VASCUPEDIA

The value of peripheral arterial IVUS in decision making

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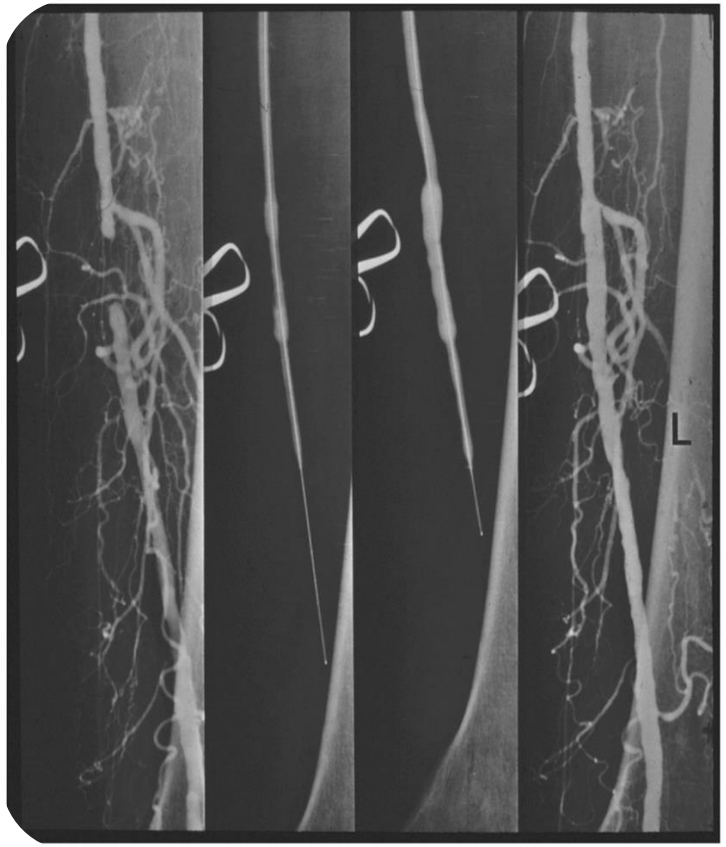
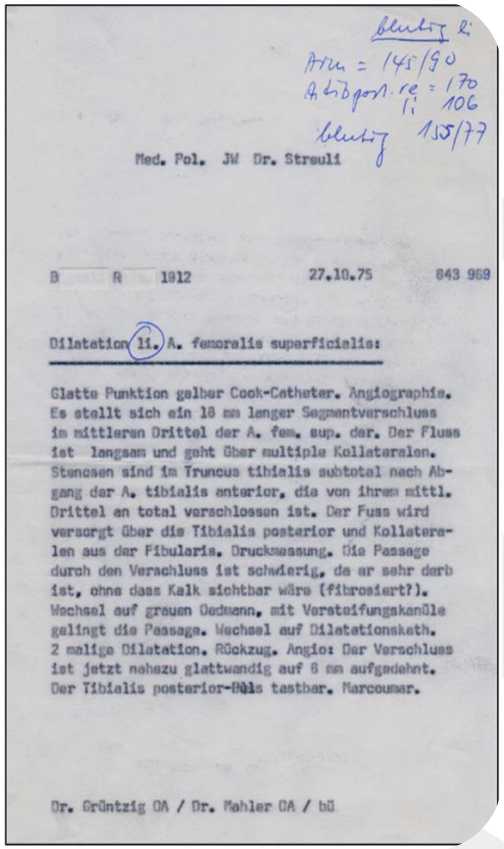
St. Franziskus Hospital Muenster Germany

The first successful percutaneous limb salvage procedure

A. Grüntzig





Blutig R:
Atm = 145/90
Arteriogr. re = 170
li 106
blutig 135/77

Med. Pol. JW Dr. Streuli

B R 1912 27.10.75 843 969

Dilatation li. A. femoralis superficialis:

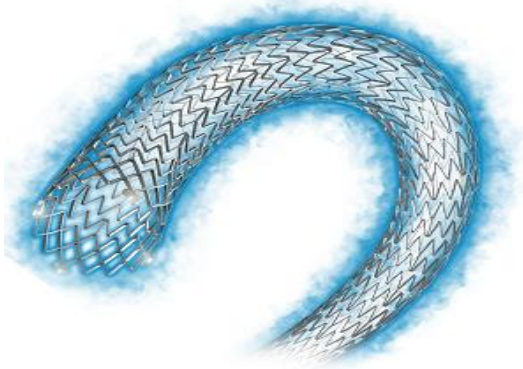
Glatte Punktion gelber Cook-Catheter. Angiographie. Es stellt sich ein 18 cm langer Segmentverschluss im mittleren Drittel der A. fem. sup. der. Der Fluss ist langsam und geht über multiple Kollateralen. Stenosen sind im Truncus tibialis subtotal nach Abgang der A. tibialis anterior, die von ihrem mittl. Drittel an total verschlossen ist. Der Fuss wird versorgt über die Tibialis posterior und Kollateralen aus der Fibularis. Druckmessung. Die Passage durch den Verschluss ist schwierig, da er sehr derb ist, ohne dass Kalk sichtbar wäre (fibrosiert?). Wechsel auf grauen Gedmann, mit Versteifungskanüle gelingt die Passage. Wechsel auf Dilatationskath. 2 malige Dilatation. Rückzug. Angio: Der Verschluss ist jetzt nahezu glattwandig auf 6 cm aufgedehnt. Der Tibialis posterior-Puls tastbar. Marcoumar.

Dr. Grüntzig OA / Dr. Mahler OA / bü

Barton et al, Front Cardiov Medicine 2014 Dec 29;1:15.

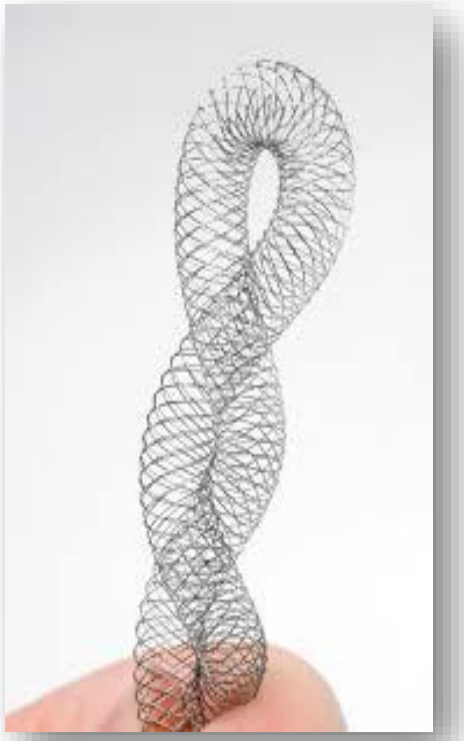
Since then.. Treatment Options have changed..

DES/DCB



Atherectomy

Interwoven Stents



IVL

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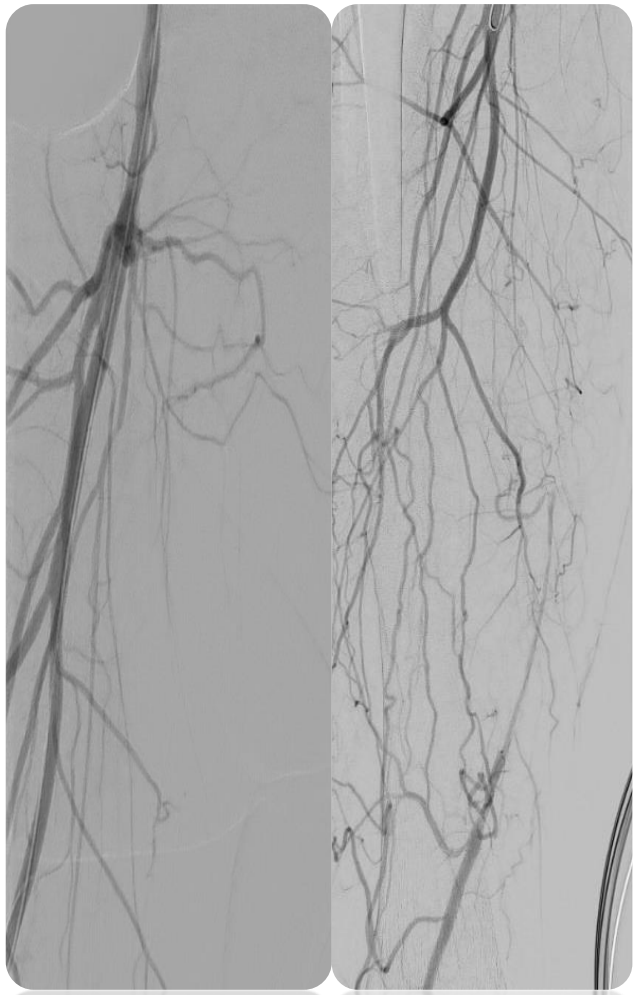
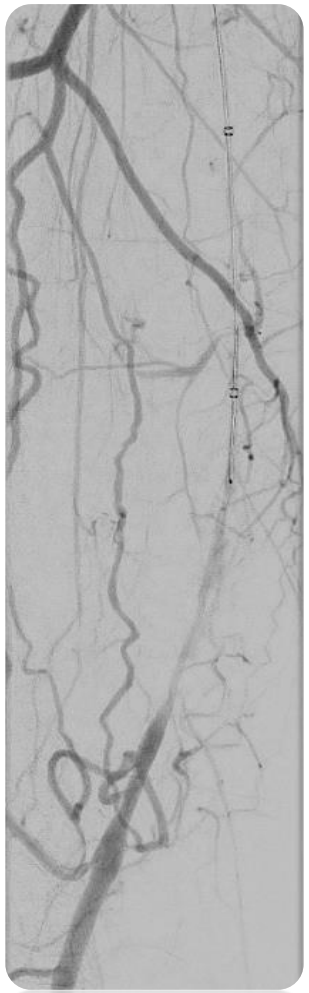
But.. we pretty much do the same..

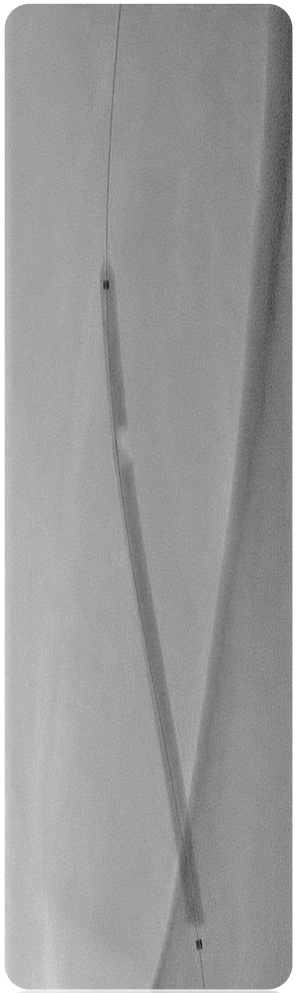
Angiogram



Recanalization



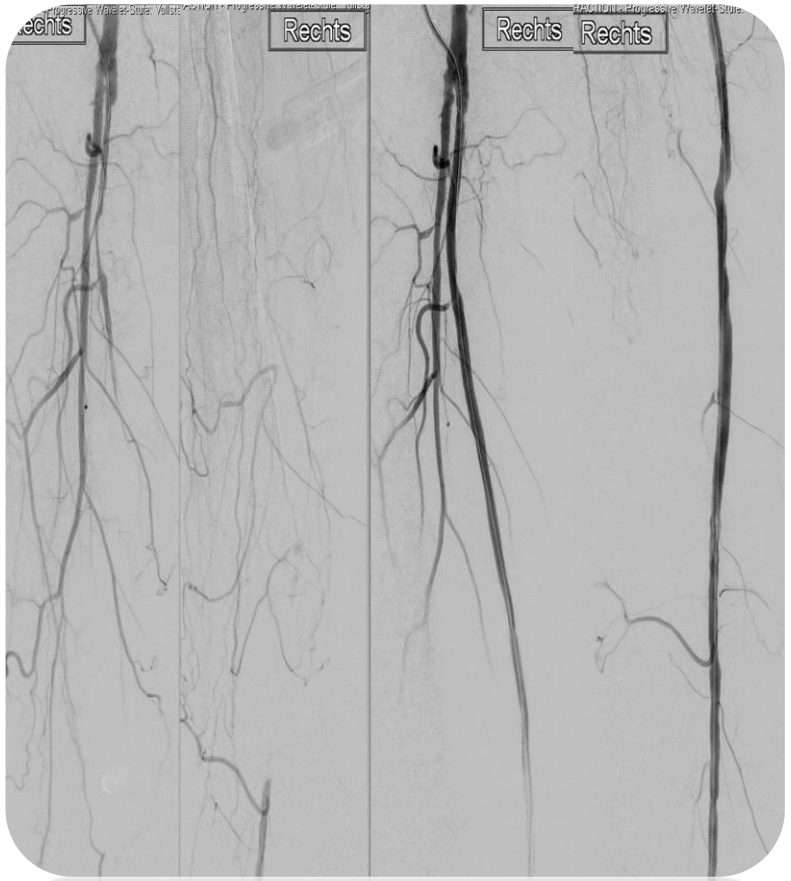
Treatment



Angiogram

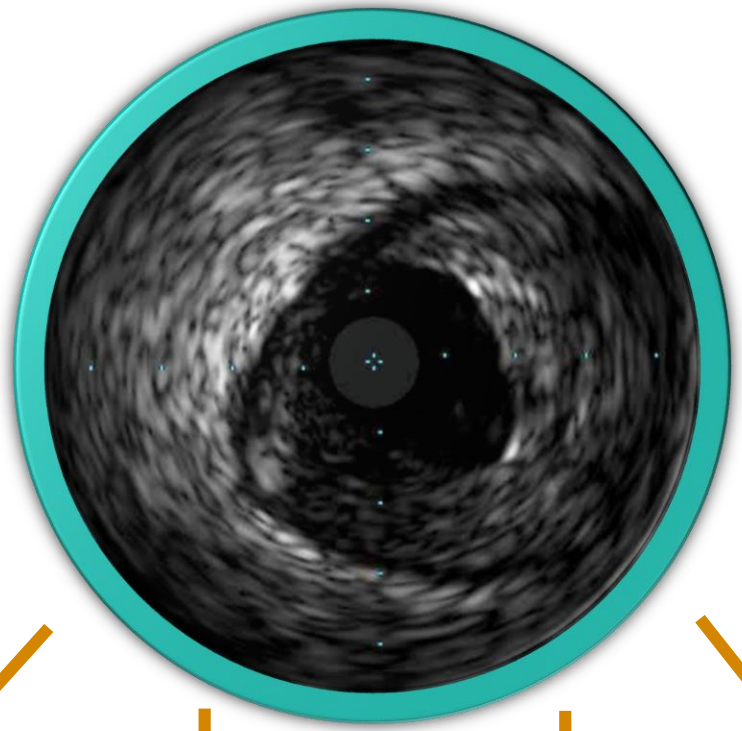
Angiography based interventions

- > 60 years experience
- Helpful in clinical decision making
- Validated QCA



- Stenosis underestimation
- Sizing/ under-sizing
- Dissections
- Subintimal Crossing
- Stent Malapposition
- Radiation exposure
- CA exposure

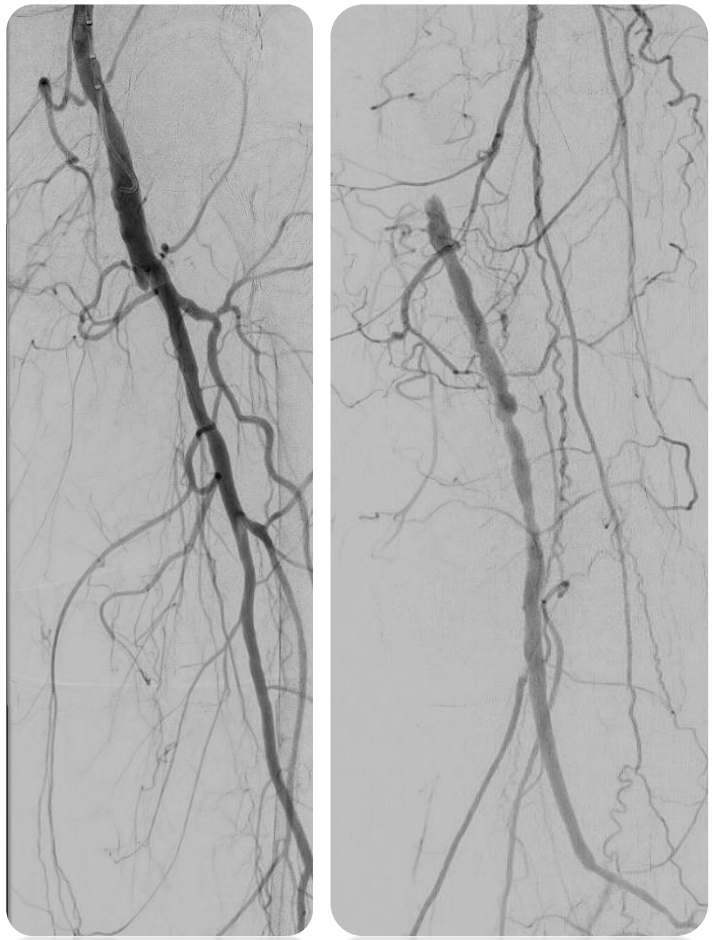
How can IVUS change my practice?



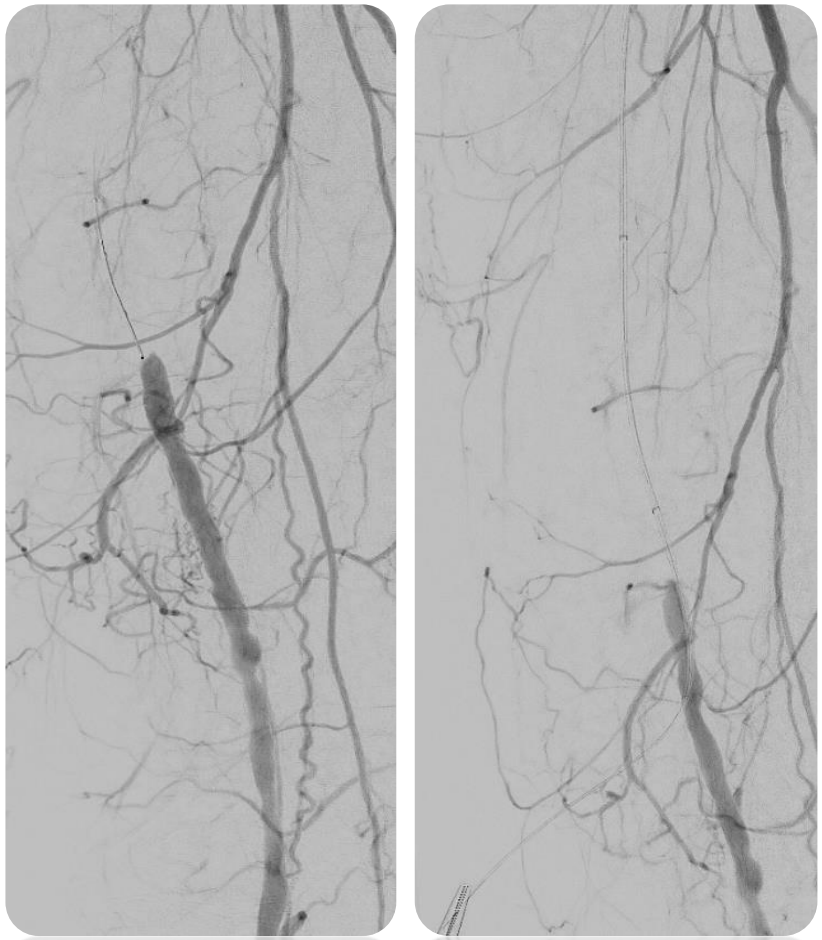
- Crossing
- Plaque Morphology
- Sizing
- Guide treatment

CTO Crossing

Diagnostic Angiogram

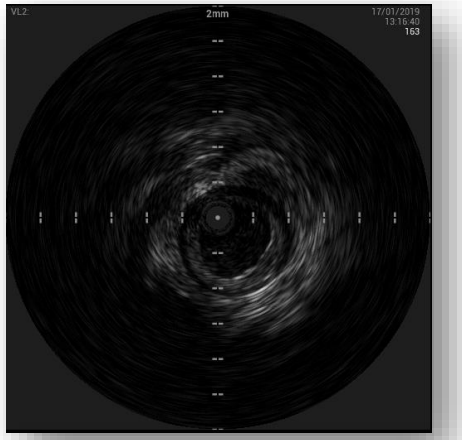


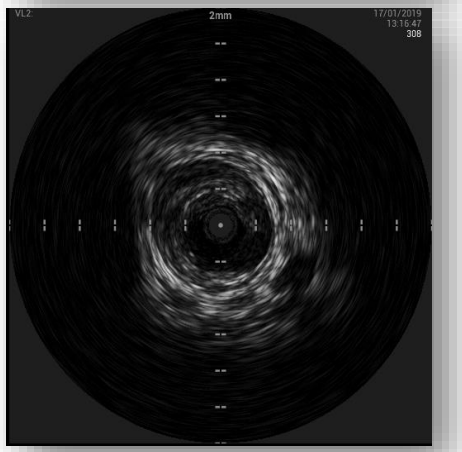
Antegrade/Retrograde Crossing

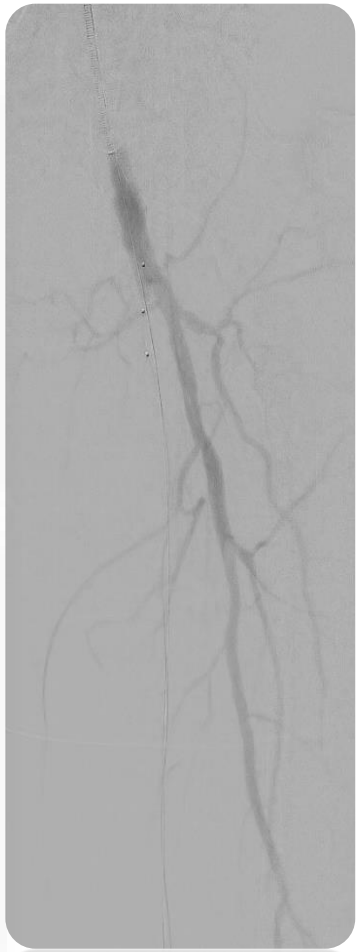


CTO Crossing: Subintimal?

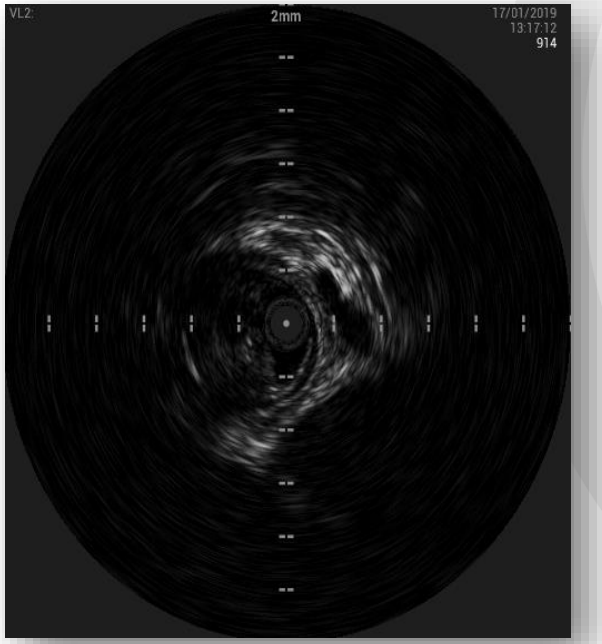
Intimal Crossing







Subintimal Crossing



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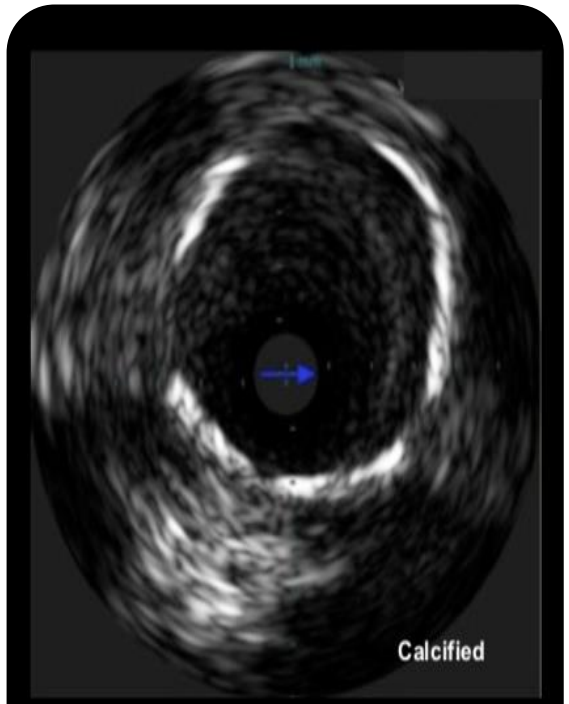
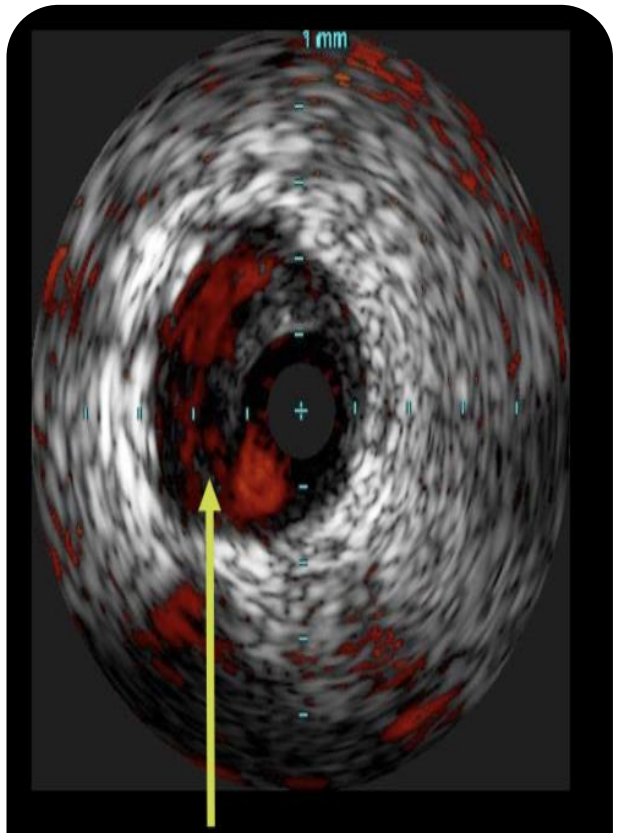
After crossing the lesion..
Understand the nature of the disease



Calcified
Highly echogenic
White with acoustic shadowing



Dissection flap with ChromaFlo

Eccentric Plaque:
Less than total circumference (not completely around) lumen/vessel

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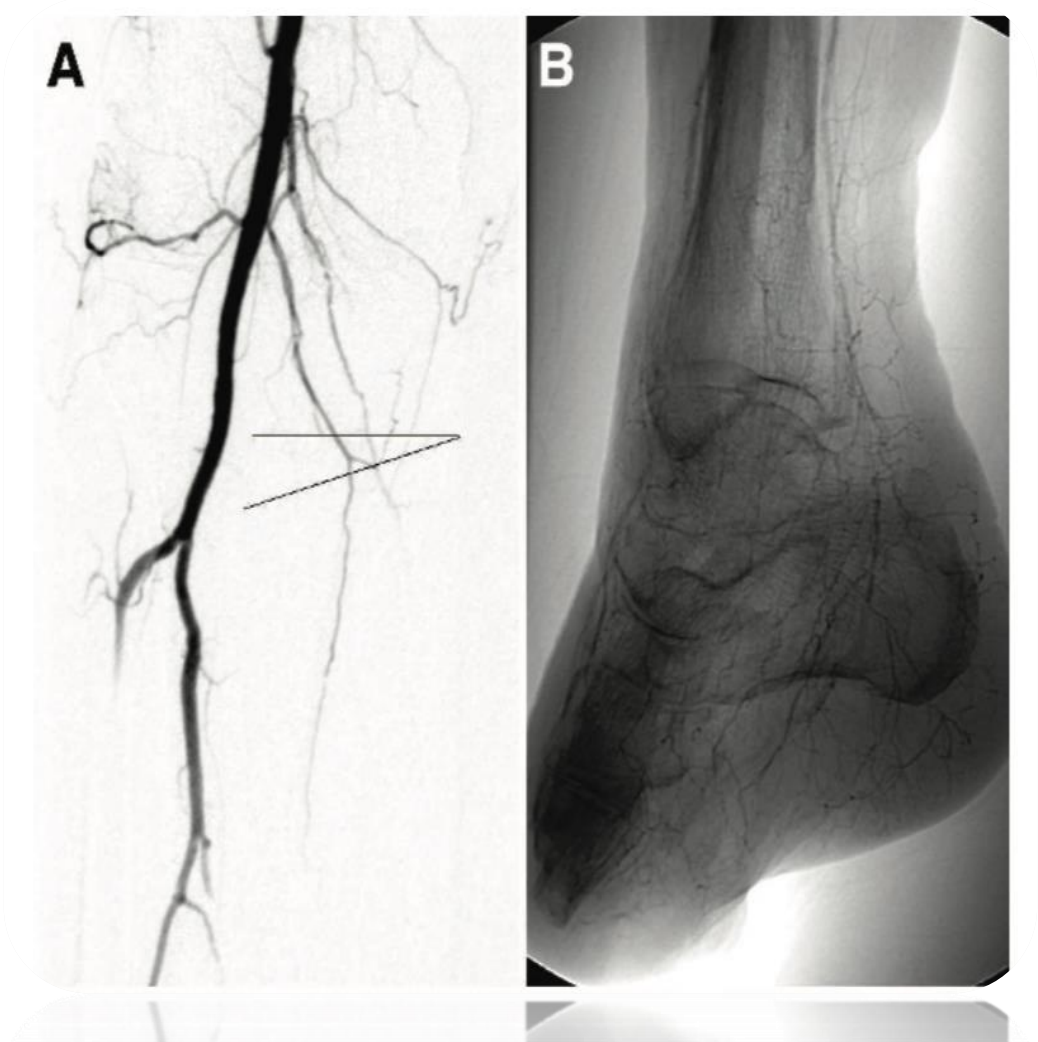
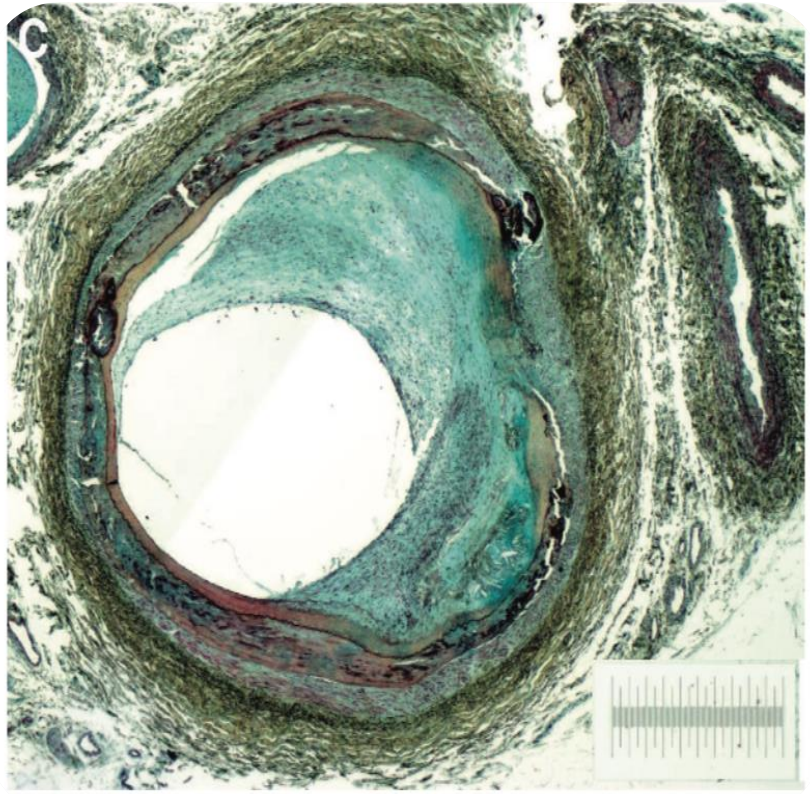
Angiography: lumen visualization

Angio: Patent vessel



Pathology: 40% Stenosis



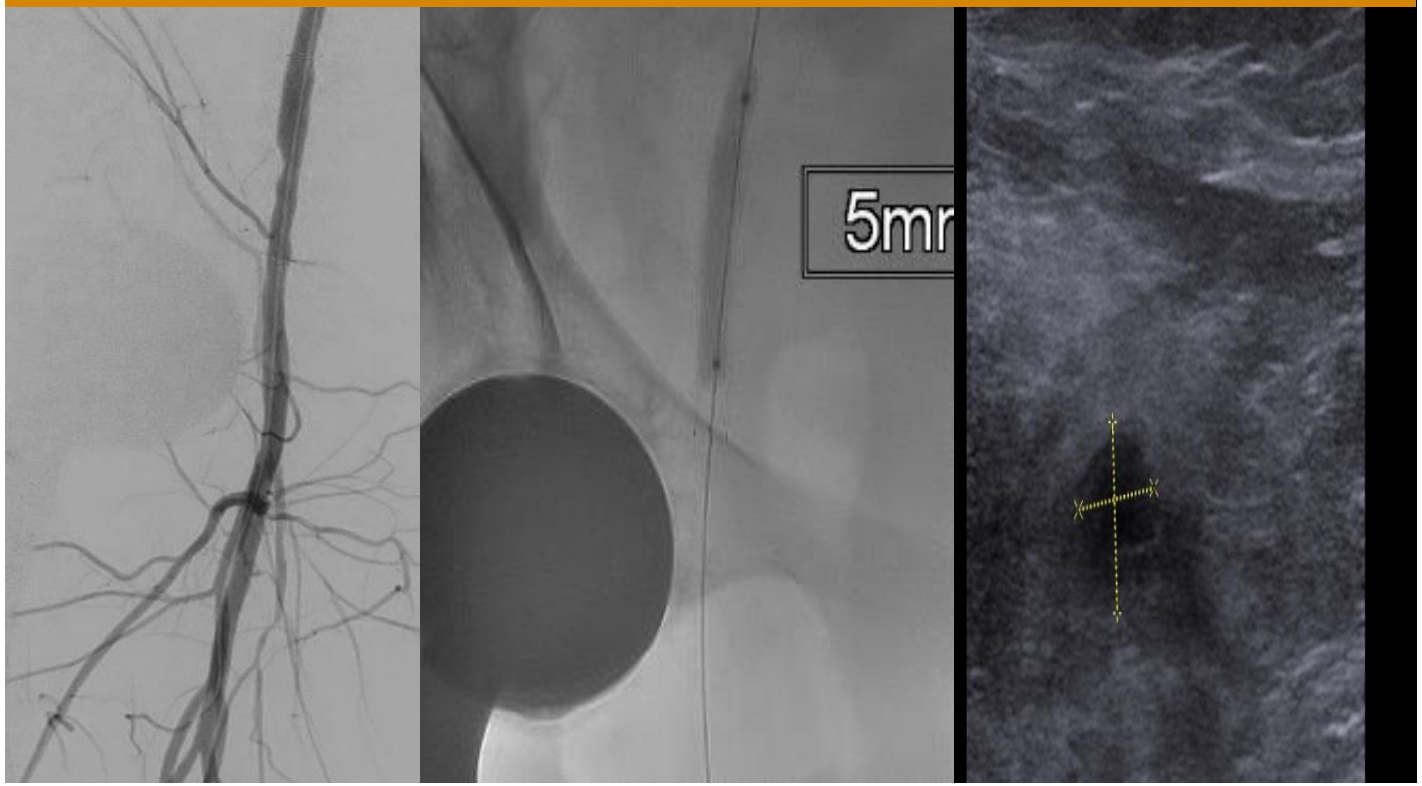
Kashyap et al, JEVT 2008;15:117–125

How reliable is angio-based sizing?

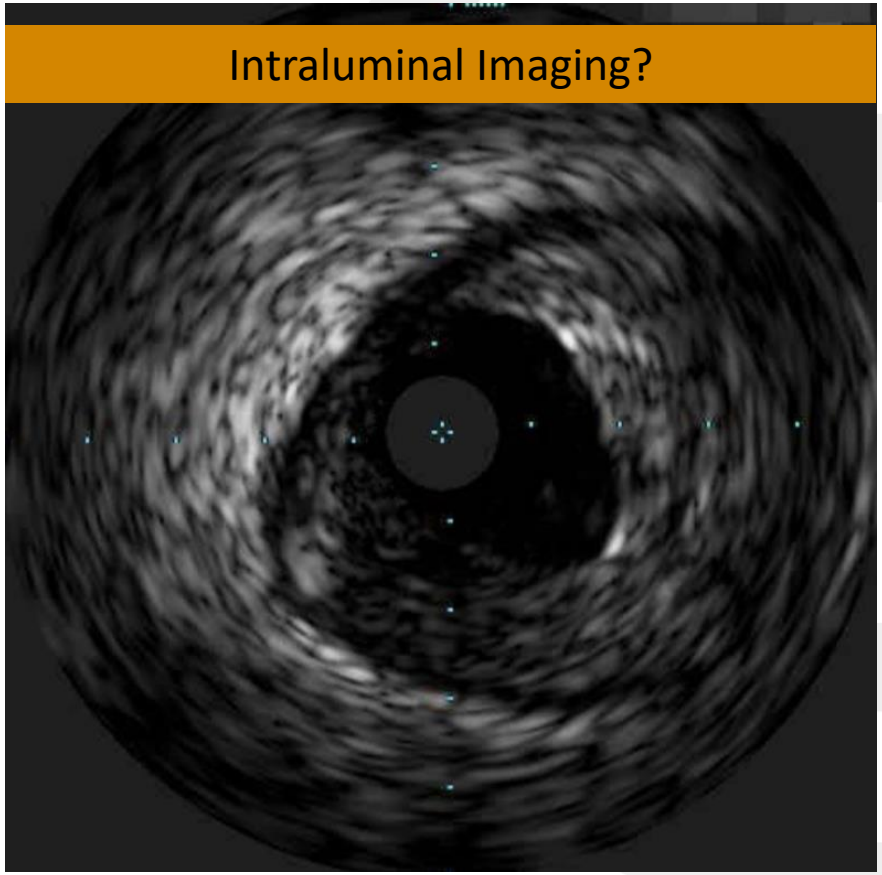
Diagnostic Angiogram | Crossing | Treatment | Final Angiogram

How reliable is angio-based sizing?

40% undersized!



Intraluminal Imaging?



The IVUS VS visual estimation project

Study Design

- Retrospective analysis
- Conventional Angio/IVUS
- 2 Blinded investigators
- 43 patients
- Symptomatic PAD (RC 3-6)
- April 2016 - February 2017

Objective

Compare predicted diameters of treated vessels utilizing angiographic imaging and compare these measurements to diameters obtained via IVUS imaging

Stavroulakis et al CX 2019

The IVUS VS visual estimation project

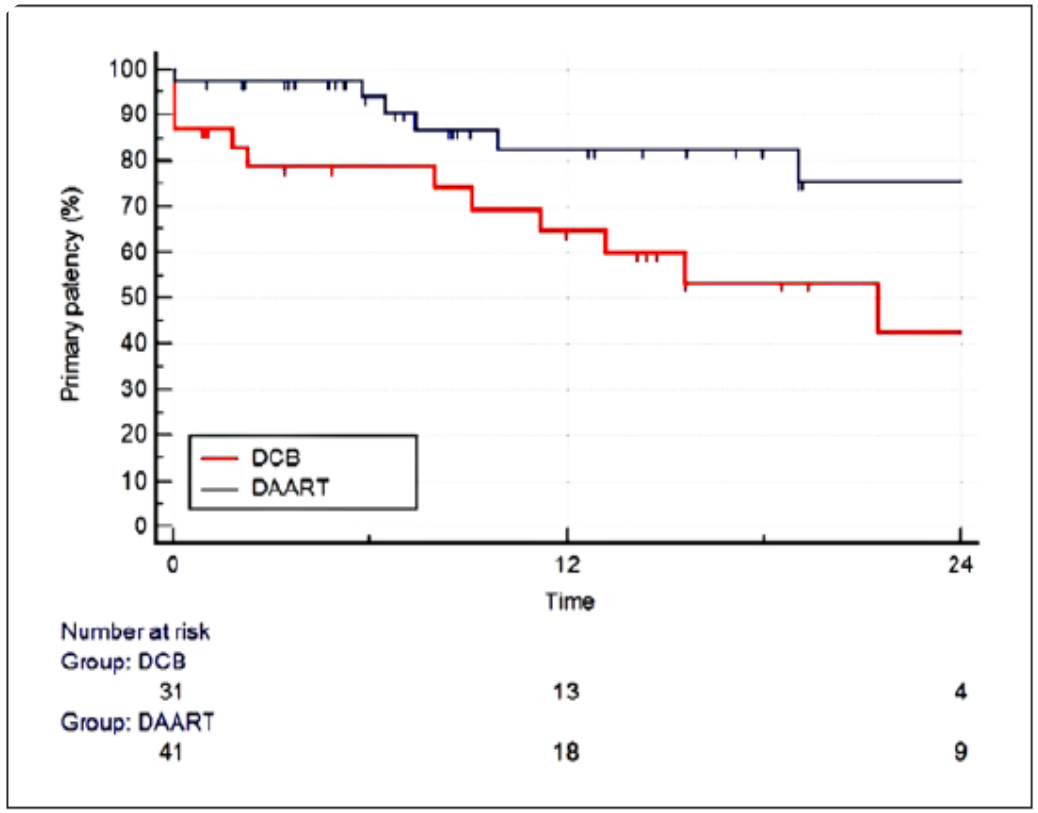
Femoropopliteal Vessels

Location	DSA (mm) (median)	IVUS (mm) (median)	P-value*
Proximal Superficial Femoral	5.5	6.1	0.0001
Mid Superficial Femoral	5.0	5.9	<0.0001
Distal Superficial Femoral	4.8	5.9	<0.0001
Proximal Popliteal (P1)	5.0	5.8	<0.0001
Mid Popliteal (P2)	4.5	5.6	<0.0001
Distal Popliteal (P3)	4.0	5.3	<0.0001

Stavroulakis et al CX 2019

Fluoroscopic guided atherectomy

Improved patency



Stavroulakis et al JEVT. 2017;24(2):181-188

Aneurysm formation

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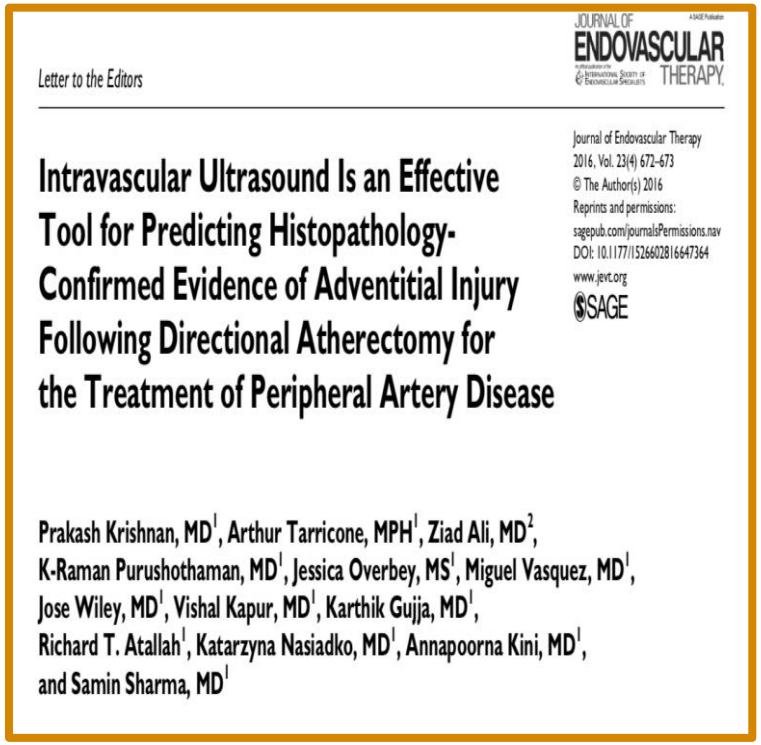
IVUS guided atherectomy



Letter to the Editors

JOURNAL OF ENDOVASCULAR THERAPY

Intravascular Ultrasound Is an Effective Tool for Predicting Histopathology-Confirmed Evidence of Adventitial Injury Following Directional Atherectomy for the Treatment of Peripheral Artery Disease

Journal of Endovascular Therapy
2016, Vol. 23(4) 672–673

DOI: 10.1177/1526602816647364
www.jevt.org
SAGE

Prakash Krishnan, MD[1], Arthur Tarricone, MPH[1], Ziad Ali, MD[2], K-Raman Purushothaman, MD[1], Jessica Overbey, MS[1], Miguel Vasquez, MD[1], Jose Wiley, MD[1], Vishal Kapur, MD[1], Karthik Gujja, MD[1], Richard T. Atallah[1], Katarzyna Nasiadko, MD[1], Annapoorna Kini, MD[1], and Samin Sharma, MD[1]

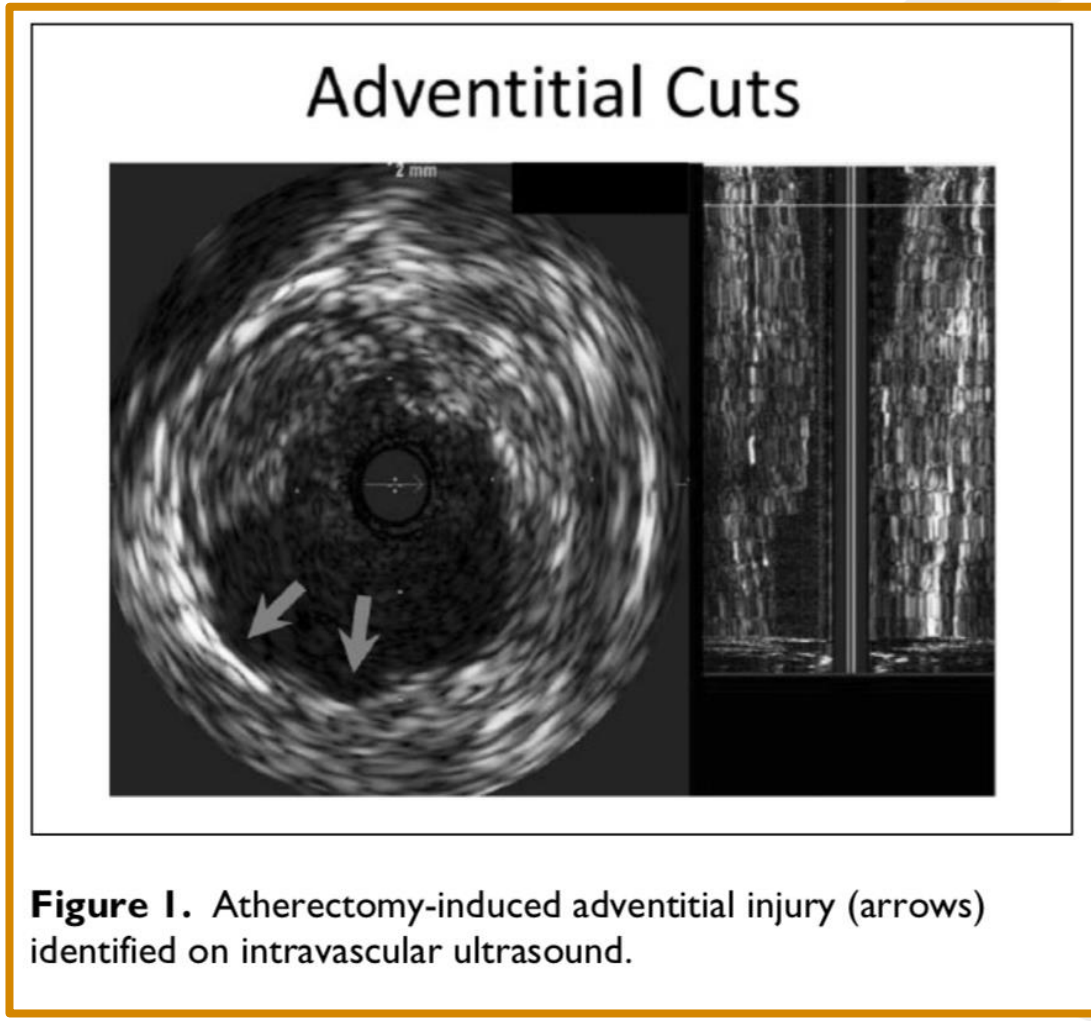


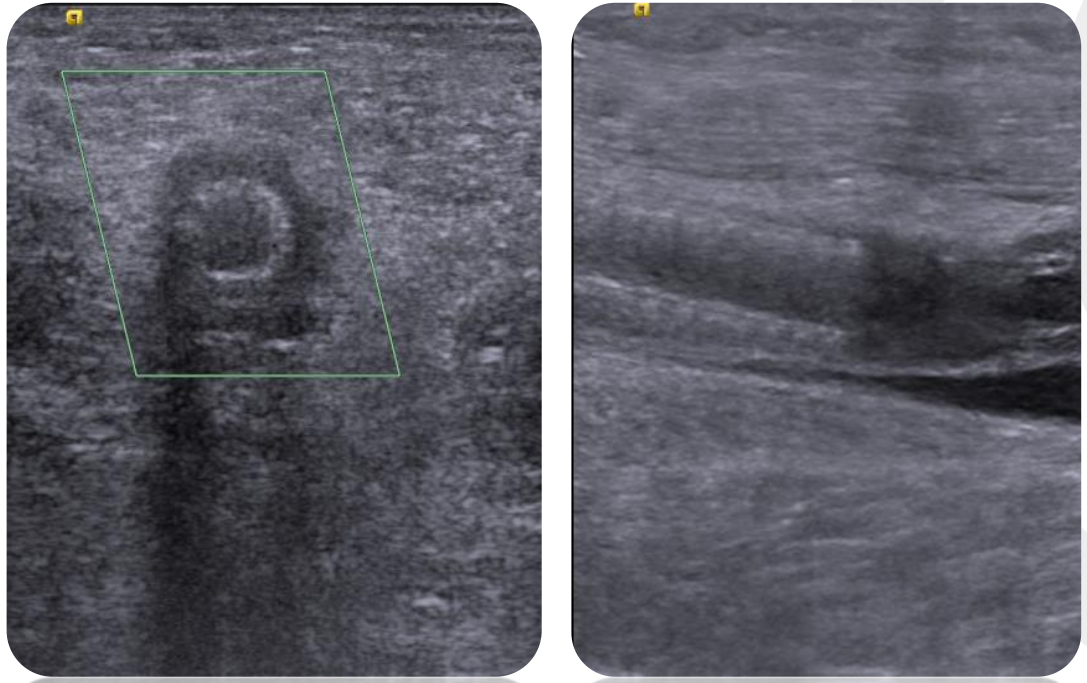
Figure 1. Atherectomy-induced adventitial injury (arrows) identified on intravascular ultrasound.

Krishnan et al JEVT, 2016 Aug;23(4):672-3.

Late incomplete stent apposition- Angiogram

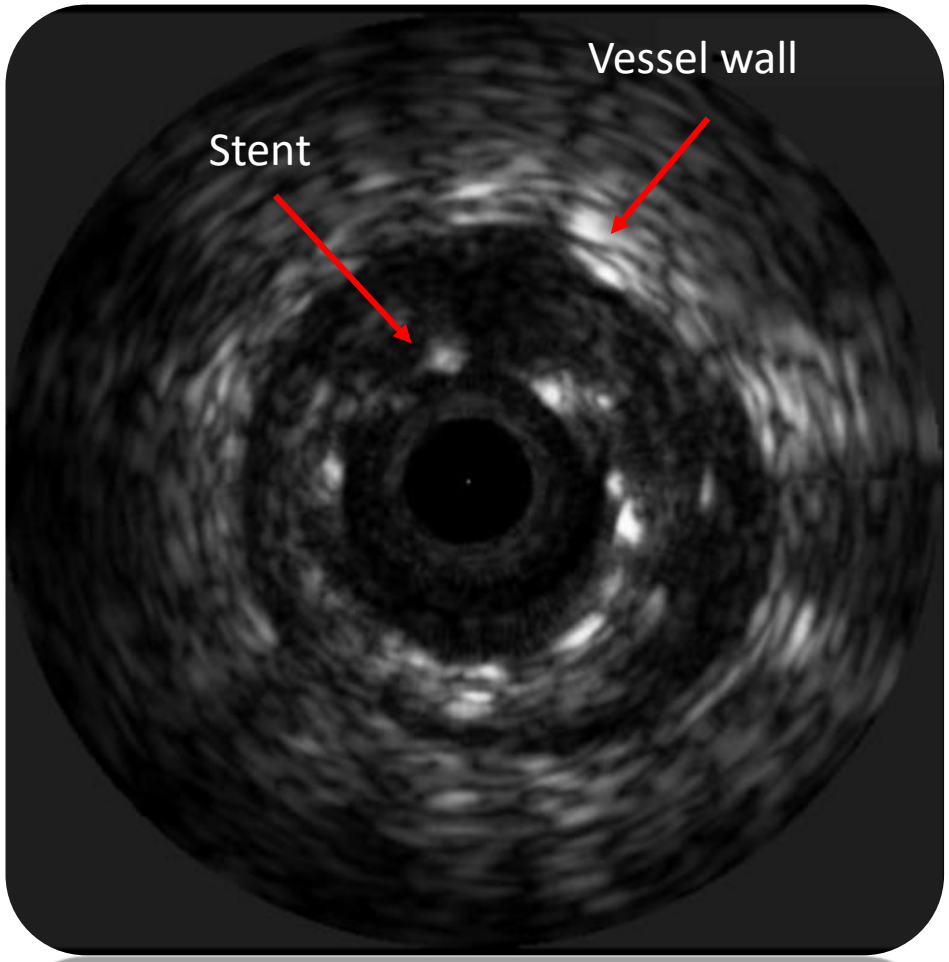
DES FU Angiogram

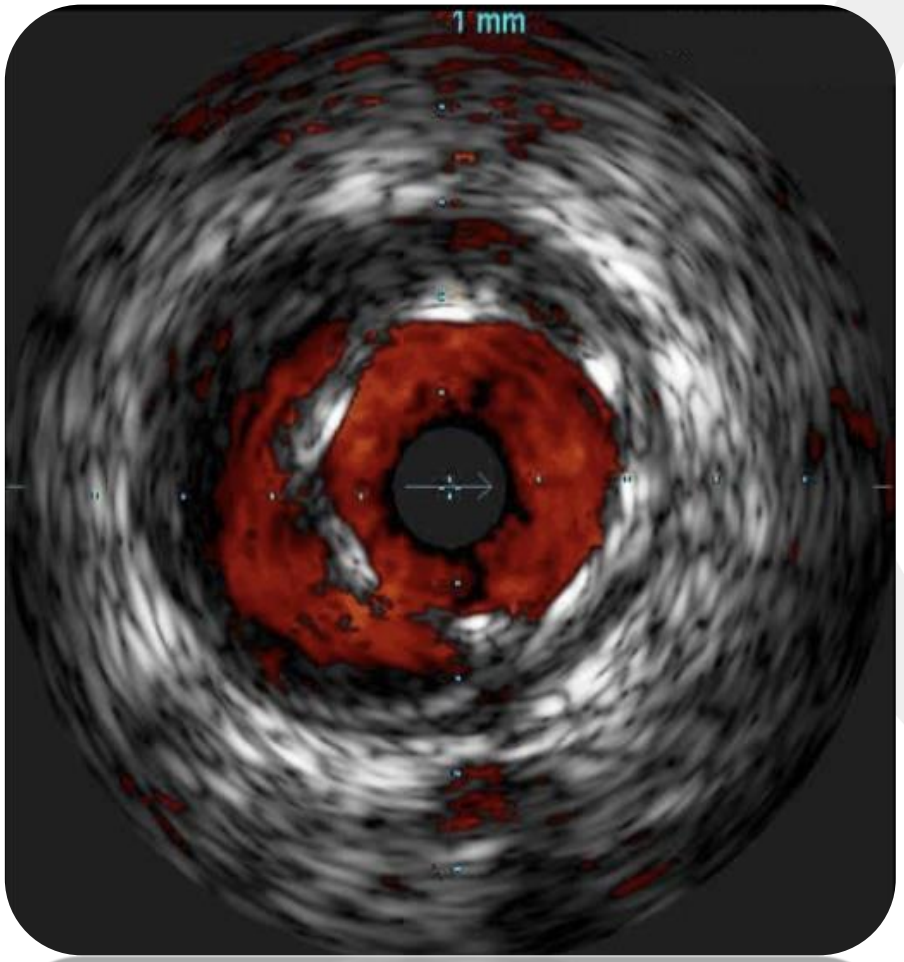
DES FU DUS



Bisdas et al JACC Int 2018;11:957–66

Late incomplete stent apposition- IVUS





IVUS guided therapy long term results

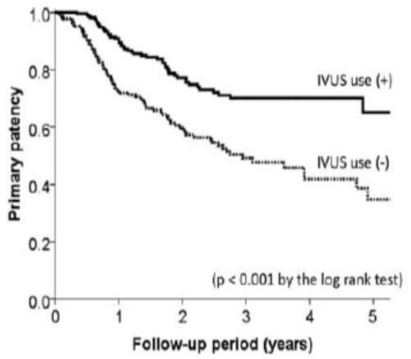
Efficacy of Intravascular Ultrasound in Femoropopliteal Stenting for Peripheral Artery Disease With TASC II Class A to C Lesions

Compared primary patency rates of IVUS vs. non-IVUS guided procedures in 234 propensity score matched pairs.

- 35.5% of procedures were TASC II Class C Patients.
- Higher 5-year primary patency with IVUS than without (65%±6% vs. 35%±6%, p<0.001).

Significantly better

- Assisted primary patency (p<0.001)
- Freedom from any adverse limb event (p<0.001),
- Event-free survival (p<0.001).



		0 yr	1 yr	2 yr	3 yr	4 yr	5 yr
IVUS use(-)	No. at risk	234	126	74	37	20	9
	Rate±SE	100±0%	72±3%	60±4%	49±4%	42±5%	35±6%
IVUS use(+)	No. at risk	234	173	96	58	34	13
	Rate±SE	100±0%	90±2%	77±3%	70±4%	70±4%	65±6%

IVUS use was associated with a significantly higher primary patency rate than no IVUS use in TASC II class A-C femoropopliteal lesions (p<0.001 by log-rank test).

Iida O, et. al. Efficacy of Intravascular Ultrasound in Femoropopliteal Stenting for Peripheral Artery Disease With TASC II Class A to C Lesions. J Endovasc Ther. 2014 Aug;21(4):485-92.

IVUS guided therapy long term results

Therapeutic Advances in Cardiovascular Disease

Intravascular ultrasound guided directional atherectomy *versus* directional atherectomy guided by angiography for the treatment of femoropopliteal in-stent restenosis

Prakash Krishnan, Arthur Tarricone, Purushothaman K-Raman, Farhan Majeed, Vishal Kapur, Karthik Gujja, Jose Wiley, Miguel Vasquez, Rheoneil A. Lascano, Katherine G. Quiles, Tashanne Distin, Ran Fontenelle, Farah Atallah-Lajam, Annapoorna Kini and Samin Sharma

Abstract

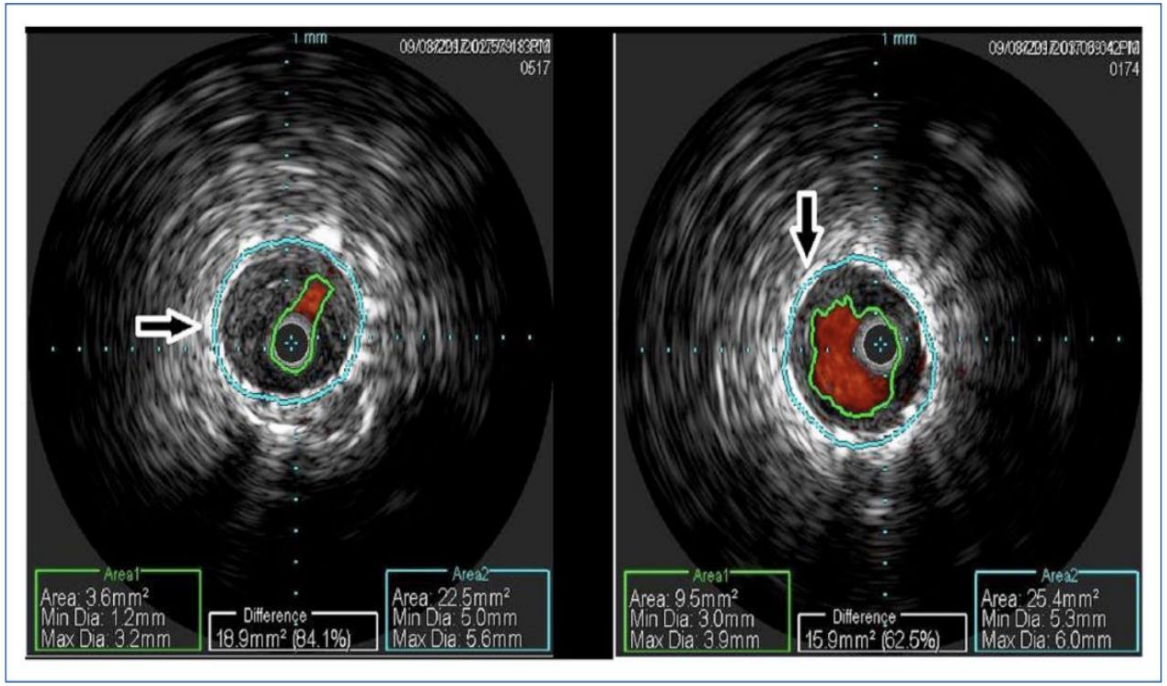
Background: The aim of this study was to compare 1-year outcomes for patients with femoropopliteal in-stent restenosis using directional atherectomy guided by intravascular ultrasound (IVUS) *versus* directional atherectomy guided by angiography.

Methods and results: This was a retrospective analysis for patients with femoropopliteal in-stent restenosis treated with IVUS-guided directional atherectomy *versus* directional atherectomy guided by angiography from a single center between March 2012 and February 2016. Clinically driven target lesion revascularization was the primary endpoint and was evaluated through medical chart review as well as phone call follow up.

Conclusions: Directional atherectomy guided by IVUS reduces clinically driven target lesion revascularization for patients with femoropopliteal in-stent restenosis.

Keywords: atherectomy, intravascular ultrasound, in-stent restenosis

Received: 6 June 2017; revised manuscript accepted: 20 October 2017



	Directional Atherectomy + IVUS	Directional Atherectomy Alone	*p*-value
CD-TLR	8	34	.03

BMI, body mass index; CAD, coronary artery disease; CD-TLR, clinically driven target lesion revascularization; CTO, chronic total occlusion; DA, directional atherectomy; DM, diabetes mellitus; HDL, high density lipoprotein; ISR, in-stent restenosis; IVUS, intravascular ultrasound; LDL, low density lipoprotein; PTA, percutaneous transluminal angioplasty

Krishnan et, Ther Adv Cardiovasc Dis 2018;12(1):17-22

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Conclusions

Continuous development of endovascular modalities

Still angiogram-based therapy

IVUS can be a valuable tool in order to:

- Assess plaque/lesion morphology
- Guide and control the selected treatment option
- Improve the acute and long term results

A vessel is a complex structure