

The Endovascular Approach to the Patient with Lower Extremity PAD (Claudication and CLTI)

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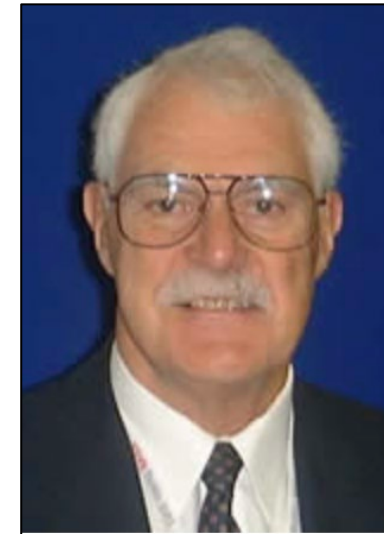
Formal Classification Systems of PAD

Table I. Classification schemes of peripheral arterial disease

<i>Classification</i>	<i>Stage</i>	<i>Clinical description</i>
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	IIa	Mild claudication
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About Robert Rutherford

1931-2013



Varu J Vasc Surg 2010;51:230-41.

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Goal



Avoid



Prior Revascularization is a Risk Factor for Adverse Limb Events

COMPASS

EUCLID

FIGURE 1 Rates of Major Adverse Limb Events by History of Symptoms and Revascularization

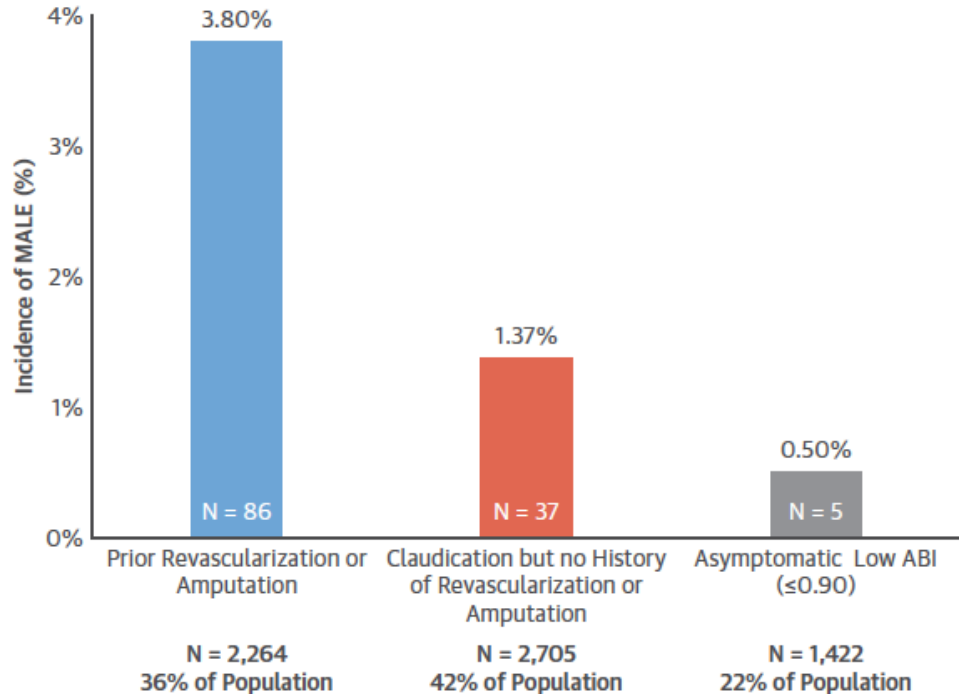


Table 3. Baseline Factors Associated With ALI Hospitalization Among the Overall Study Population (Table view)

	HR (95% CI)	P Value
Age, per 10 y	0.8 (0.7, 1.0)	0.02
BMI, per unit increase, kg/m ²	1.0 (0.7–1.0)	0.03
Region (South America as the reference)		0.03
Asia	1.1 (0.5–2.1)	0.88
Europe	1.8 (1.0–3.2)	0.04
North America	1.7 (0.9–3.0)	0.09
Previous lower extremity revascularization	4.7 (3.3–6.8)	<.01
Previous atrial fibrillation	1.8 (1.1, 3.2)	0.03
Baseline ABI		<.01
Per 0.1 ABI decrease in patients with baseline ABI ≤0.60	1.3 (1.1–1.5)	<.01
Per 0.1 ABI decrease in patients with baseline ABI >0.60	1.1 (1.0–1.2)	0.16
Baseline statin use	0.7 (0.5–0.9)	<.01
Baseline angiotensin receptor blocker use	0.7 (0.5–1.0)	0.05
Randomized treatment: ticagrelor (clopidogrel as reference)	1.0 (0.8–1.3)	0.91

Claudication versus CLTI

Claudication

Low risk of limb loss
More favorable survival
Higher functional status
Fewer comorbidities

Treatment goals:

- ***Improve Walking performance***
- ***2ary prevention***

CLTI

High risk of limb loss
Higher mortality
Lower functional status
More comorbidities

Treatment goals:

- ***Limb salvage***
- ***2ary prevention***

Claudication versus CLTI

It is important to understand different PAD subgroups and their indications for potential revascularization.

Claudication versus CLTI

It is important to consider different patient subgroups and their indications for potential revascularization.

It is also important to consider different anatomic subsets!

Rationale for Revascularizing 'Inflow': Better Patency

Table IV. Primary and secondary patency rates

First author	Year	1 year		2 year	
		PP (%)	SP (%)	PP (%)	SP (%)
Nyman	2000	97	100 ^a		
Scheinert	2001	84	88	81	88
Ali	2003			84	95 ^b
Greiner	2003		91 ^a		65 ^a
Rzucidlo	2003	70	88		
Domanin	2005	70	88		
Lagana	2006	89	100		
Ballzer	2006				
De Roeck	2006	94	100	89	94
Park	2007	C 94 D 93	C 97 D 94		
Piffaretti	2007	92		86	
Bjorses	2008	97	100	88	97
Chang	2008				
Gandini	2008	95	97	93	96
Hans	2008				
Sixt	2008	C 86 D 85	C 98 D 98		
Sharafuddin	2008				
Kashyap	2008	90	97	82	97
Moise	2009	85	100		

Meta-analysis of 1711 patients who underwent aorto-iliac intervention across 19 studies

2016 ACC / AHA Lower Extremity PAD Guidelines

COR	LOE	RECOMMENDATIONS
I	A	Endovascular procedures are effective as a revascularization option for patients with lifestyle-limiting claudication and hemodynamically significant aortoiliac occlusive disease (12,37,38,232,240,242,246).

Jongkind et al. *JVS* 2010;52:1376-83; Gerhard-Herman et al. *JACC* Vol. 69, No. 11, 2017

Rationale for Revascularizing 'Inflow': Better Patency

Revascularizing 'inflow' (aorto-iliac segments) percutaneously makes sense for patients with claudication (after exercise / cilostazol) and for CLTI given relatively good patency data

Tab

First

Nym

Schei

Ali

Greir

Rzuc

Dom

Laga

Ballz

De R

Park

Piffar

Bjors

Chan

Ganc

Hans

Sixt

Shara

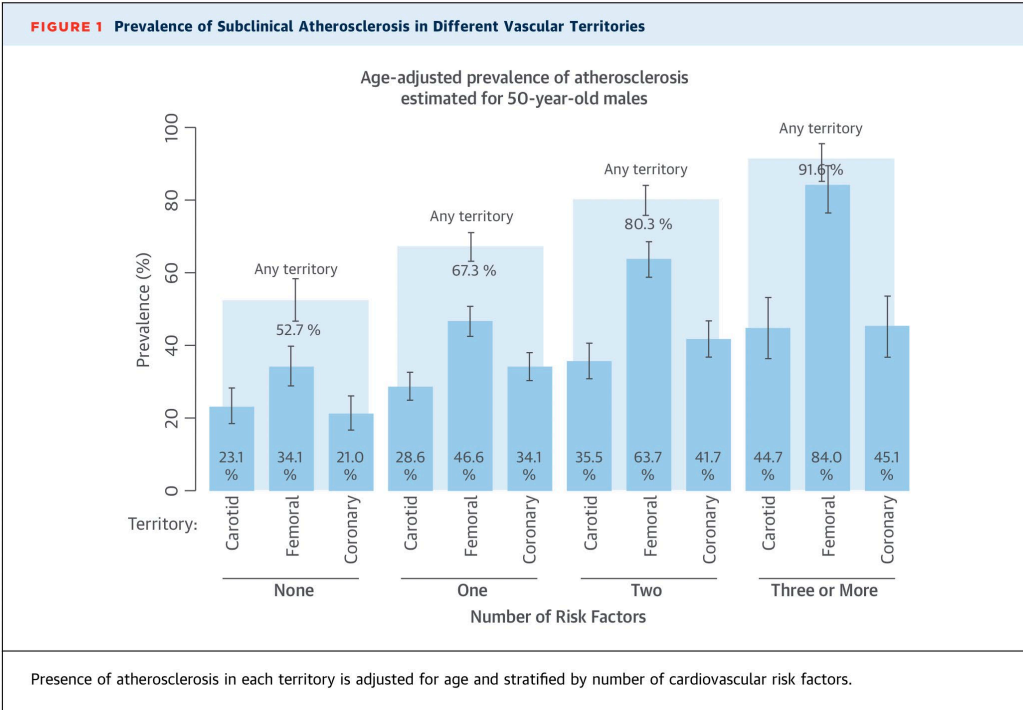
Kash

Mois

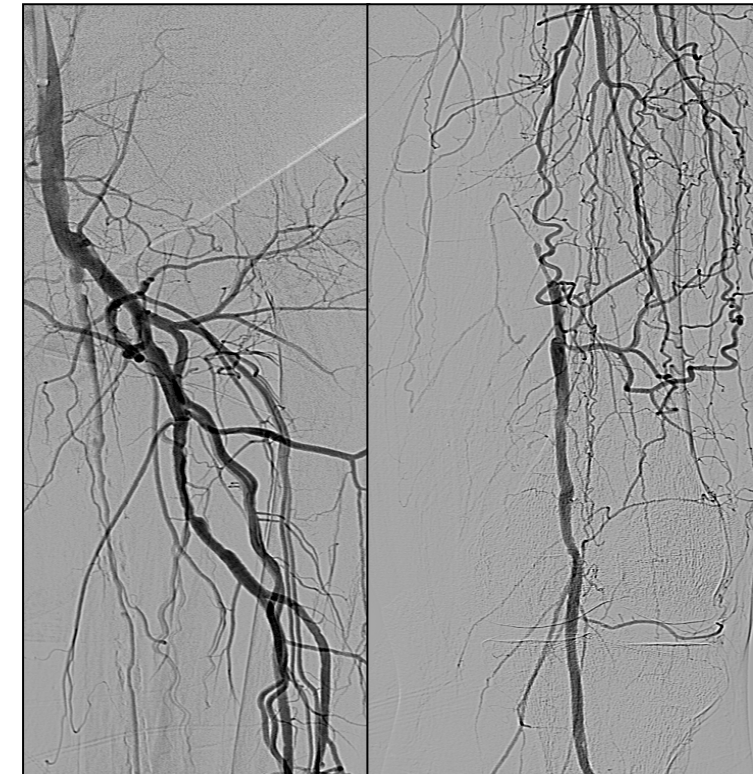
ing claudication

Jongkind et al. JVS 2010;52:1376-83; Gerhard-Herman et al. JACC Vol. 69, No. 11, 2017

Superficial Femoral Artery



Long SFA occlusions is common anatomic pattern and the bane of endovascular intervention for claudication



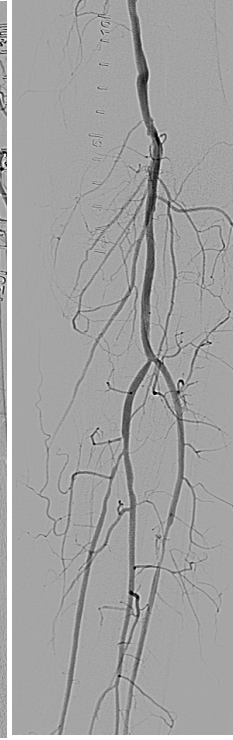
Middle-aged men (n = 1,423) in Aragon Workers' Health Study underwent carotid and femoral ultrasound + noncontrast coronary computed tomography.

Laclaustra et al. JACC Vol 67 No. 11 2016

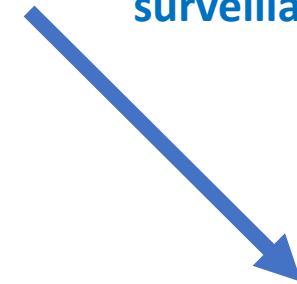
Case: Revascularization for Walking Performance: *After offering structured walking and cilostazol*



Orbital atherectomy
Drug-coated balloon angioplasty

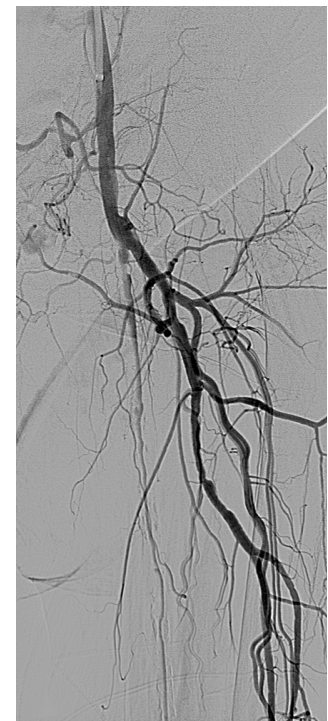


**Followup, medical
management, and
surveillance**

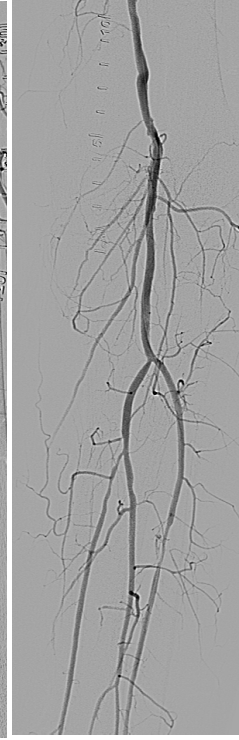


**Low-dose FXa inh / asa
Risk factors**

Case: Revascularization for Walking Performance: *After offering structured walking and cilostazol*



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Drug-coated balloon angioplasty



**Followup, medical
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surveillance**

**Low-dose FXa inh / asa
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Claudication versus CLTI: Anatomy

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Diagrammatic annotations:

- A bracket groups Rutherford stages 1, 2, and 3, with an arrow pointing to the text **Above-knee disease**.
- A bracket groups Rutherford stages 4, 5, and 6, with an arrow pointing to the text **Below-knee disease**.

Most CLTI patients have below-knee disease

450 consecutive patients with CLI undergoing infrainguinal angiography at 2 academic institutions

Anatomy retrospectively characterized

91% popliteal or tibioperoneal occlusion

<i>Arteries</i>	<i>Total, No. (%)</i>
A-I + Fem + Pop-Tib	20 (5)
A-I + Fem	4 (1)
A-I + Pop-Tib	8 (2)
A-I	15 (3)
Fem	18 (4)
Fem + Pop-Tib	131 (30)
Pop-Tib	234 (54)
Total	450

Table IV. Distribution of occlusions in arterial groups in patients with critical limb ischemia

Carlos A. Rueda, MD,^{a,b} Mark R. Nehler, MD,^{a,b} Darryl J. Perry, BS,^b Robert B. McLafferty, MD,^c Ivan P. Casserly, MB, Bch,^a William R. Hiatt, MD,^{a,b} and Brian D. Peyton, MD,^a *Denver, Colo; and Springfield, Ill*

J Vasc Surg 2008;47:995-1000

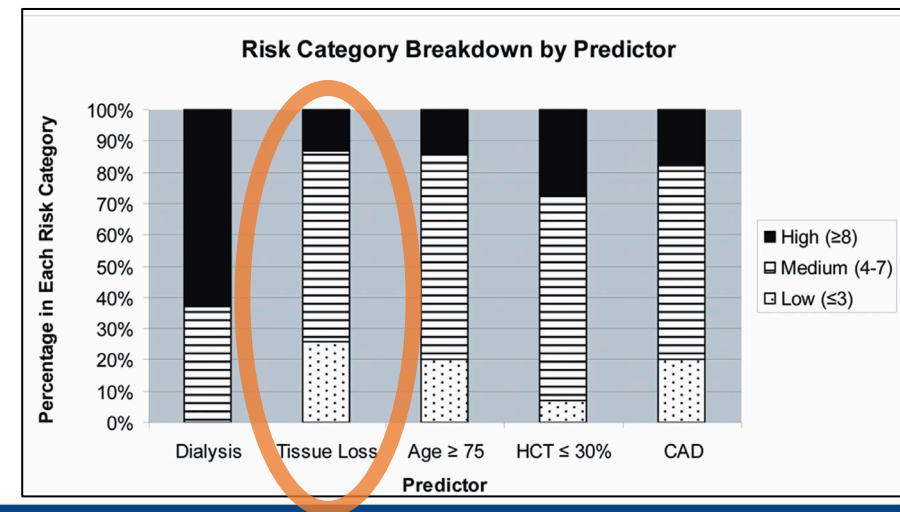
Treatment Goals Vary Across CLTI Categories

Rutherford 4 (rest pain)

- Less risk of amputation
- Patency important for long-term clinical result
- May require less extensive revascularization for clinical success

Rutherford 5-6 (tissue loss, gangrene)

- Higher risk of amputation
- Patency important for wound healing
- May require more extensive revascularization



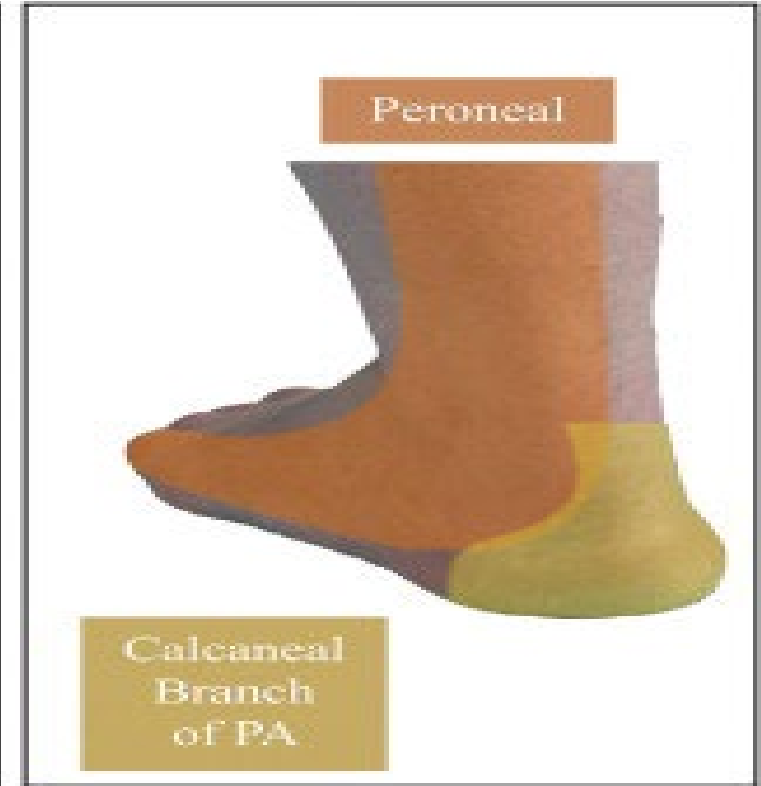
Angiosomes Below the Knee



ATA Angiosome

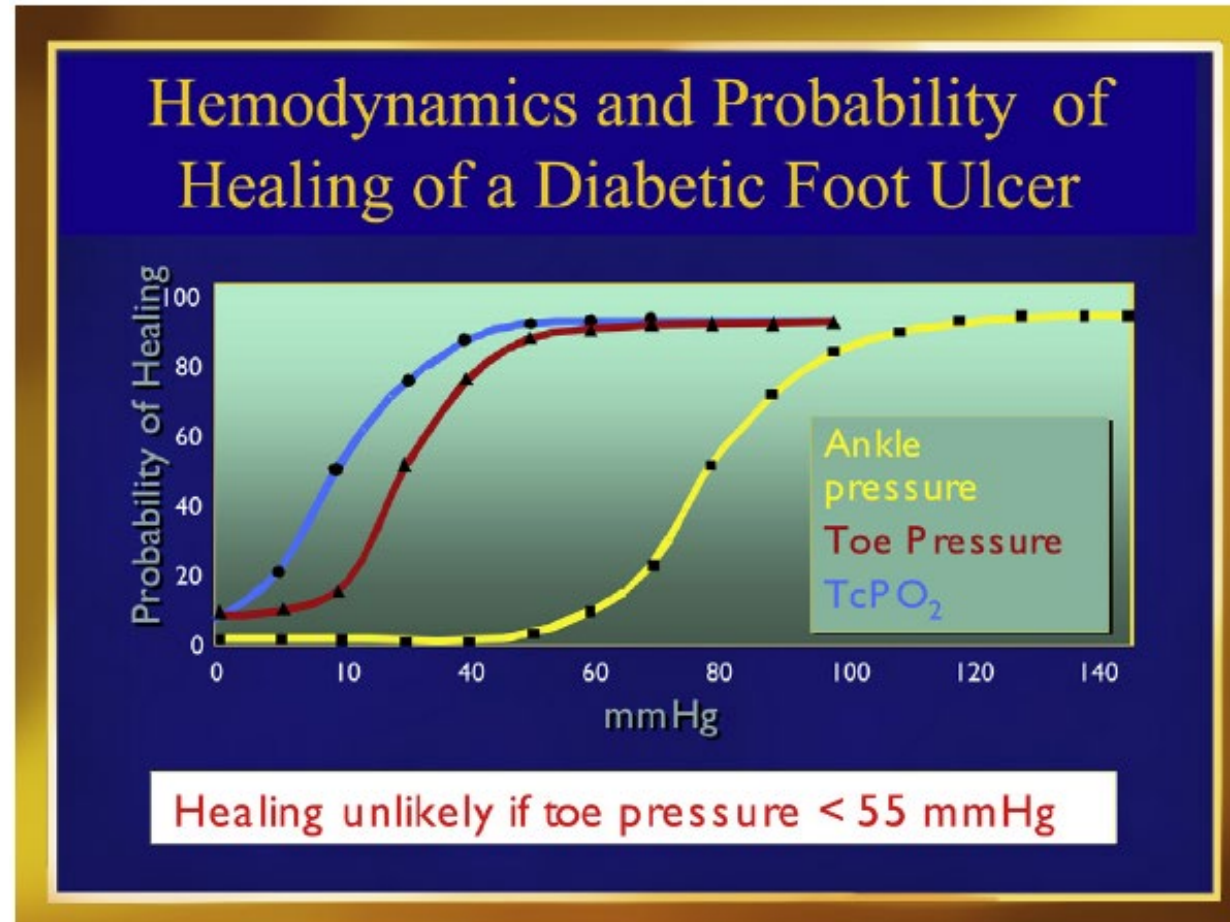


PTA Angiosome



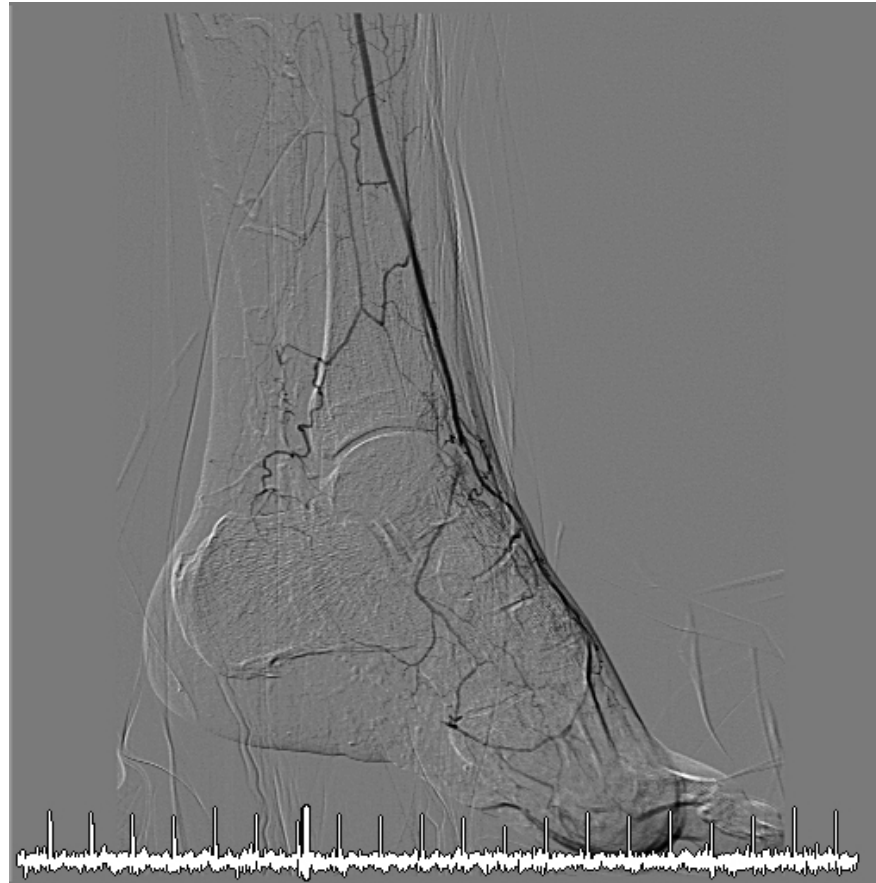
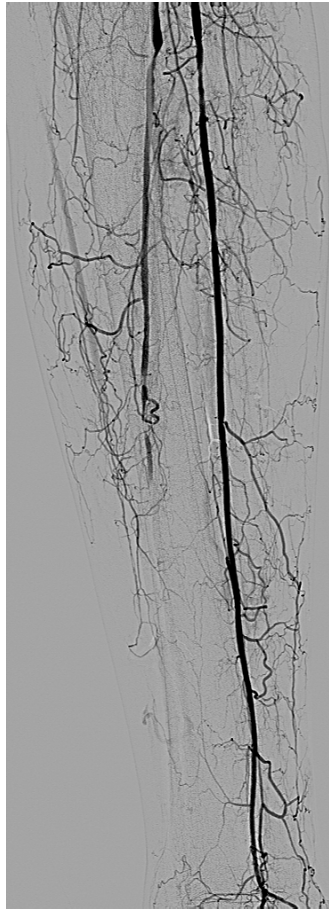
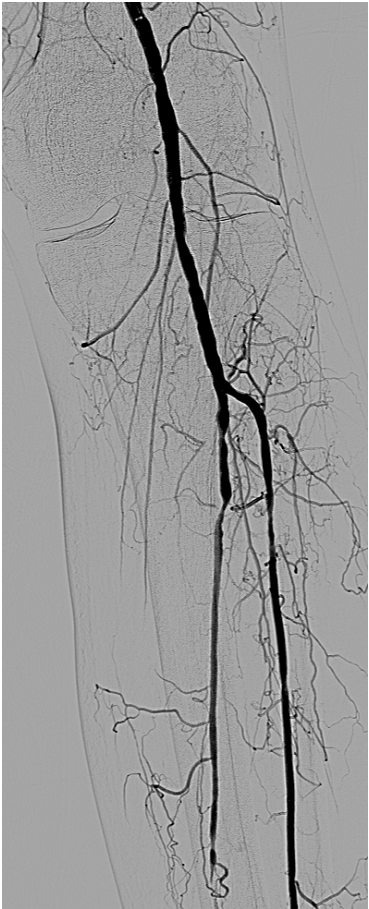
PA Angiosome

Wound Healing is Probability Spectrum



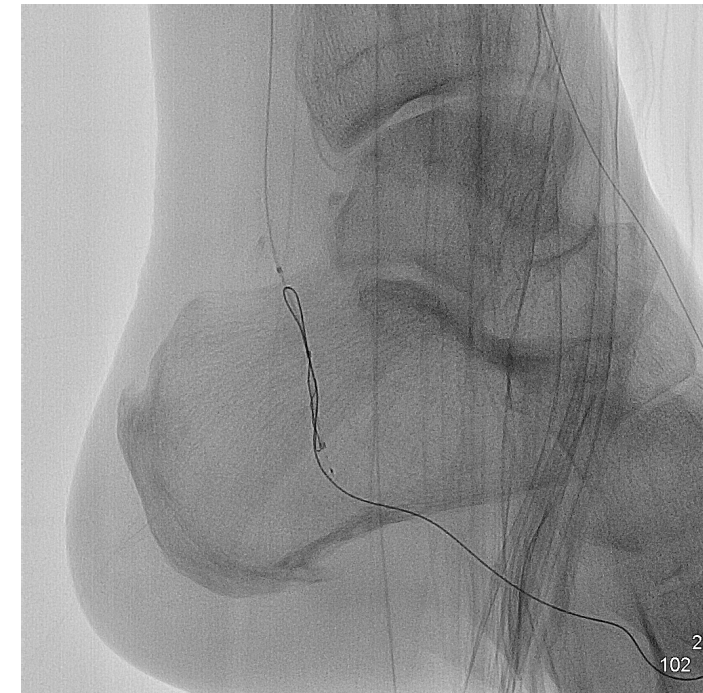
Mills et al (J Vasc Surg 2014;59:220-34.

CLTI Case: Initial Angiogram

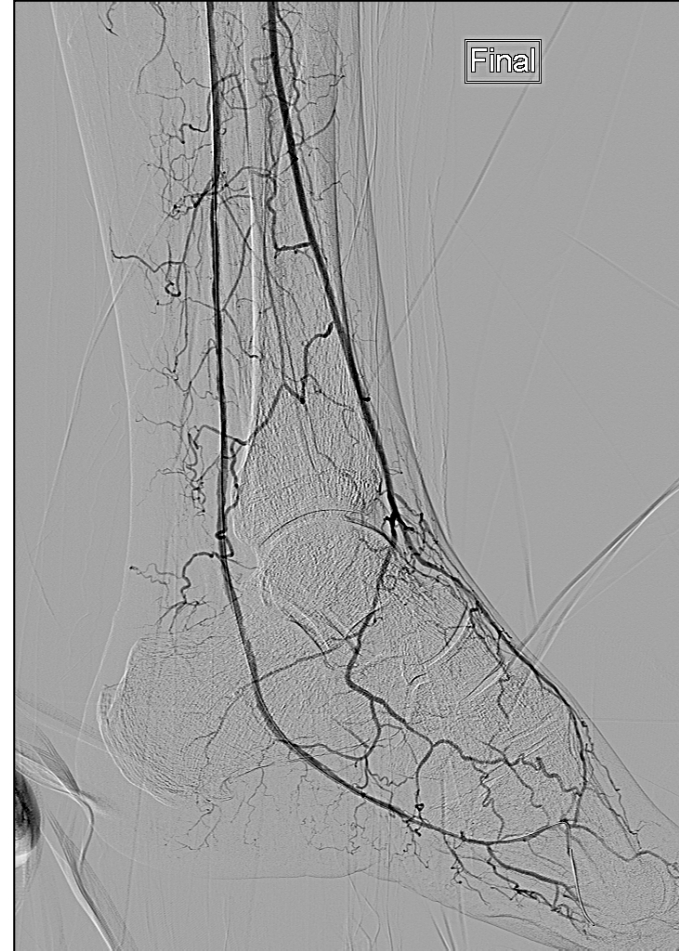
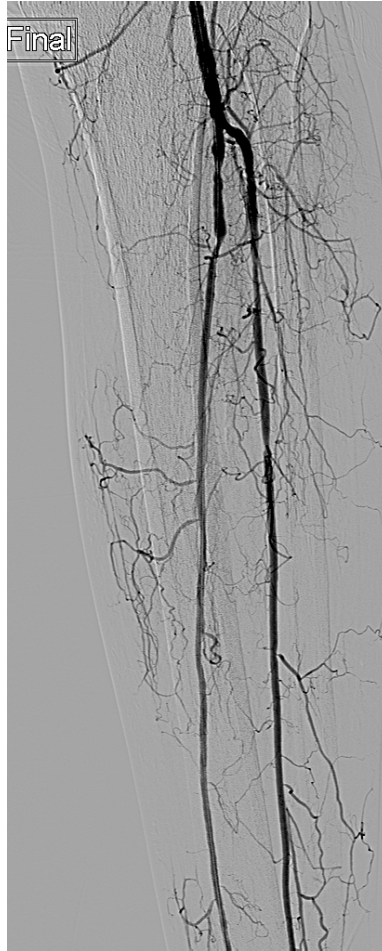


71 year-old male with
non-healing lateral
forefoot wound
(*lateral plantar
angiosome*)

Crossing Posterior Tibial



Final Angiography



Orbital atherectomy

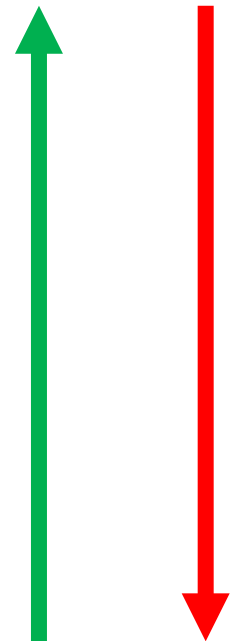
IVUS-guided nitinol-caged
balloon angioplasty

Treatment by Category of PAD

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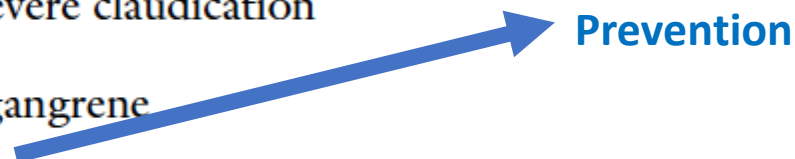
Goal Avoid



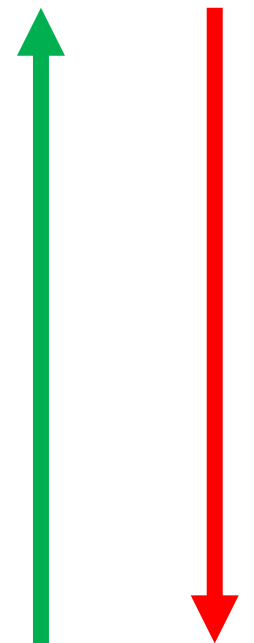
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Goal **Avoid**



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Goal **Avoid**

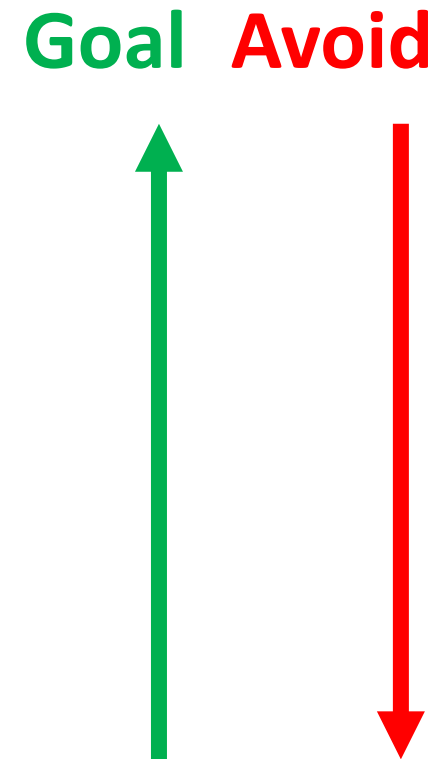


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- *Prevention*
 - *Limb salvage*
 - *Revascularization balancing patency for rest pain and extent for tissue loss*



Thank you!


Case: Treated 'Inflow' 1st in Patient with Rutherford 4 Symptoms

Technical considerations:

- Radial access (intended diagnostic only, consented for BEST CLI)
- Self-expanding stent used. Balloon-expandable reasonable.
- Did not use covered stent, adjacent to internal iliac

Clinical followup:

- Moved from Rutherford 4 → 3
- Started SET, cilostazol
- Residual SFA occlusion

Rutherford		
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