4 French endovascular treatment is as safe and effective as 6 French with no need for a VCD
–
Full cohort analysis of the BIO4AMB multicenter trial

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On behalf of the BIO4AMB Investigators

Disclosure

Speaker name:

Jos C. van den Berg MD PhD

I have the following potential conflicts of interest to report:

☐ Consulting

☐ Employment in industry

☐ Stockholder of a healthcare company

☐ Owner of a healthcare company

☒ Other(s) Research Grant

☐ I do not have any potential conflict of interest

BIO4AMB Study Design

DESIGN:

- Controlled, multicenter, non-inferiority trial to compare the rate of access site complications (ASC) in 4 French (4F) vs. 6 French (6F) femoral access endovascular interventions of lower extremity peripheral artery disease in an outpatient setting

STUDY GOALS:

- To evaluate ambulatory PAD treatment and the occurrence of ASC using 4F or 6F femoral access devices

PRIMARY ENDPOINTS:

- Peri- and post-procedural access site complications [1]

SECONDARY ENDPOINTS:

- Ambulatory failure[2]
- MAE

[1] Access site complications are defined as a composite of:1- Groin hematoma (larger than 5 cm in diameter, visible by sonography, and haemoglobin decrease <3 g/dL) 2-Pseudoaneurysm 3-Groin as well as retroperitoneal bleeding (defined as requiring acute intervention for haemostasis, need for blood transfusions, or haemoglobin decrease > 3 g/dL) 4-AV fistula (visible by shunting in colour coded sonography between the common femoral artery and vein) 4-Arterial dissections at access site (visible with fluoroscopy or sonography as a membrane causing stenosis in the vessel lumen) 5-Thrombosis 6- VCD related ASCs

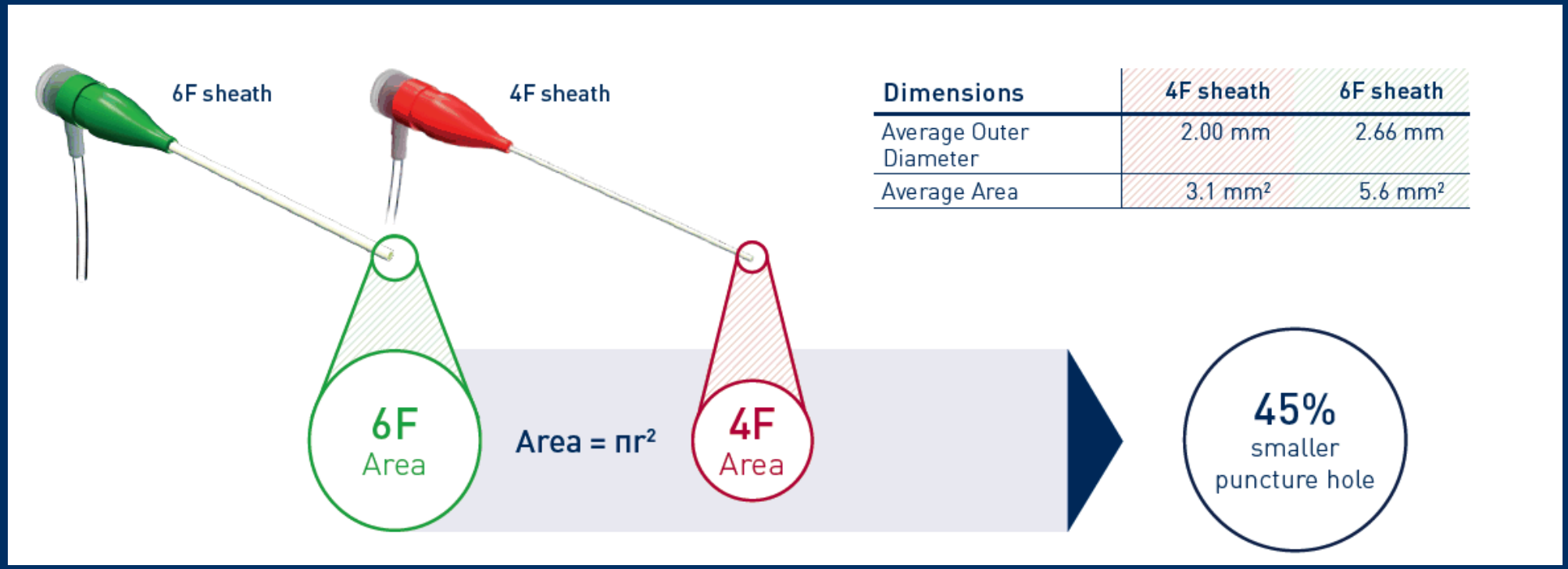
[2] Ambulatory failure is described as unplanned overnight hospitalization

*Single Monitoring Visits missing due to COVID-19. Therefor small changes possible for final report

Subjects with major protocol violations where excluded from all presented evaluations

4 French vs 6 French

Comparison of Puncture Size



Dimensions	4F sheath	6F sheath
Average Outer Diameter	2.00 mm	2.66 mm
Average Area	3.1 mm²	5.6 mm²

Smaller puncture hole may…

- reduce need for Vascular Closure Devices
- lower rate of access site complications

➢ **have potential for ambulatory treatment**

BIO4AMB Study Sites

Austria	**Prof. Marianne Brodmann (CCI)**	**University Clinic Graz**
Switzerland	**Prof. Jos C. van den Berg (CCI)**	**Ospedale Regionale di Lugano**
Belgium	**Dr. Koen Deloose (SCM)**	**AZ Sint Blasius Hospital**
France	**Prof. Eric Steinmetz (SCM)**	**CHU de Dijon - Hôpital Le Bocage**
Australia	Dr. Manfred Spanger	Box Hill Hospital, Melbourne
Australia	Dr. Shirley Jansen	Sir Charles Gairdner Hospital Perth
Australia	Dr. Carsten Ritter	Fiona Stanley Hospital, Perth
Australia	Dr. Vikram Puttaswamy	Royal North Shore Hospital
Australia	Prof. Bibombe Patrice Mwipatayi	Hollywood Private Hospital
Australia	Dr. Mark Jackson	Gold Coast Private Hospital, Gold Coast Public Hospital
Austria	Prof. Klaus Hausegger	LKH Klagenfurt
Belgium	Dr. Jean-francois De Wispelaere	Cliniques Universitaires de Mont Godinne
Belgium	Dr. Jos Vandekerhof	Jessa Ziekenhuis
Belgium	Dr. Lieven Maene	OLVZ Aalst
Belgium	Dr. Jürgen Torsten Verbist	Imelda Hospital
Belgium	Dr. David Lambrechts	AZ Heilige Familie
Denmark	Dr. Flemming Randsbaek	Regionshospitalet Viborg
France	Prof. Eric Ducasse	CHU de Bordeaux - Hôpital Pellegrin
France	Dr. Raphael Coscas	Hôpital Ambroise Paré
France	Prof. Pascal Desgranges	Hôpital Henri Mondor
France	Prof. Ludovic Berger	CHU de Caen
France	Dr. Jonathan Sobocinski	CHU de Lille
France	Dr. Gilles Miltgen	Clinique Axium
France	Dr. Bahaa Nasr	CHU de Brest
France	Dr. Fabrice Schneider	CHU de Poitiers - Hôpital Jean Bernard
France	Dr. Pierre Jules Delannoy	Clinique du Tonkin
France	Dr. Olivier Regnard	Clinique Saint Joseph
France	Dr. Armand Bourriez	Clinique de l'Europe
France	Dr. Sébastien Veron	Hôpital Privé de la Loire
France	Prof. Simon Rinkenbach	CHU de Besancon
France	Dr. Adrien Kaladji	CHU de Rennes
France	Dr. Didier Paneau	Hôpital Albert Schweitzer
France	Dr. Laurent Casbas	Clinique Rive Gauche
Germany	Prof. Johannes Dahm	Herz- und Gefäßzentrum Göttingen

Baseline Patient & Lesion Information

	4F N=361	6F N=404	P-value
Age, years	70 ± 11	69 ± 11	0.235
Male	260 (72.0)	310 (76.7)	0.136
Smoking	274 (75.9)	310 (76.7)	0.787
BMI	N=349 26.8 ± 4.4	N=397 27.0 ± 4.5	0.524
Hypertension	289 (80.1)	326 (80.7)	0.825
Hyperlipidaemia	214 (59.3)	285 (70.5)	0.001
Diabetes mellitus **Insulin dependent**	106 (29.4%) 45 (12.5)	134 (33.2%) 42 (10.4)	0.258
Renal insufficiency*	81 (22.4)	65 (16.1)	0.026
History of PAD	206 (57.1%)	243 (60.1%)	0.387
Previous PVI/ surgeries	167 (46.3%)	196 (48.5%)	0.533

Data are displayed as mean ± standard deviation or n (%). *according to site-assessment. BMI-body mass index, PAD-peripheral artery disease, PVI-peripheral vascular intervention

	4F N=517	6F N=613	P-value
Lesion location	N=517	N=613	
Common femoral	23 (4.4)	32 (5.2)	0.548
SFA	294 (56.9)	347 (56.6)	0.930
Popliteal artery	73 (14.1)	108 (17.6)	0.110
BTK	98 (19.0)	81 (13.2)	0.008
Other*	29 (5.6)	45 (7.3)	0.241
Calcification†	N=511	N=607	0.002
Moderate	101 (19.8)	179 (29.5)	
Heavy	104 (20.4)	107 (17.6)	
TASC classification	N=512	N=607	0.328
A	130 (25.4)	154 (25.4)	
B	173 (33.8)	234 (38.6)	
C	126 (24.6)	129 (21.3)	
D	83 (16.2)	90 (14.8)	

Data are displayed as mean ± standard deviation or n (%). *4F: 9 Arteria femoralis profunda, 8 bypass grafts, 7 iliac arteries, 2 lesions extending in two vessels, 6F: 8 Arteria femoralis profunda, 10 bypass grafts, 24 iliac arteries, and one stented artery, †according to site-assessment. BTK-below-the-knee, SFA-superficial femoral artery

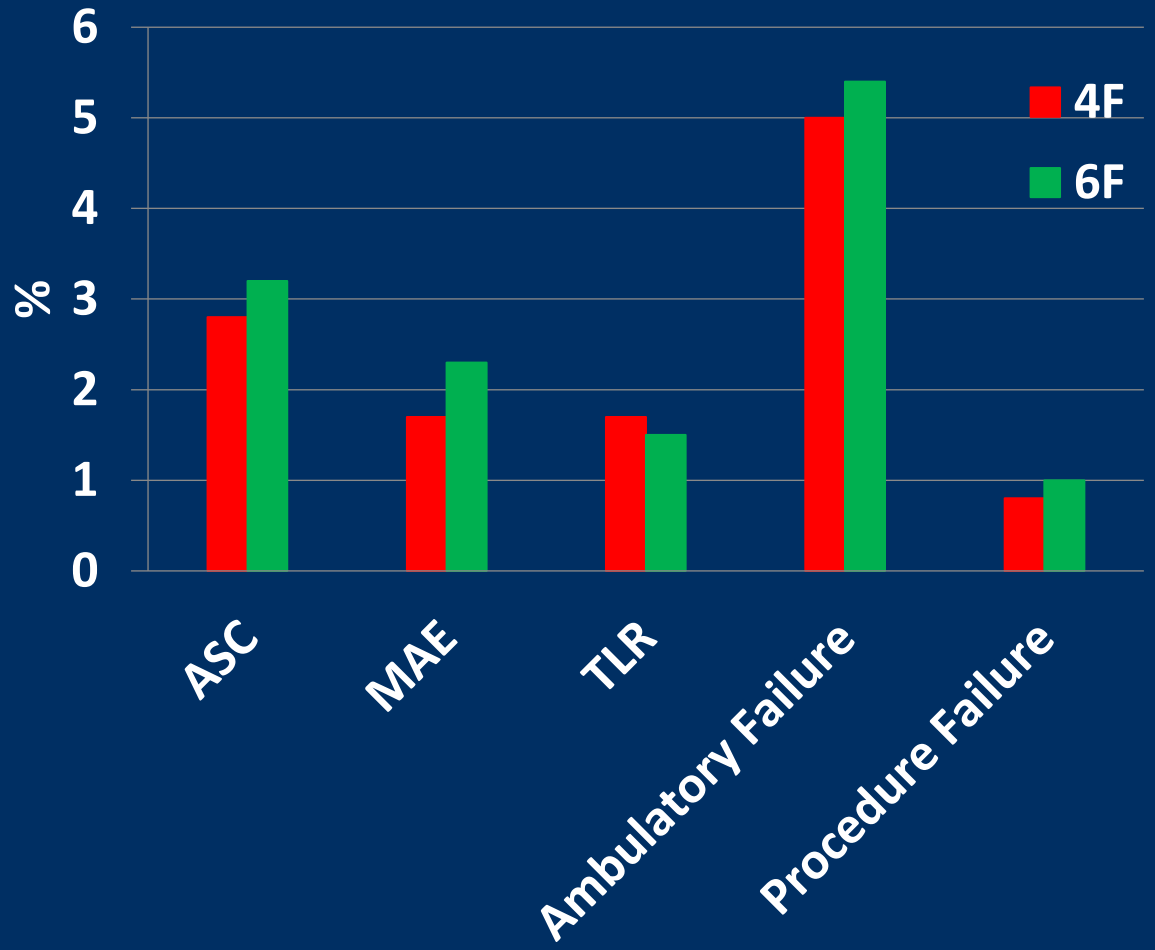
Primary Endpoints

ITT and Propensity Score Matched Populations

Total Subjects (subject based) • **ITT** • **Propensity Score Matched**	**4F** **N=356** **N=306**	**6F** **N=404** **N=307**	**P-value**
Access Site Complications[1] (subject based, %)			
• ITT	10(2.8%)	13 (3.2%)	0.729
• Propensity Score Matched	10 (3.3%)	8 (2.6%)	0.627
ASCs (event based) **ITT**			
Groin hematoma (>5cm)	4	4	
Pseudo-aneurysm	5	6	
Groin as well as retroperitoneal bleeding	1	2	0.788
Arterial dissections	0	1	
Thrombosis	1	0	

The primary endpoint was tested for potential confounding effects by propensity score matching. Neither in the ITT nor in the Propensity Score Matched analysis was any significant difference seen.

Safety and Efficacy of the ITT Population



	4F	6F	
Total Subjects	**N=356**	**N=402**	**P-value**
Major Adverse Events (subject based, %)	6 (1.7%)	8 (2.0%)	0.794
MAE (event based)			
Clinically driven TLR	6	6	>0.999
Major target limb amputation	1	0	0.471
Procedure or device related death	0	2	0.501
Procedural success	99.2	99	>0.999
Procedure time	39.1 ± 25.2 min	46.4 ± 27.6 min	<0.0001

Procedural failure (defined as unplanned change to a larger sheath size and/or second puncture site); Ambulatory failure (defined as unplanned overnight hospitalization)

LINC

Safety and Efficacy for Selected Subgroups

	Endpoint	4F	6F	p-value
Age >65 years	Freedom from ASC (subject based, %)	235 (96.7%)	247 (96.5%)	0.891
	MAE (subject based, %)	4 (1.6%)	4 (1.5%)	>0.999
	Same-day discharge	231 (94.3%)	245 (94.6%)	0.880
Female	Freedom from ASC (subject based, %)	95 (94.1%)	89 (94.7%)	0.851
	MAE (subject based, %)	3 (3.0%)	2 (2.2%)	>0.999
	Same-day discharge	93 (92.1%)	90 (95.7%)	0.287
Diabetics	Freedom from ASC (subject based, %)	101 (98.1%)	130 (97.0%)	0.612
	MAE (subject based, %)	1 (1.0%)	2 (1.5%)	>0.999
	Same-day discharge	100 (94.3%)	128 (95.5%)	0.676

Safety and Efficacy for Selected Subgroups

	Endpoint	4F	6F	p-value
CFA and SFA	Freedom from ASC (subject based, %)	206 (96.7%)	223 (95.7%)	0.580
	MAE (subject based, %)	3 (1.4%)	3 (1.3%)	>0.999
	Same-day discharge	206 (95.4%)	221 (94.8%)	0.799
Popliteal	Freedom from ASC (subject based, %)	28 (93.3%)	31 (93.9%)	0.922
	MAE (subject based, %)	0 (0%)	0 (0%)	NA
	Same-day discharge	30 (90.0%)	30 (90.9%)	0.902
BTK	Freedom from ASC (subject based, %)	36 (100%)	16 (100%)	NA
	MAE (subject based, %)	1 (2.8%)	0 (0%)	>0.999
	Same-day discharge	34 (91.9%)	16 (100%)	0.241

BTK, below-the-knee; CFA, common femoral artery; NA, not applicable; SFA, superficial femoral artery

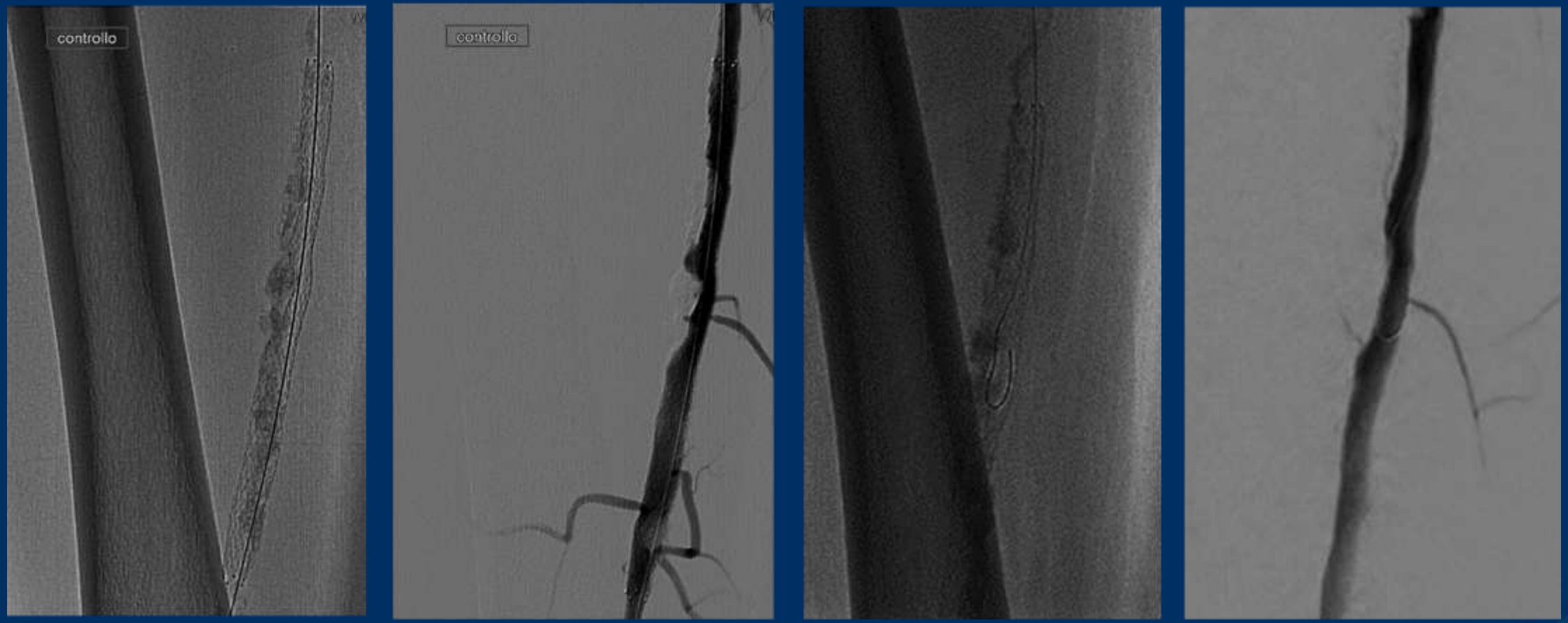
4F Interventions: No Need for VCD

	4F	6F
Haemostasis, Total Subjects	**N=361**	**N=403**
VCD only	**0 (0%)**	**202 (50%)**
Compression device only	0 (0%)	0 (0%)
Manual compression only	147 (40.7%)	24 (5.9%)
VCD + compression device	0 (0%)	23 (5.7)
VCD + manual compression	0 (0%)	91 (22.5)
VCD + compr. device + manual compr.	0 (0%)	36 (8.9%)
Compr. device + manual compr.	214 (59.3%)	25 (6.7%)
Other combinations	0 (0%)	1 (0.2%)
None	0 (0%)	1 (0.2%)

- VCDs are not a guarantee for adequate haemostasis
- Additional treatment was needed in 42.8% (151/353) of 6F VCD cases to achieve haemostasis
- Use of multiple haemostatic strategies may potentially increase procedural cost

VCD, vascular closure device

4F SFA Interventions: Durability/Radial Force

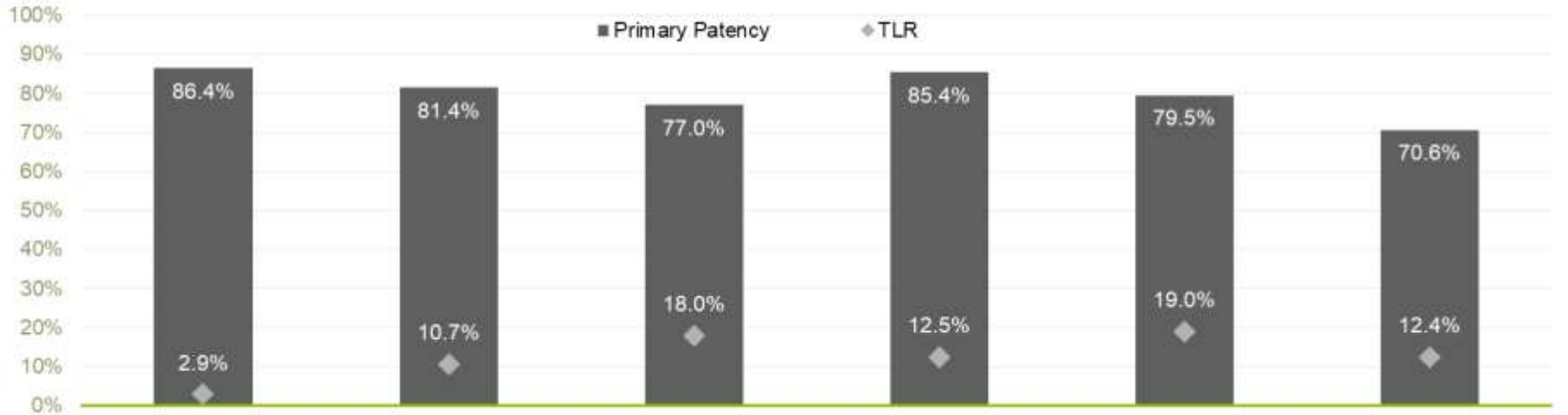


2011

2016

4F SFA 12-month Outcomes

	Short/med lesions	Long lesions	Popliteal	Dissection	Occlusion	Low/Mod. Calcification	Adjunct to DCB
Pulsar	☑	☑	☑	☑	☑	☑	☑



A.L.L.*	11.6	7.1	24.5	18.2	11.2	8.2 cm

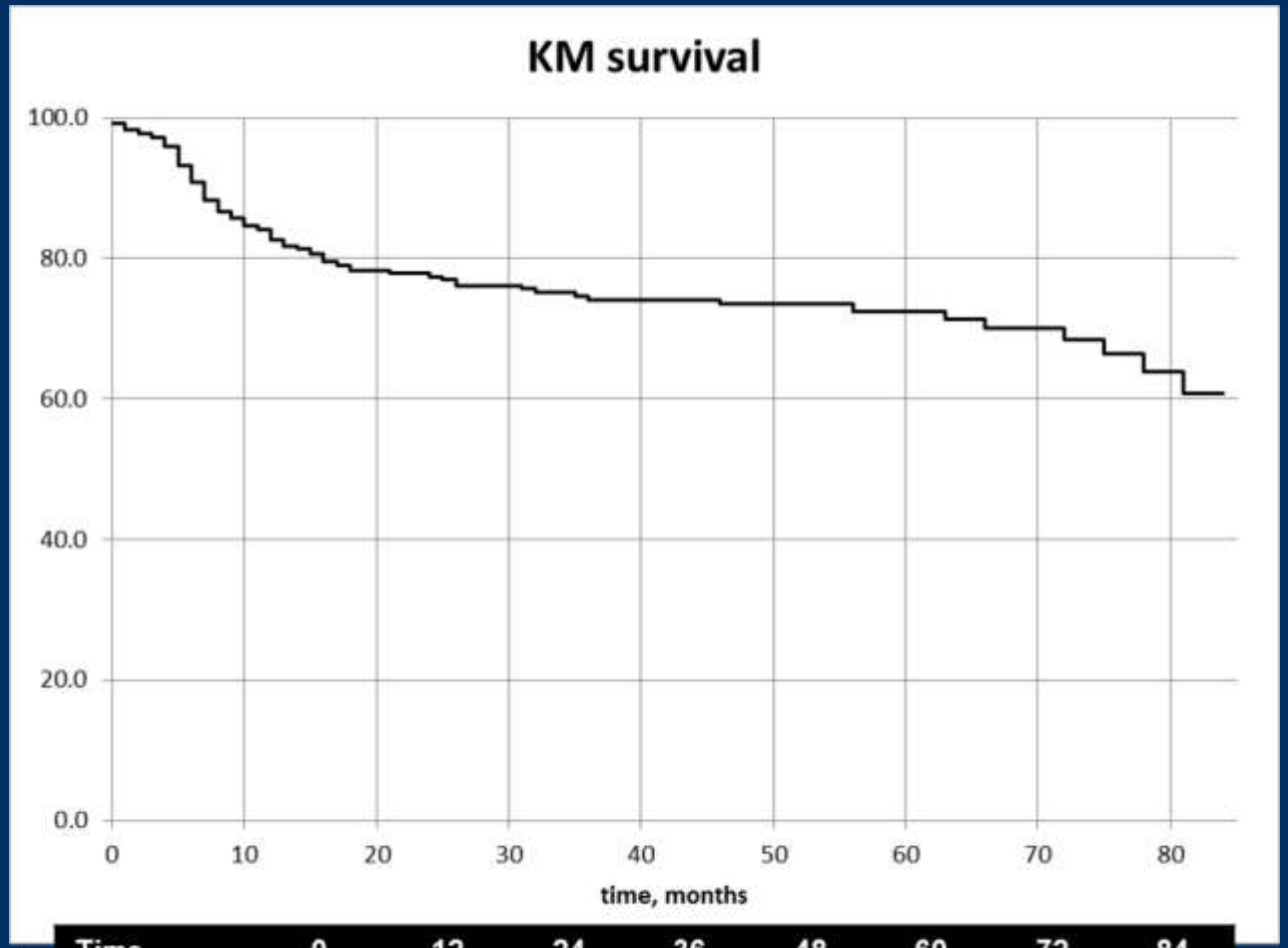
1. Lichtenberg M. BIOFLEX PEACE. Presented at: CIRSE, Sep 17, 2017; Copenhagen, Denmark; 2. Bosiers M. 4EVER 12m results. JEVT 2013;20:746–756; 3. Lichtenberg M. TASC D results. JCS 2013: 54; 433-9; 4. Lichtenberg M. TASC D II results. Clin Med Insights 2014: 8; 37-42; 5. Lichtenberg M. PEACE results JEVT, 2014, 21:373-380; 6. 37-42; 6. US Food and Drug Administration, Center for Devices and Radiological Health. FDA Summary of Safety and Effectiveness Data – Astron Pulsar and Pulsar-18 Stent, P160025. www.fda.gov (accessed, May 5, 2017). *A.L.L. = Average lesion length

4F SFA 24-Month Outcomes

Study	ALL	PP	FTLR
BIOFLEX PEACE[1] (Pulsar-18 stent only)	**8.2 cm**	**78.4%**	**89.3%**
SUPERA[2]	7.8 cm	n/a	83.3%
4EVER[3] (Astron Pulsar, Pulsar-18)	**7.1 cm**	**72.3%**	**82.7%**
BIOFLEX-I[4]	**8.2 cm**	**n/a**	**81.0%**
STROLL[5]	7.7 cm	74.9%	80.3%
RESILIENT[6]	7.0 cm	n/a	77.8%
ZILVER PTX[7]	6.3 cm	65.8%	76.7%
DURABILITY II[8]	10.9 cm	66.1%	75.3%

1. Lichtenberg et al. Effectiveness of the Pulsar-18 self-expanding stent with optional drug-coated balloon angioplasty in the treatment of femoropopliteal lesions - the BIOFLEX PEACE All-Comers Registry.Vasa (2019), 1-9. doi_10.10240301-1526a000785; 2. Supera IFU, EL2100430 (2016-03-23); 3. Bosiers M. 4EVER 24 month results: long-term results of 4F Pulsar stent in femoropopliteal lesions. Presented at: CIRSE 2013; Barcelona, Spain; 4. BIOFLEX-I Pulsar 2018 Post Approval Clinical Report Final 36m; 5. Bunte M et al. in STROLL Catheterization and Cardiovascular Interventions 2018; 92:106-114; 6. Laird J et al. RESILIENT SFA nitinol stenting. JET 2012;19:1-9; 7. Dake et al. 2-year Zilver PTX Results for femoropopliteal Lesions. JACC 61, 24, 2013: 2417-27; 8. Rocha-Singh et al. DURABILITY II Three-Year Follow-up. Catheterization and Cardiovascular Interventions 2015; 86:164-170.

Long-term Outcome 4F AMB Stenting (fTLR)



Time	0	12	24	36	48	60	72	84
# at risk	364	253	194	145	110	65	44	15

Conclusions

Cardiovasc Intervent Radiol
https://doi.org/10.1007/s00270-020-02738-5

CIRSE

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CLINICAL INVESTIGATION ARTERIAL INTERVENTIONS

Clinical Outcomes of Ambulatory Endovascular Treatment Using 4-French and 6-French Femoral Access Strategies: The Bio4amb Multicentre Trial

Marianne Brodmann[1] · Koen Deloose[2] · Eric Steinmetz[3] · Olivier Regnard[4] · Jens C. Ritter[5] · Ludovic Berger[6] · Johannes B. Dahm[7] · Shirley Jansen[8,9,10,11] · Bibombe P. Mwipatayi[12] · Pascal Desgranges[13] · Klaus Hausegger[14] · Jos C. van den Berg[15,16] · on behalf of the BIO4AMB investigators

Received: 25 October 2020 / Accepted: 2 December 2020

Conclusions Ambulatory peripheral vascular interventions are feasible and safe. The use of 4F devices resulted in similar outcomes compared to that of 6F devices.

Conclusions

In summary, ambulatory treatment is a valid and safe option for endovascular treatment of lower-extremity peripheral arterial disease.

4F-compatible devices show similar short-term safety when compared to the well established 6F devices and are a valid alternative based on patients' needs and physicians' preferences, while avoiding the additional need for VCDs.

Further studies, including health economic aspects, are needed for better defining the appropriate patient population that benefits most from the ambulatory procedures.

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