteries were then sutured. Using the inlay technique, the end to end anastomoses were made with continuous polypropylene 5-0 sutures (Fig. 3).

Intra-operatively, duplex ultrasound (18 MHz probe) and transit time flow measurements were performed (Table 2). Postoperatively, 5000 units low molecular weight heparin was administered daily until discharge.

## Results

Primary patency rates at 30 days postoperative was 100%. At mean 27 months follow up postoperative, secondary patency rates was 94%.

One patient was re-operated at 34 months postoperative due to a retrograde filling of the aneurysm sac via a supragenicular artery. Also, in two cases, a percutaneous transluminal angioplasty was performed at 60 days and 27 months postoperative due to stenosis at the proximal and distal anastomosis, respectively. The spiral vein-grafts, however, were patent.

## Conclusion.

Spiral vein-graft technique is a suitable and durable method to treat PAA in cases at increased infection risk or lacking autologous vein for traditional bypass. It may also be a therapeutic option in cases of graft infection following PAA surgery.

Table 1. Preoperative Characteristics

Age, mean years, [range]	67 [51-84]
BMI, mean kg/cm <sup>2</sup> , [range]	30 [22-42]
Female:Male ratio	1:15
Localization, Left:Right	7:10
Mean PAA diameter i mm, [range]	32 [20-60]
Smoking status	
Current, n(%)	3 (18)
Former smoker, n(%)	9 (56)
Never smoker, n(%)	4 (23)
Comorbidities	
Contralateral PAA, n(%)	11 (65)
AAA, n(%)	6 (36)
Hypertention, n(%)	11 (65)
COPD, n(%)	1 (6)
Medication	
Statin, n(%)	10 (59)
Anti-platelet therapy, n(%)	13 (81)

Table 2. Spiral Vein-Graft Characteristics

	GL	BF	PapF	FU	FLC
<b>Max.</b>	11	151	628	45	500
<b>Min.</b>	4	90	130	6	100
<b>Mean</b>	6	97	348	27	219

GL: Graft length in cm, BF: Basal flow in ml/min, PapF: Flow in ml/min after Papaverin was given, FU: Follow up time in months, FLC: Flow at last controll.

## References:

1. Pulli R, Dorigo W, Castelli P, Dorrucchi V, Ferrilli F, De Blasis G, et al. A multicentric experience with open surgical repair and endovascular exclusion of popliteal artery aneurysms. *Eur J Vasc Endovasc Surg* 2013 Apr;45:357e63.
2. Leake AE, Segal MA, Chaer RA, Eslami MH, Al-Khoury G, Makaroun MS, et al. Meta-analysis of open and endovascular repair of popliteal artery aneurysms. *J Vasc Surg* 2017 Jan;65: 246e56.
3. Pedersen G, Gleditsch E, Johnsen L, Gubberud E. Spiral Vein Graft Technique for Popliteal Artery Aneurysms. *EJVES Short Rep.* 2019 May 15;43:21-23.