



2D vs. 3D Angiosome for BTK

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concerning the presentation**



1. *One straight-line*
2. *As many as possible*
3. *Below the ankle*

Angiosome

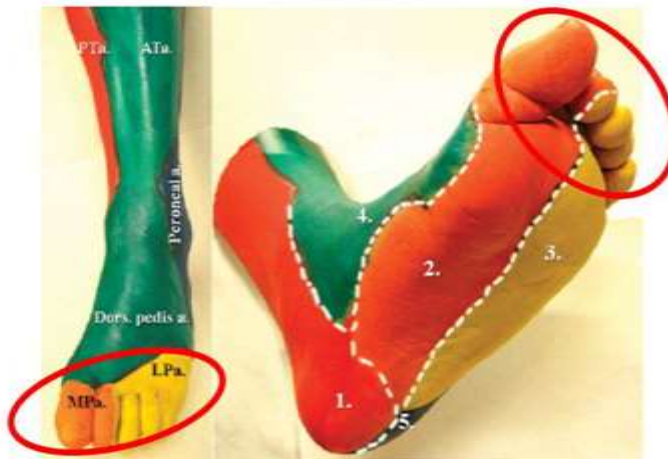
What is Original Concept

Angiosome is a “**3-dimensional volume**” supplied by a source artery that **cannot be assessed after the occlusion of adjacent source artery.**

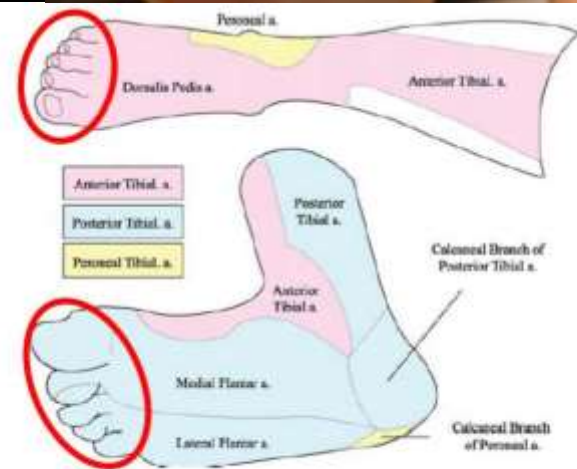
Taylor GI and Palmer JH. Br J Plast Surg. 1987; 40: 113-141.

Angiosome cannot be applied to the infrapopliteal disease

Confusing “2D” Angiosome Maps



J Endovasc Ther 2008; 15: 580–593.



Catheter Cardiovasc Interv 2010; 75: 830–836.

A biased diagnosis of direct and indirect intervention

2D Angiosome Theory is Myth or Truth?

Author	Wound healing rate				Limb salvage rate			
	Direct	Indirect	P value	Months	Direct	Indirect	P value	Months
Alexandrescu et al ⁴⁷ (2011)	79.1	55.1	<0.018*	12	97.0	84.5	<0.030*	12
Iida et al ⁵¹ (2012)	–	–	–	24	82	68	0.01*	24
Kawarada et al ¹⁰ (2012)	–	–	0.886	–	–	–	0.524	–
Soderstrom et al ⁵² (2013)	69	47	0.021*	12	86	77	0.086	12
Fossacecca et al ⁴⁹ (2013)	57.4	32.3	NM	12	90.4	91.2	NS	12
Varela et al ⁵⁷ (2010)	92	73	0.008*	24	93.0	72.0	0.02*	24
Kabra et al ⁶⁸ (2013)	96.4	83.3	0.21	6	84	75	0.06	6
Neville et al ⁵³ (2009)	91	62	0.03*	–	–	–	–	–
Deguchi et al ⁶⁹ (2011)	73.3	72.2	0.43	–	–	–	–	–
Azuma et al ⁹ (2012)	95.8	91.7	0.185	24	97.8	92.3	0.855	24
Rashid et al ⁵⁵ (2013)	86	79	0.2736	–	–	–	–	–
Kret et al ⁵⁴ (2014)	78	46	0.01*	–	–	–	0.82††	–

Azuma N, et al. Circ J. 2014; 78: 1791-1800.

Peripheral Vascular Disease

Effect of Single Tibial Artery Revascularization on Microcirculation in the Setting of Critical Limb Ischemia

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Koichiro Harada, MD, PhD; Masaharu Ishihara, MD, PhD; Hisao Ogawa, MD, PhD

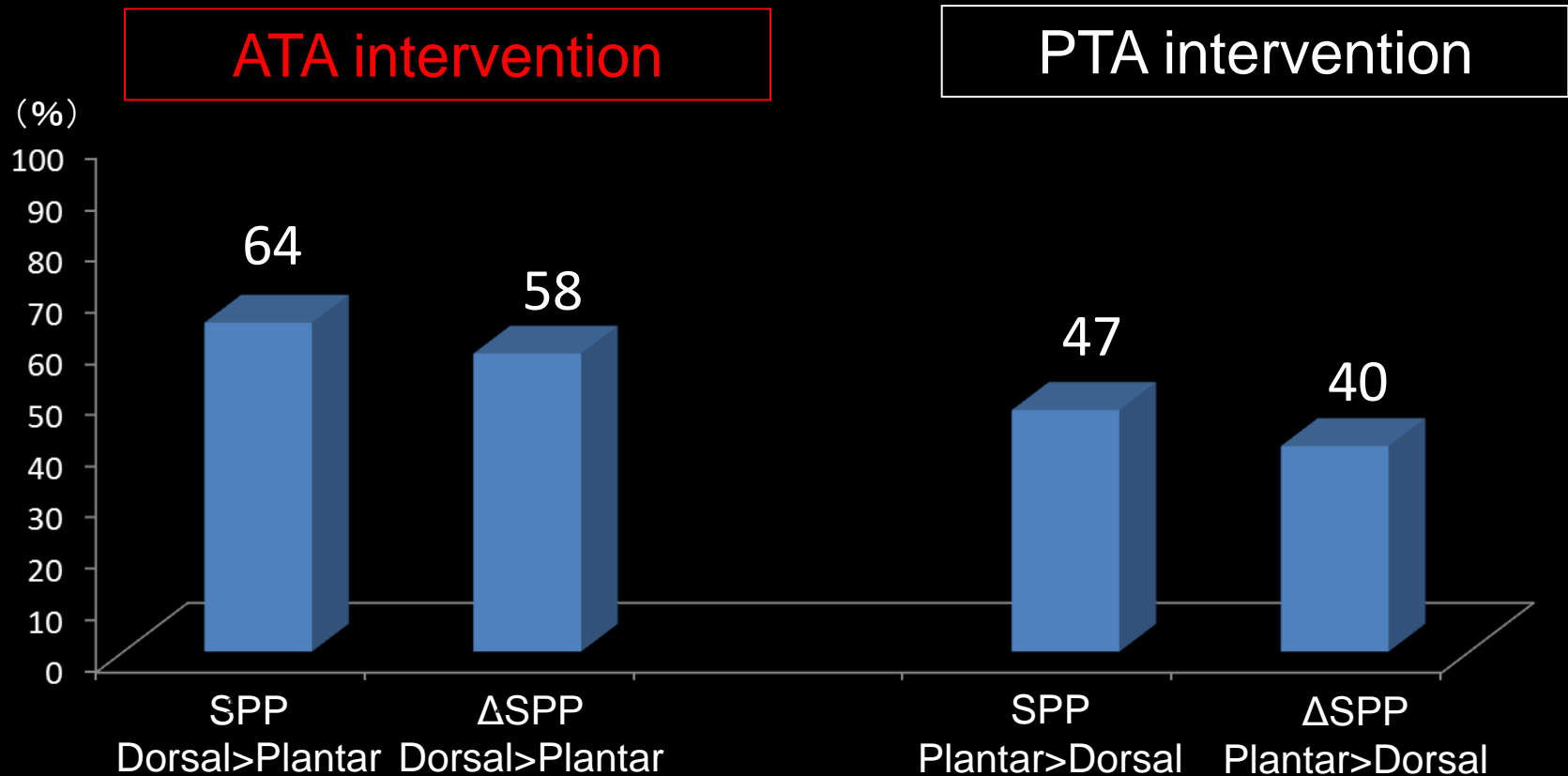
Background—Benefits of 2-dimensional (2D) angiosome-oriented infrapopliteal revascularization remain controversial. The aim of this retrospective study was to clarify the effect of single tibial artery revascularization on the dorsal and plantar microcirculation of critically ischemic limbs based on skin perfusion pressure (SPP).

Methods and Results—Fifty-seven interventions that only involved either anterior tibial artery (ATA) or posterior tibial artery (PTA) revascularization were included in this study. SPP was measured on the dorsal side (theoretically ATA perfusion area) and the plantar side (theoretically PTA perfusion area) before and after the procedure. Dorsal and plantar SPP increased significantly, from 33 (IQR 23–40.5) to 52 (IQR 32.5–65) mmHg ($P<0.0001$) and 31.6 ± 16.1 to 44.8 ± 19.2 mmHg ($P=0.001$) after ATA revascularization, respectively, and from 29.3 ± 14.0 to 42.4 ± 19.7 mmHg ($P=0.003$) and 29.3 ± 9.8 to 43.5 ± 15.9 mmHg ($P<0.001$) after PTA revascularization, respectively. Both ATA and PTA revascularization were not associated with any significant differences in Δ SPP between the dorsal and the plantar regions of the foot. Only 64% and 58% of ATA revascularization cases showed higher post-SPP and Δ SPP on the dorsal side than on the plantar side, respectively. Also, only 47% and 40% of PTA revascularization cases showed higher post-SPP and Δ SPP on the plantar side than on the dorsal side, respectively.

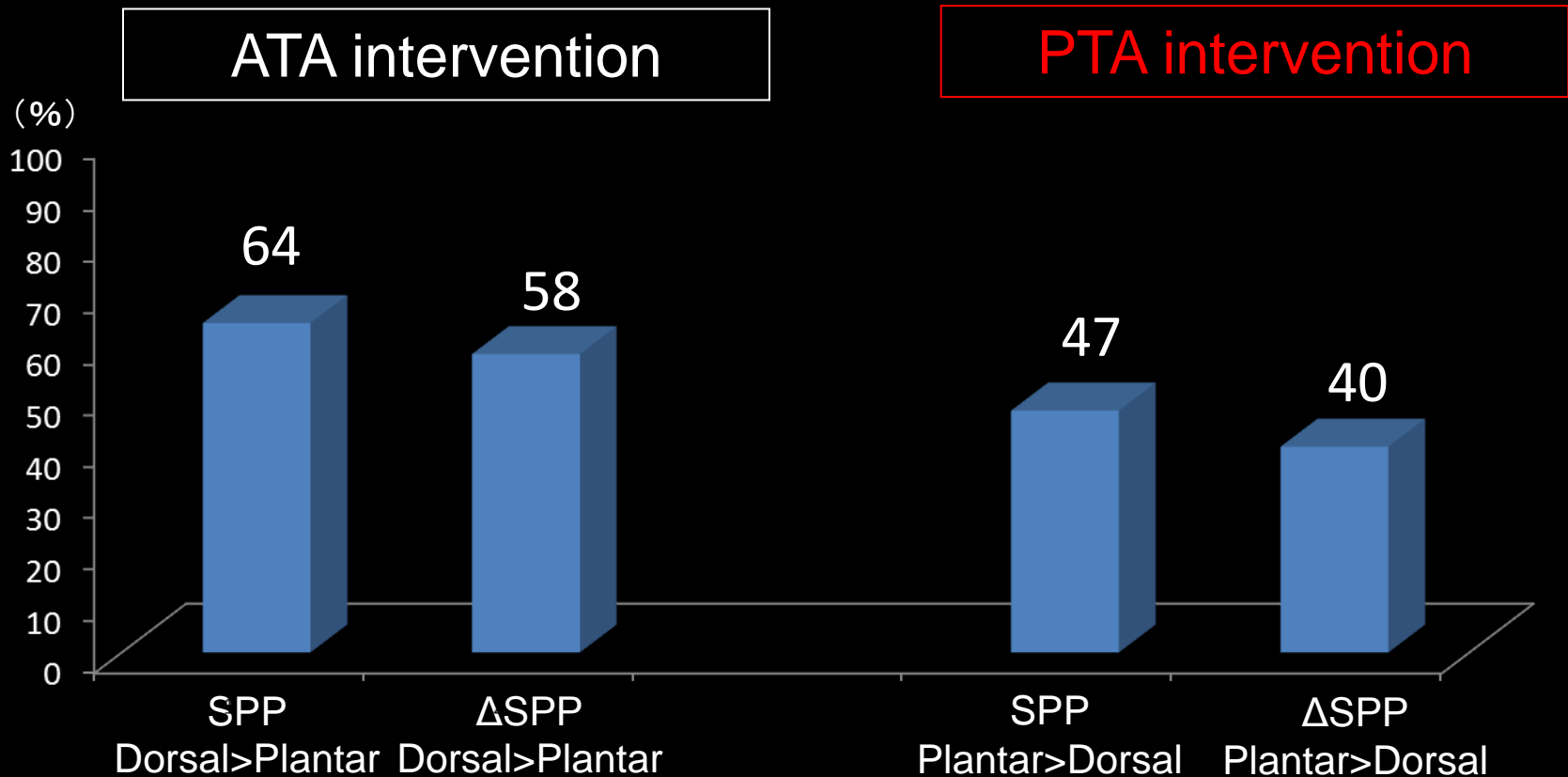
Conclusions—Single tibial artery revascularization, whether of the ATA or PTA, yielded comparable improvements in microcirculation of the dorsal and plantar foot. Approximately half of the feet revascularized had a change in microcirculation that was not consistent with the 2D angiosome theory. (*Circ Cardiovasc Interv.* 2014;7:684-691.)

Key Words: angioplasty ■ angiosome ■ microcirculation ■ peripheral arterial disease ■ reperfusion

Change of SPP and Δ SPP corresponding to 2D Angiosome Theory



Change of SPP and Δ SPP corresponding to 2D Angiosome Theory



Approximately half of cases had a change in microcirculation that was not consistent with the 2D angiosome theory

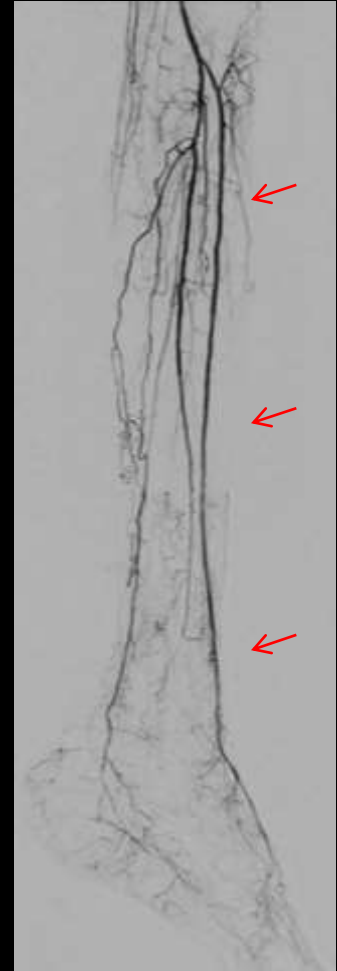
Representative Case: ATA Intervention

Pre



SPP: 34/15mmHg

Post

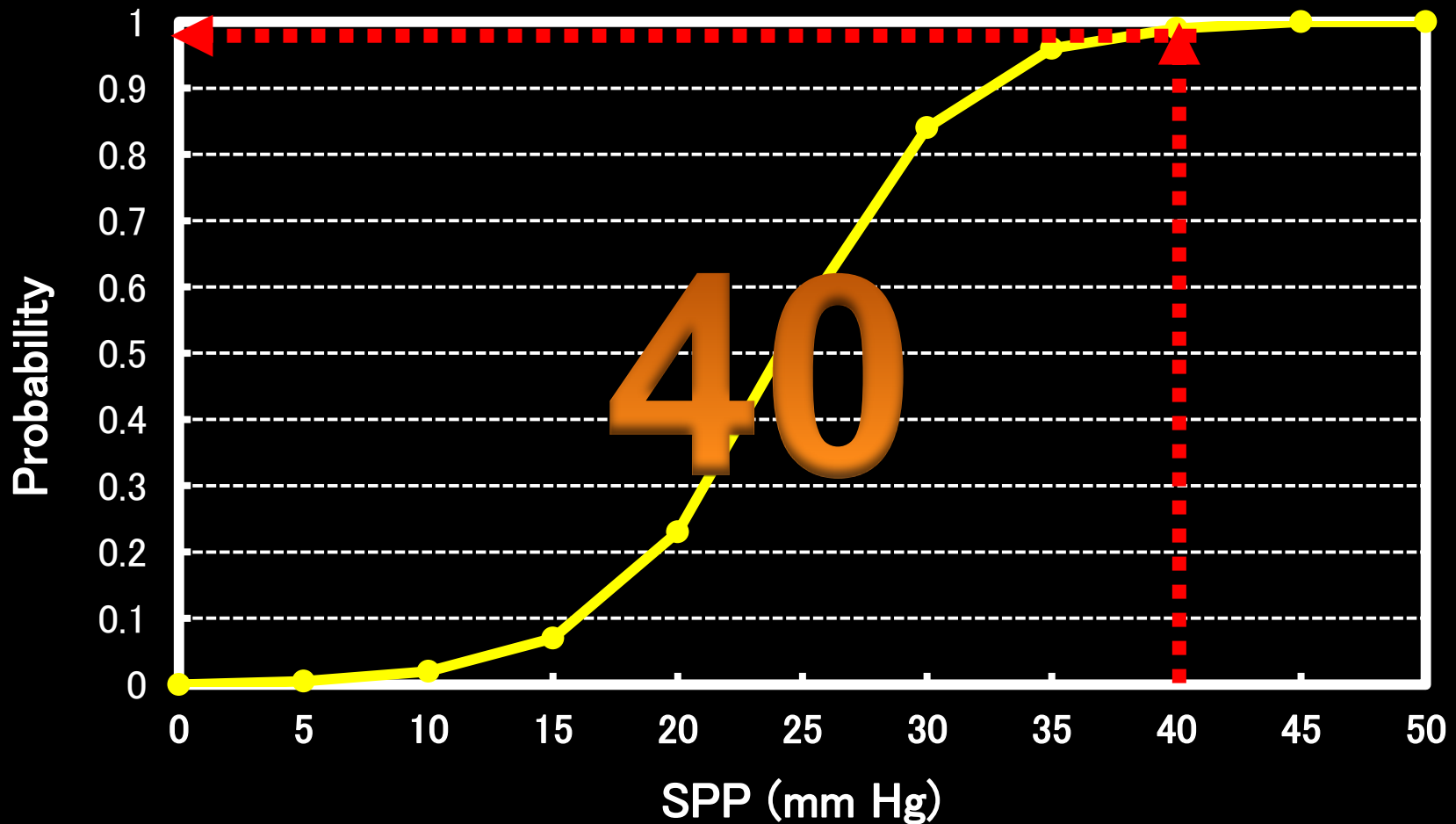


SPP: 42/53mmHg

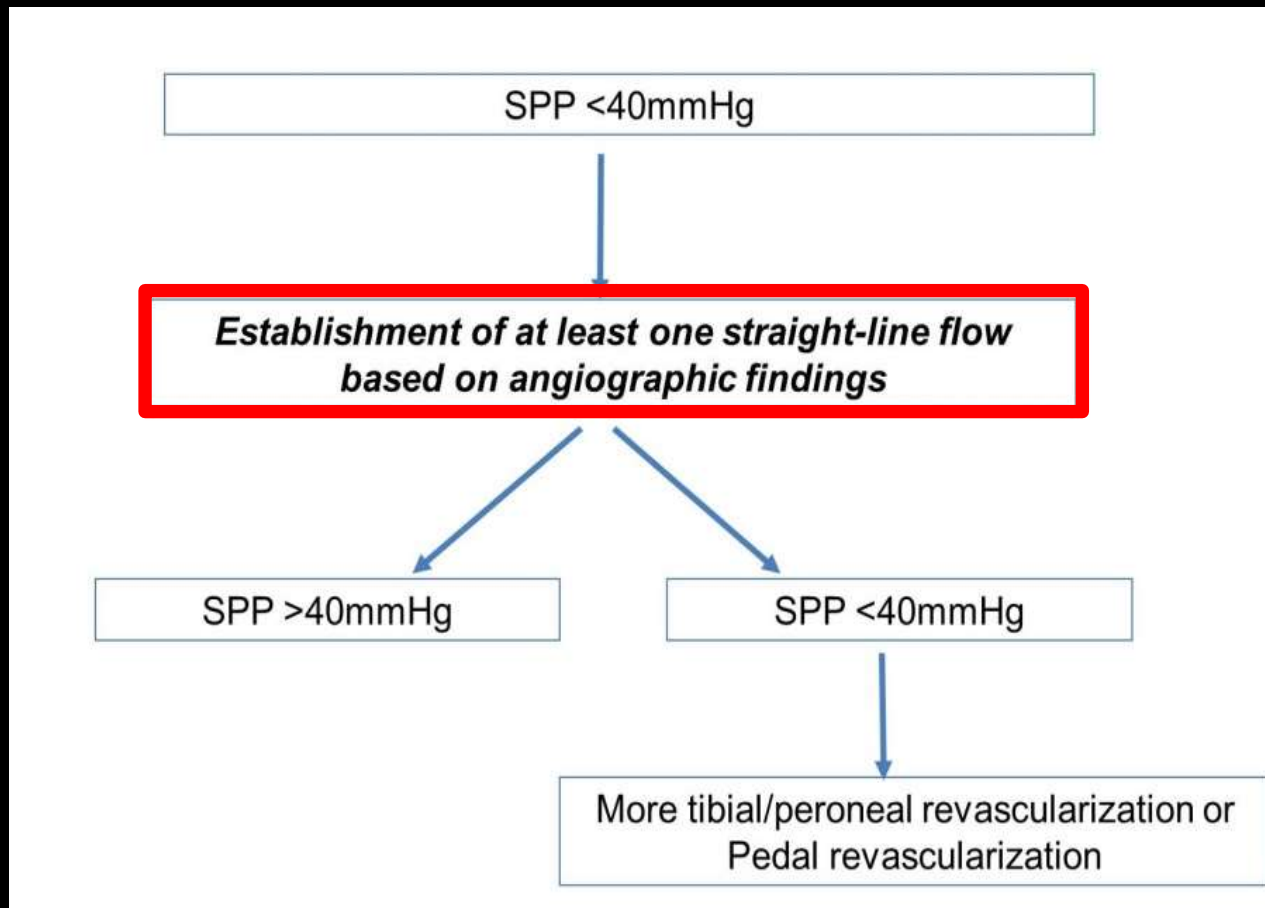
Dorsal Δ SPP: 8 mmHg, Plantar Δ SPP: 38 mmHg



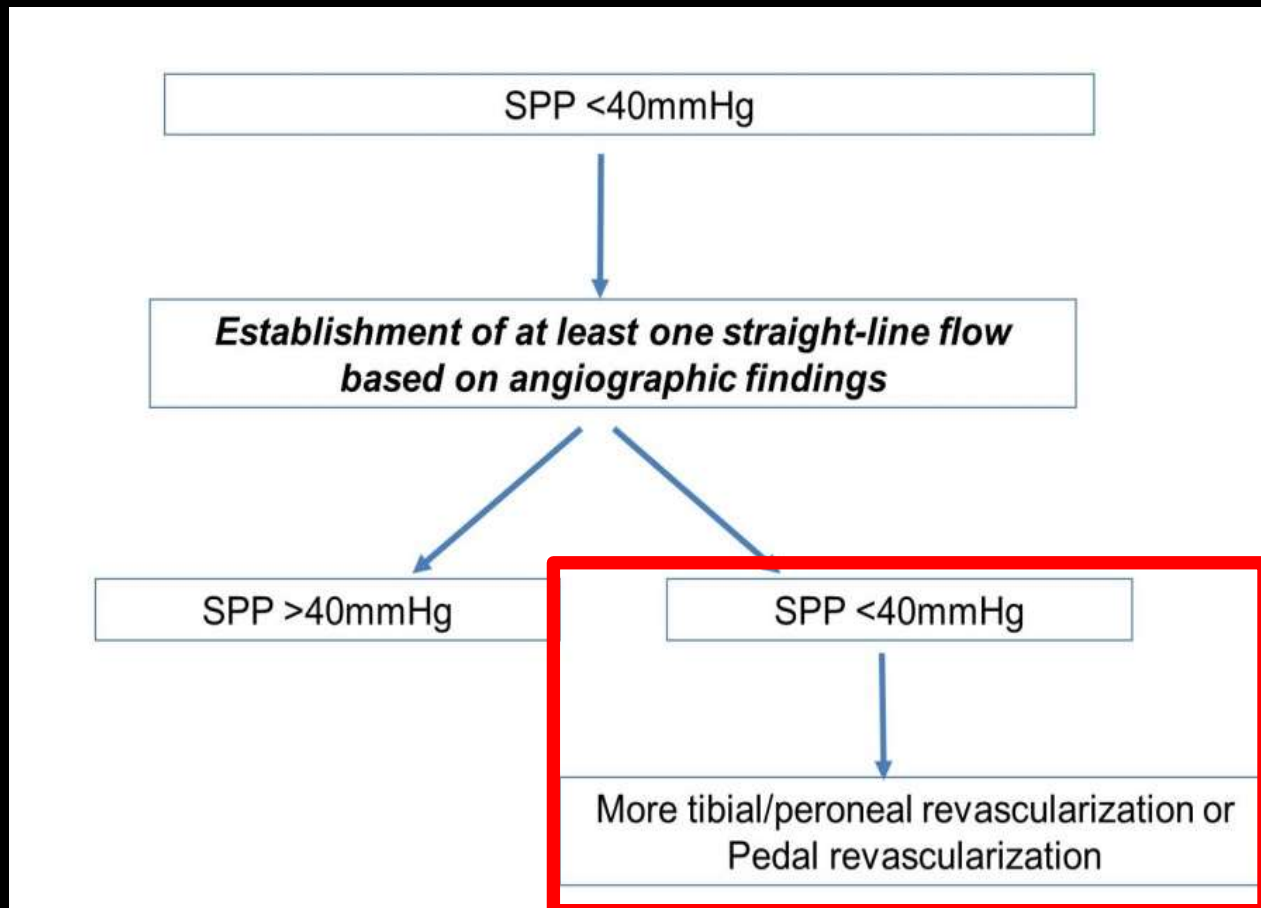
Relationship between SPP and Wound Healing



Simple Strategy for Infrapopliteal Intervention



Simple Strategy for Infrapopliteal Intervention



58 y/o Male, Rutherford 6 × 3 months Infectious wound with offensive odor

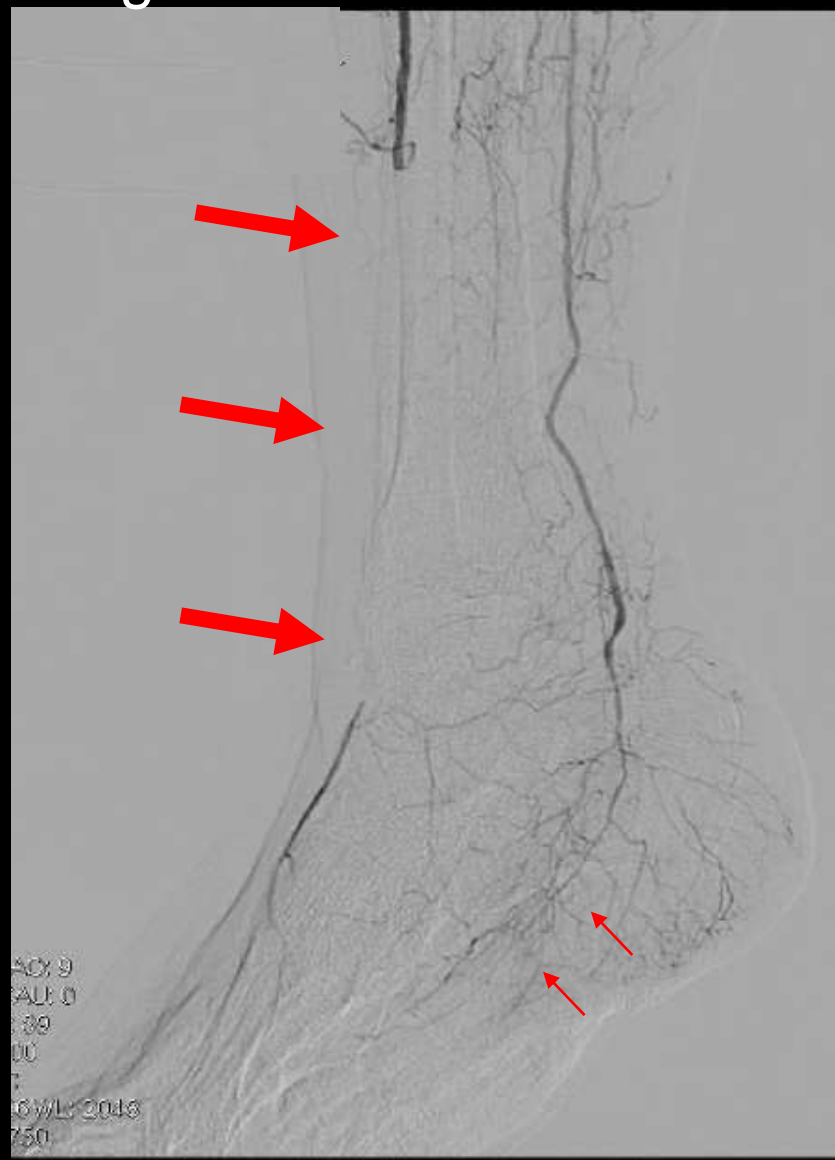
- Risk factors and comorbidity
 - HTN (+), HL (-), DM (+), Smoking (+)
 - CAD (TVD)
- Hemodialysis due to diabetic nephropathy × 5 years
- Noninvasive examination
 - ABI: Right 0.54, Left 0.68
 - **SPP: 29 mmHg on the right foot**
- Blood examination
 - **WBC12800, CRP12.7**



Diagnostic angiography



Magnified view

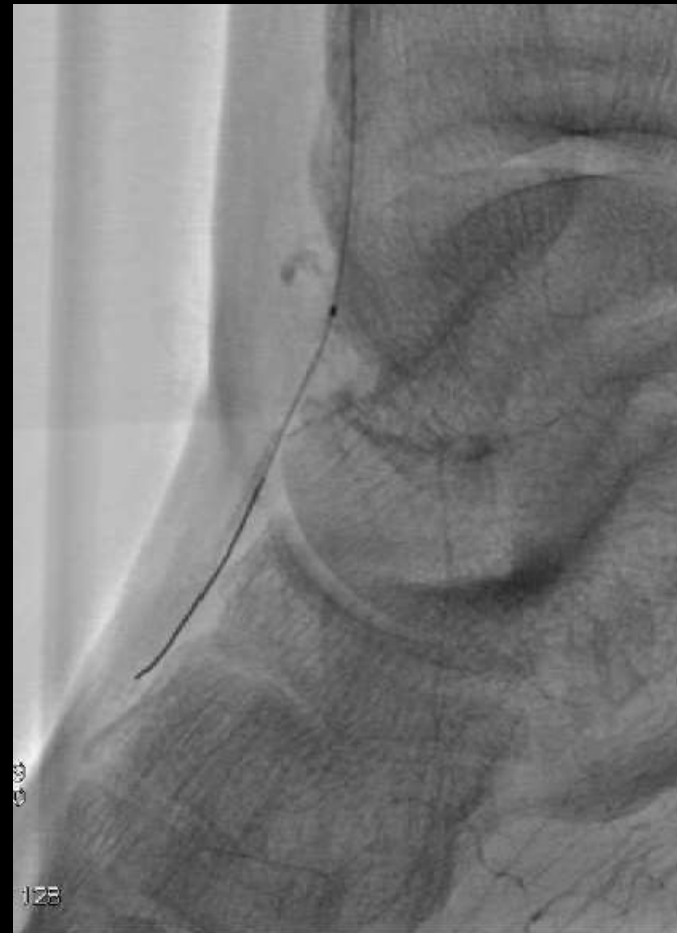


Debridement before revascularization to prevent sepsis (consultation to surgeon)



My target is ATA

CTO recanalization



Anterior tibial angioplasty



Below-the ankle angioplasty



Pre

Post

SPP
29mmHg



SPP
59mmHg



Clinically-driven repeat intervention for restenosis

Pre



POBA



Post





“Plantar” wound completely healed after “ATA” intervention

**Never mind 2D angiosome theory
in the treatment of infrapopliteal disease**

One straight-line and more