

Clinical Implication of Anatomical Variation of Below the Knee Arteries

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COI Disclosure

Speaker name :

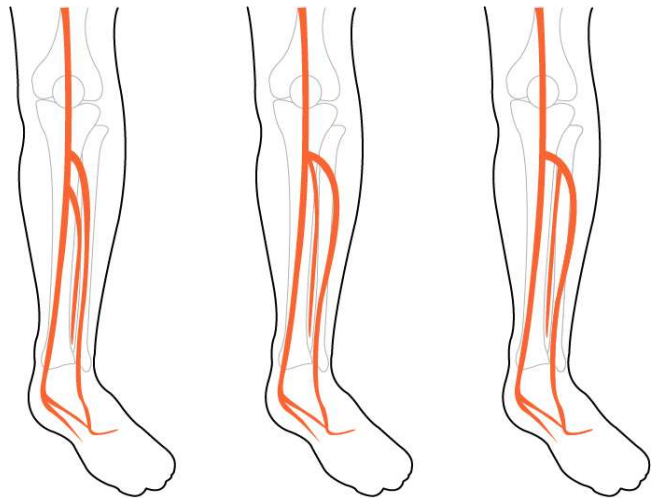
Name, Yoshiaki Yokoi, MD

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)
- I do not have any potential conflict of interest

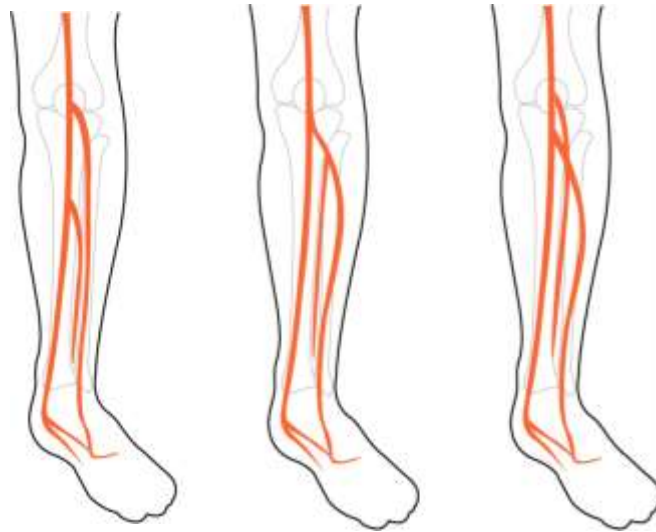
Anatomical variations of popliteal artery branch

Type I



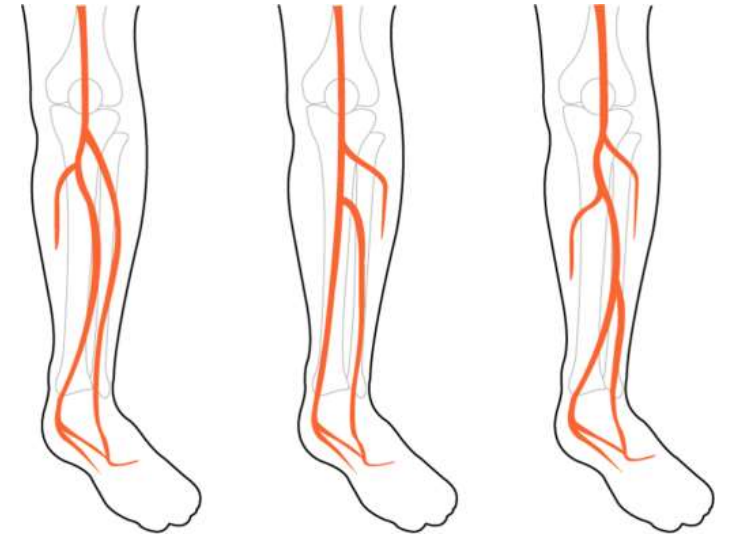
Normal level of branching

Type II



High division

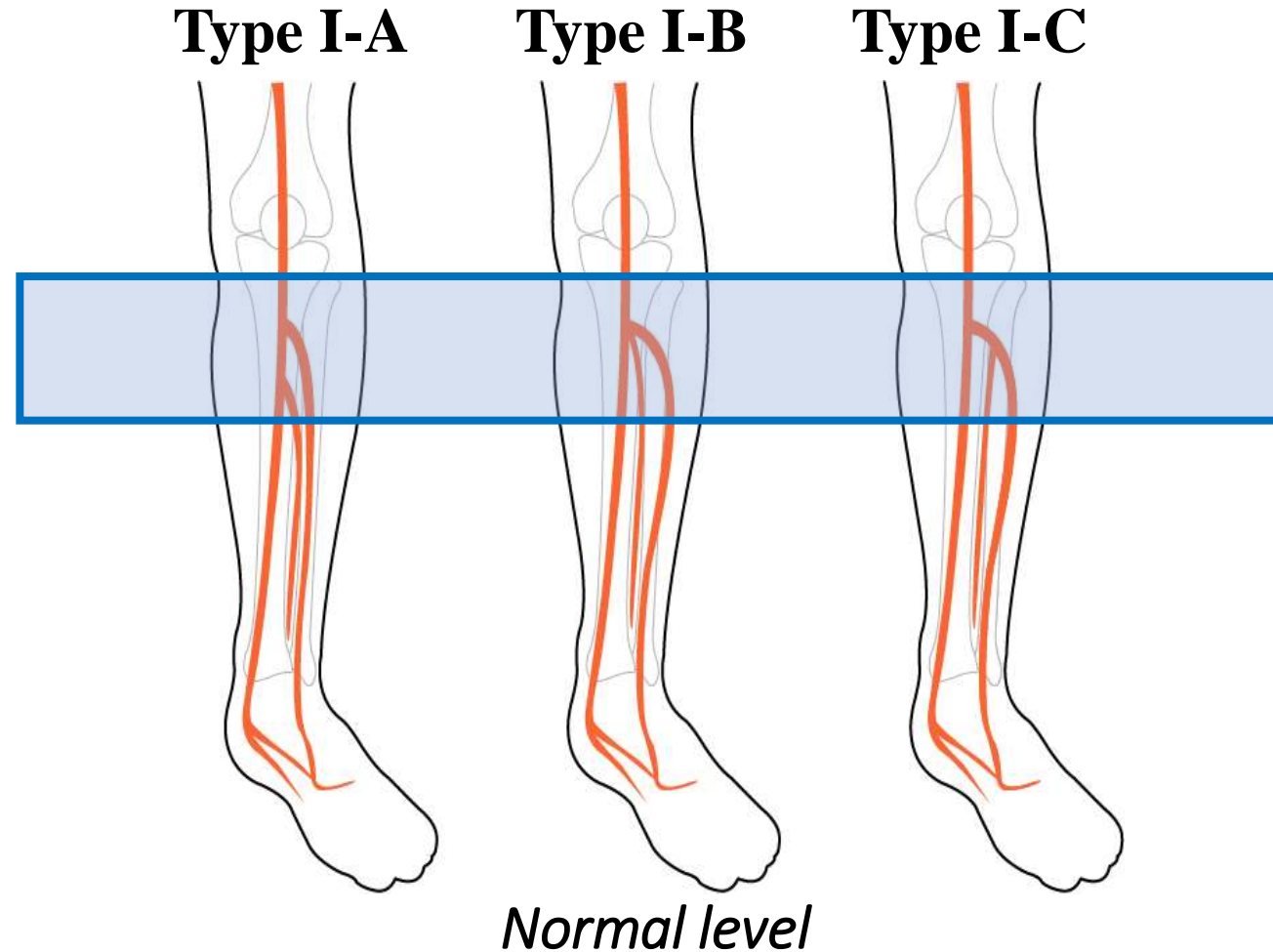
Type III



Hypoplastic or aplastic branching with altered distal supply

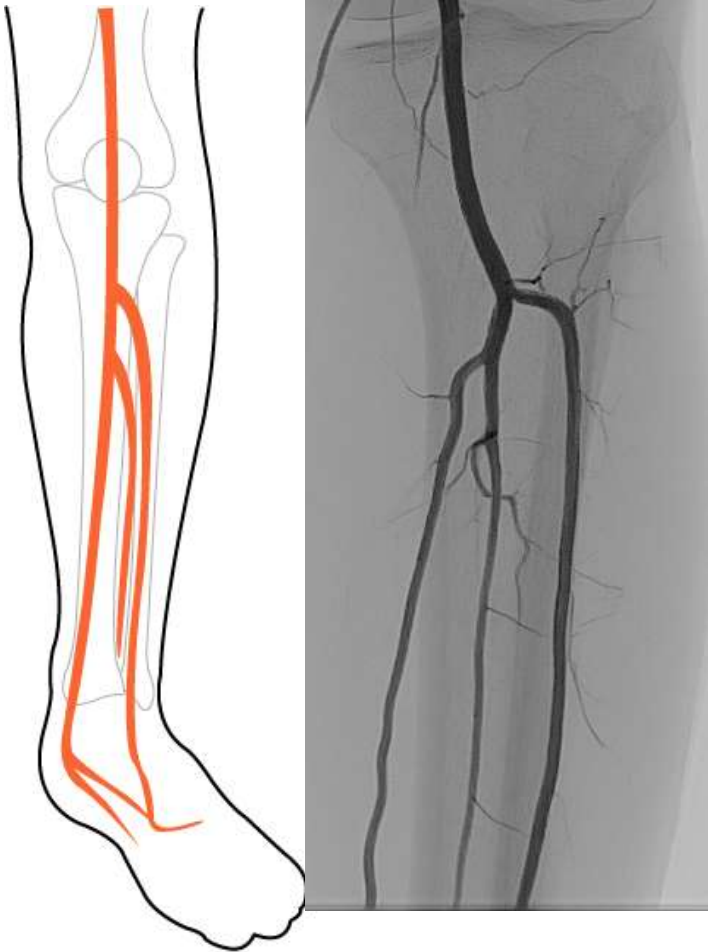
Anatomical variations of infrapopliteal artery

Type I: Normal level of branching

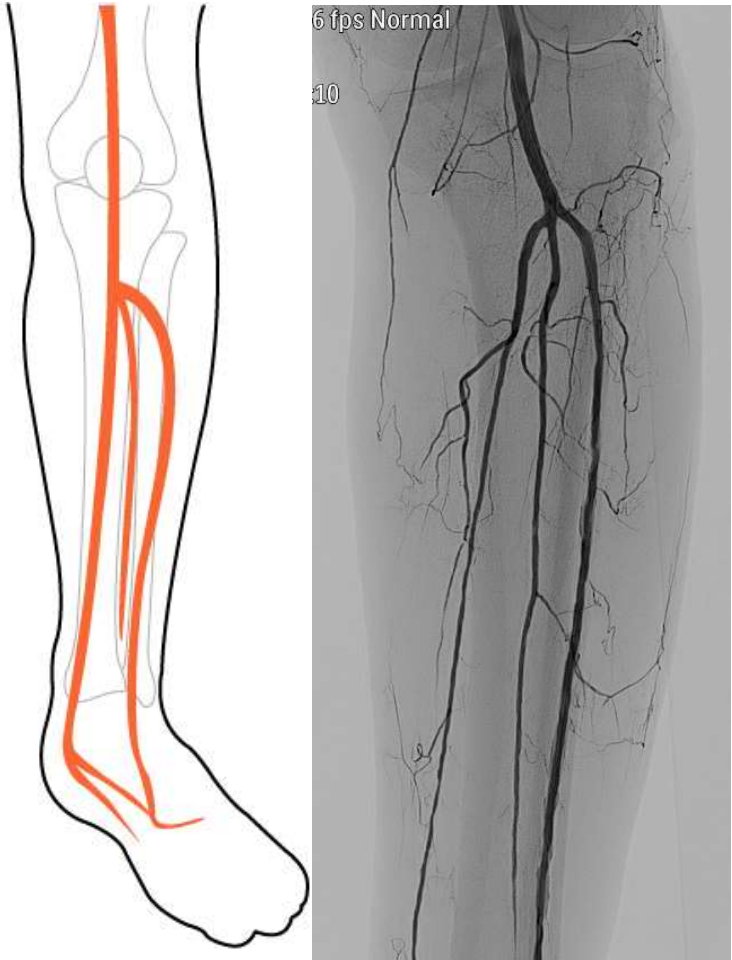


Normal level of branching

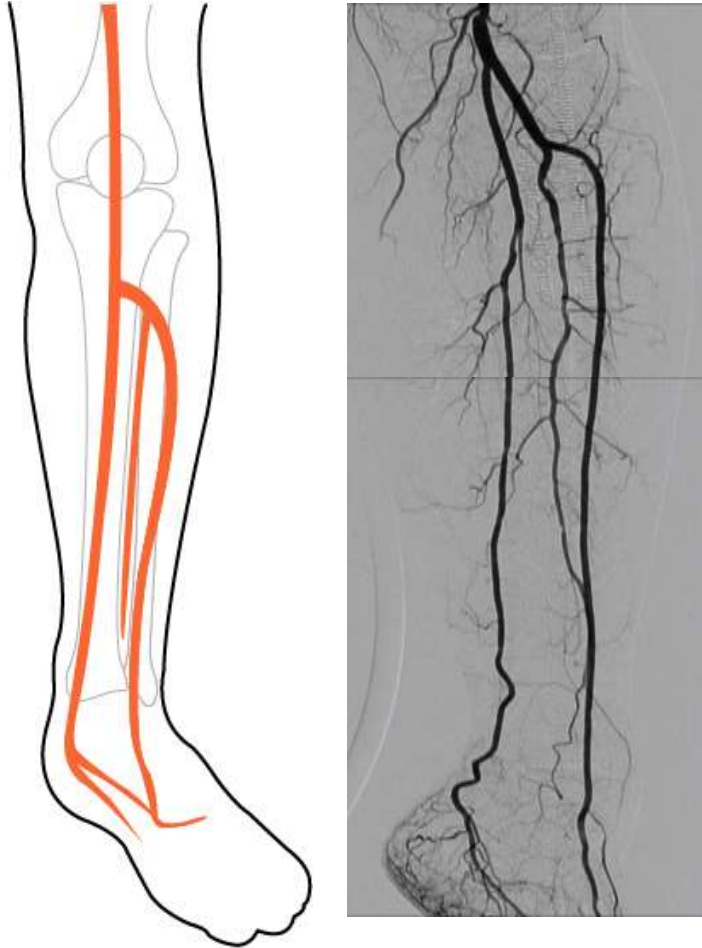
Type I-A



Type I-B



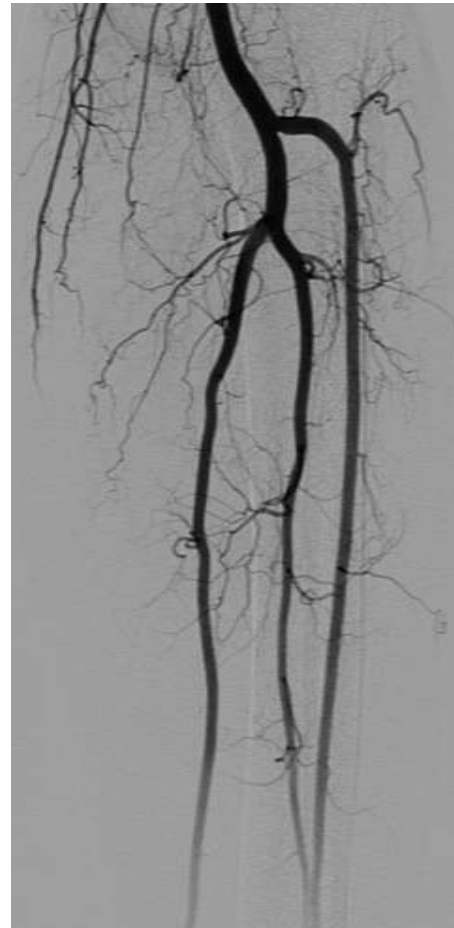
Type I-C



Type 1: Normal level of branching

Type 1-A

Type 1-B

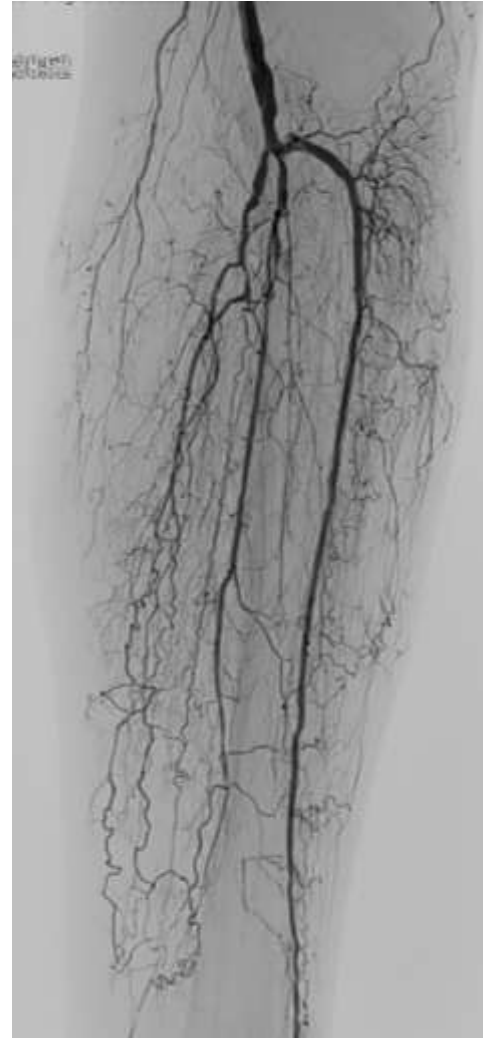


Type 1-B

Pre

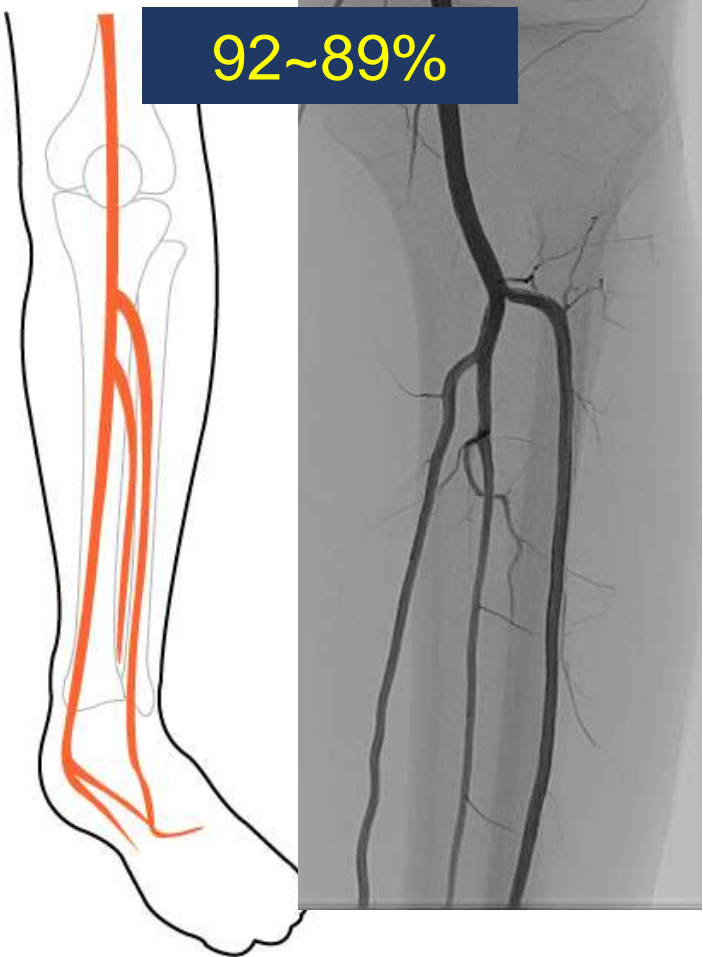


Post



Normal level of branching

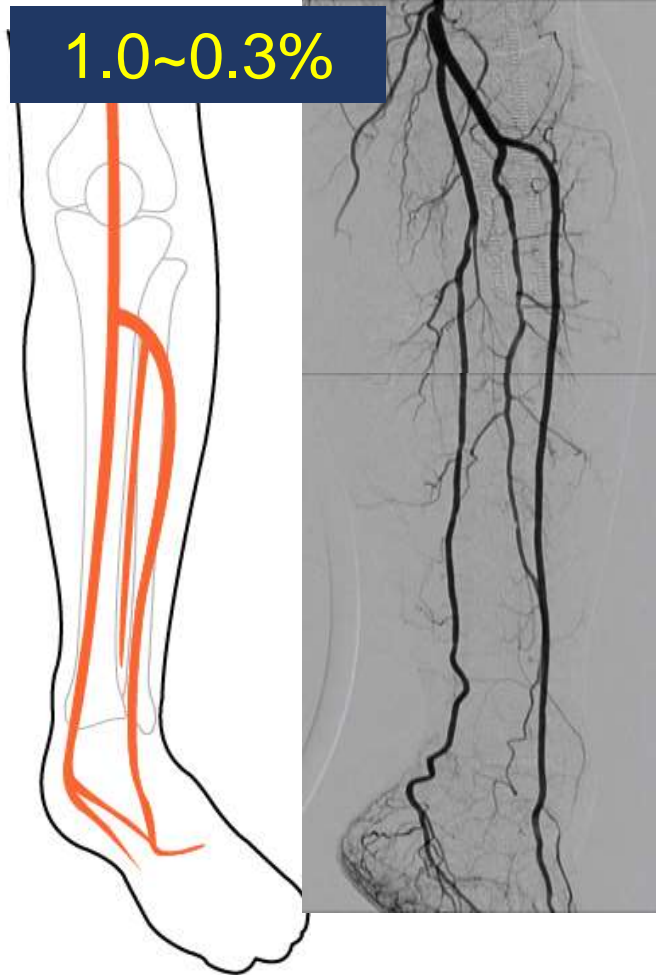
Type I-A



Type I-B



Type I-C



Anatomical variations of popliteal artery branch

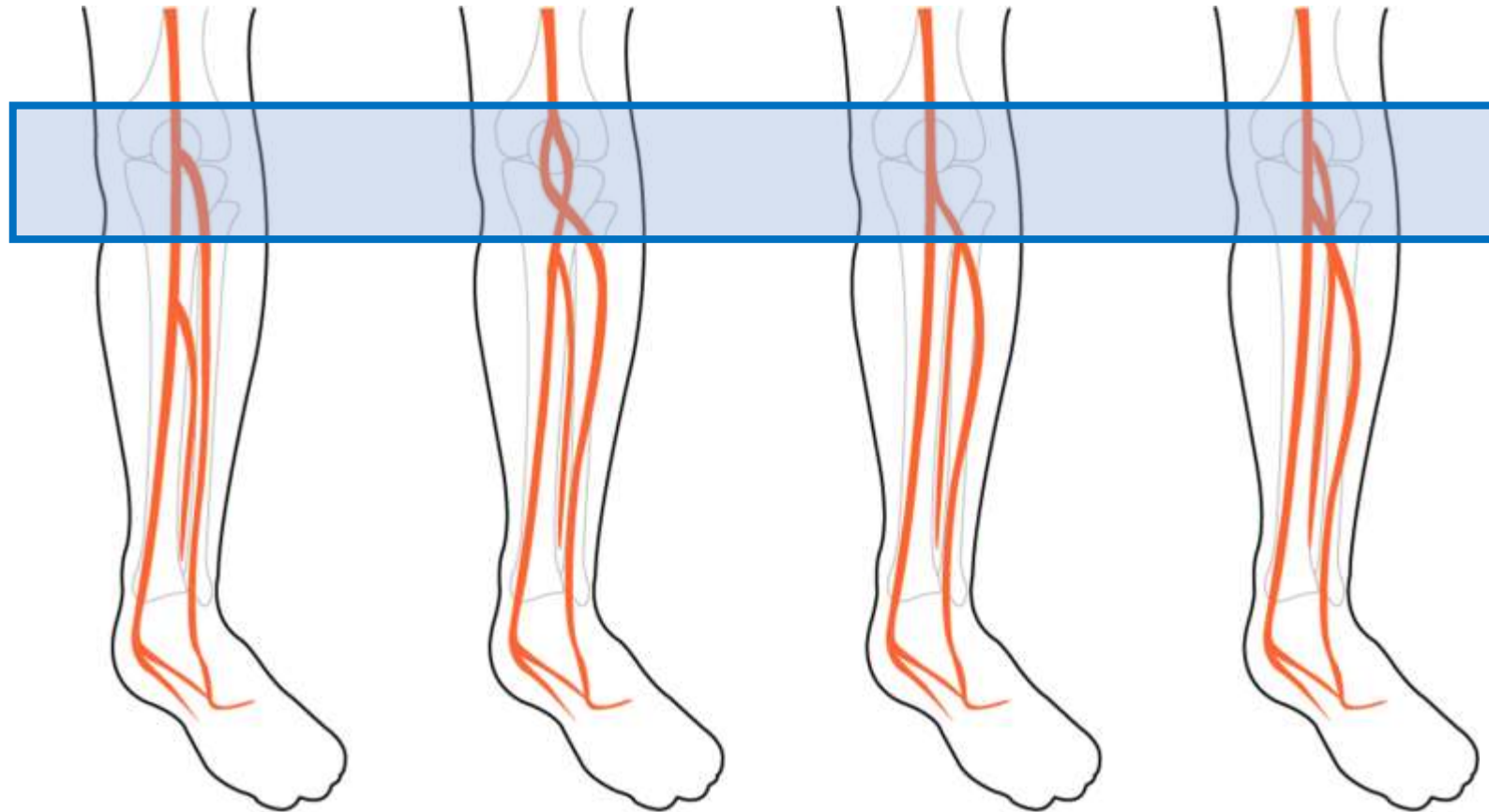
Type II: High division

Type II-A1

Type II-A2

Type II-B

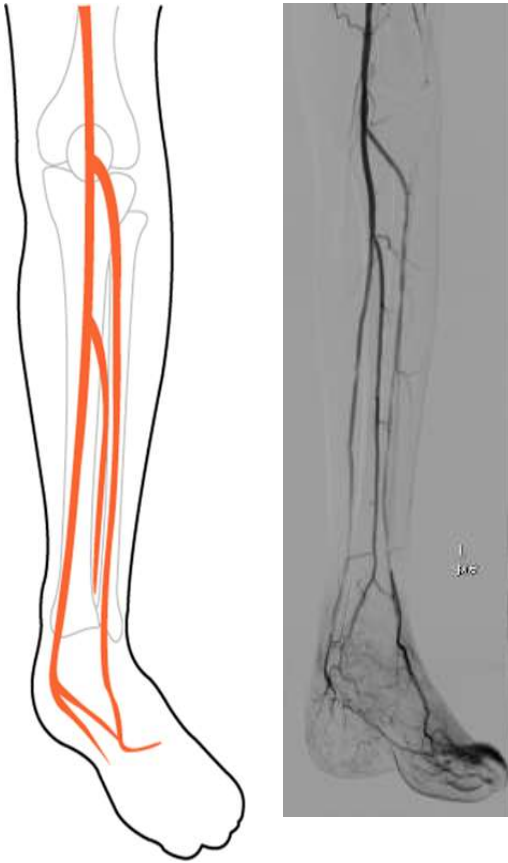
Type II-C



High division

High division of popliteal artery branch

Type II A-1: High ATA



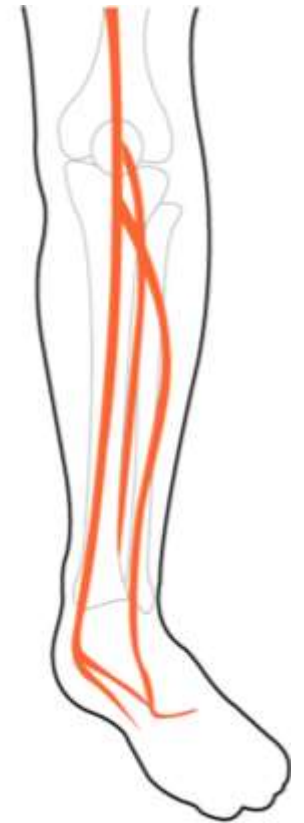
Type II A-2: High ATA



Type II B: High PTA



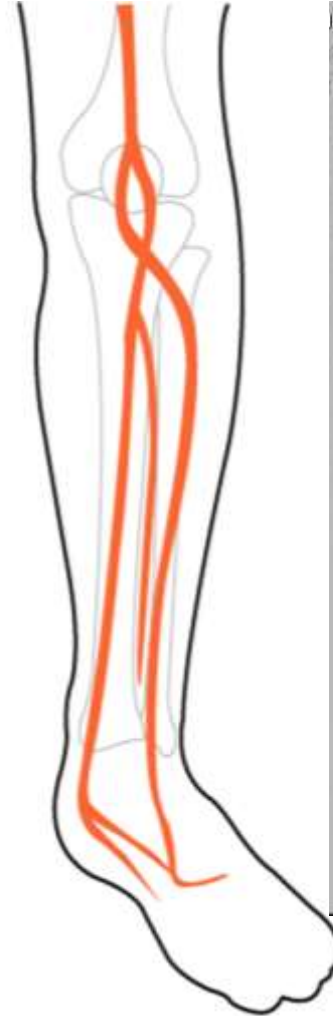
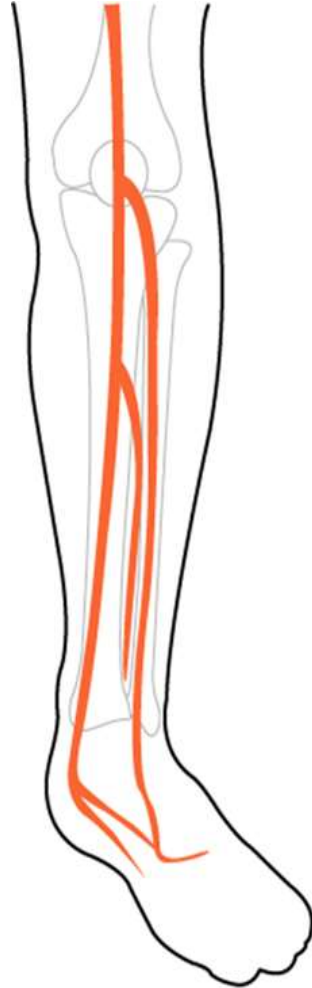
Type II C: High peroneal



High division of popliteal artery branch

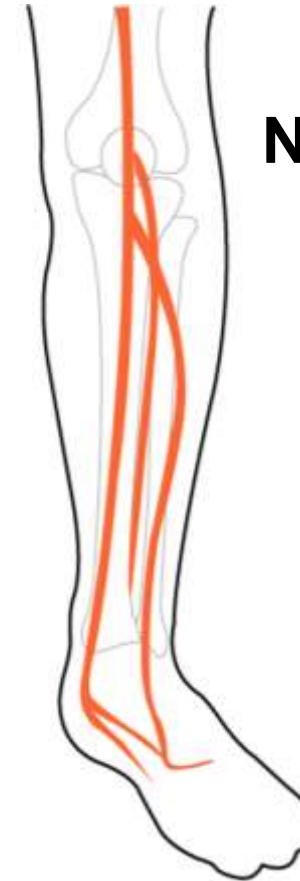
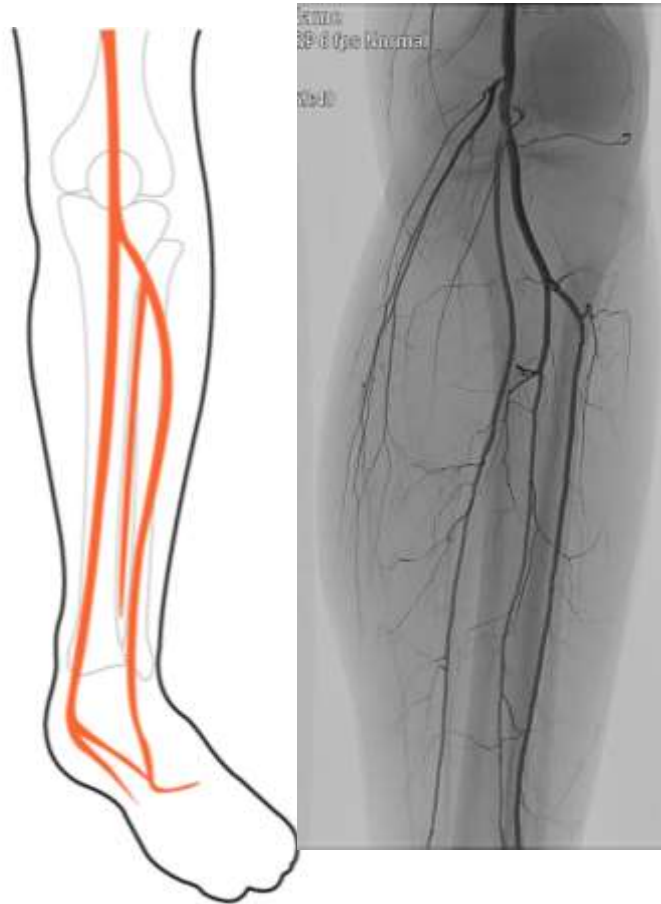
Type II A-1: High ATA

Type II A-2: High ATA



High division of popliteal artery branch High PTA and High Peroneal Type II-B

Type II-C



Not found so far

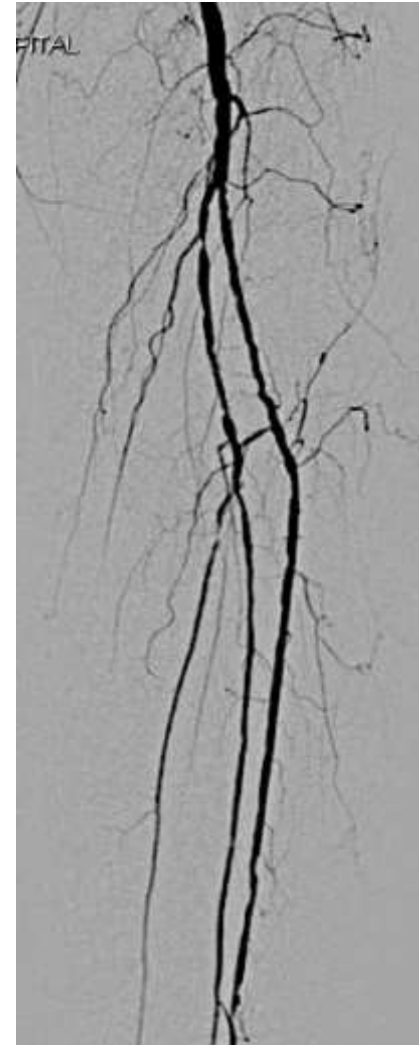
High division of popliteal artery branch

High ATA: Type IIA-1, Type IIA-2



High division of popliteal artery branch

Type II A-1: High ATA



High division of popliteal artery branch

Type II B: High PTA

Occluded PTA



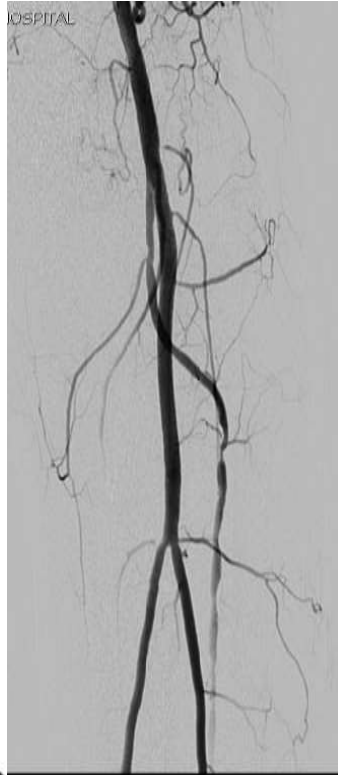
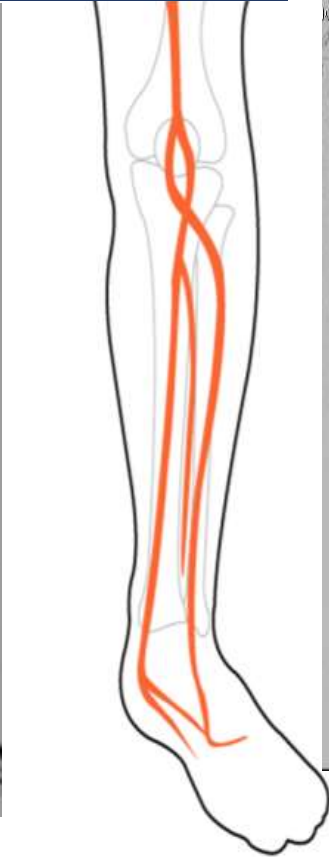
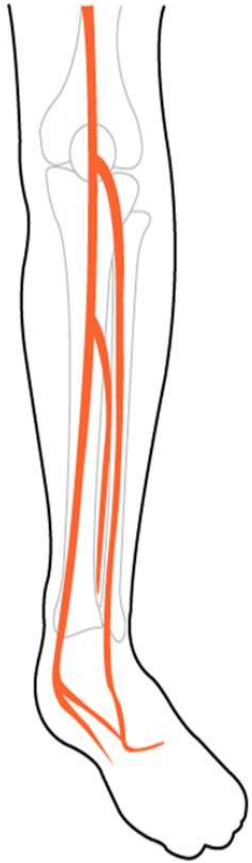
Occluded ATA



High division of popliteal artery branch

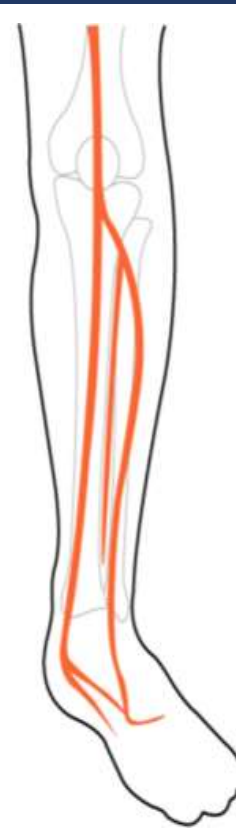
Type IIA: High ATA

3.2~2.0%



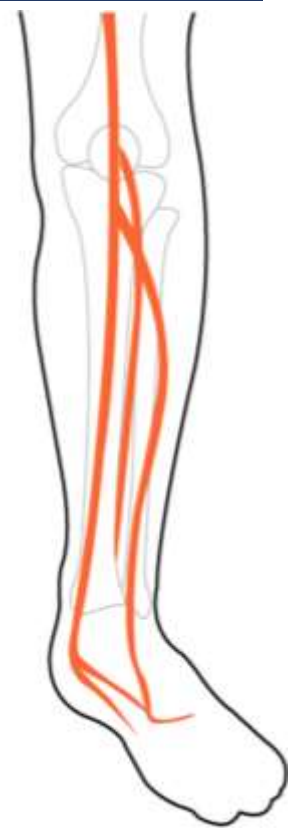
Type IIB: High PTA

1.2~0.8%



Type IIC: High peroneal

0.2%



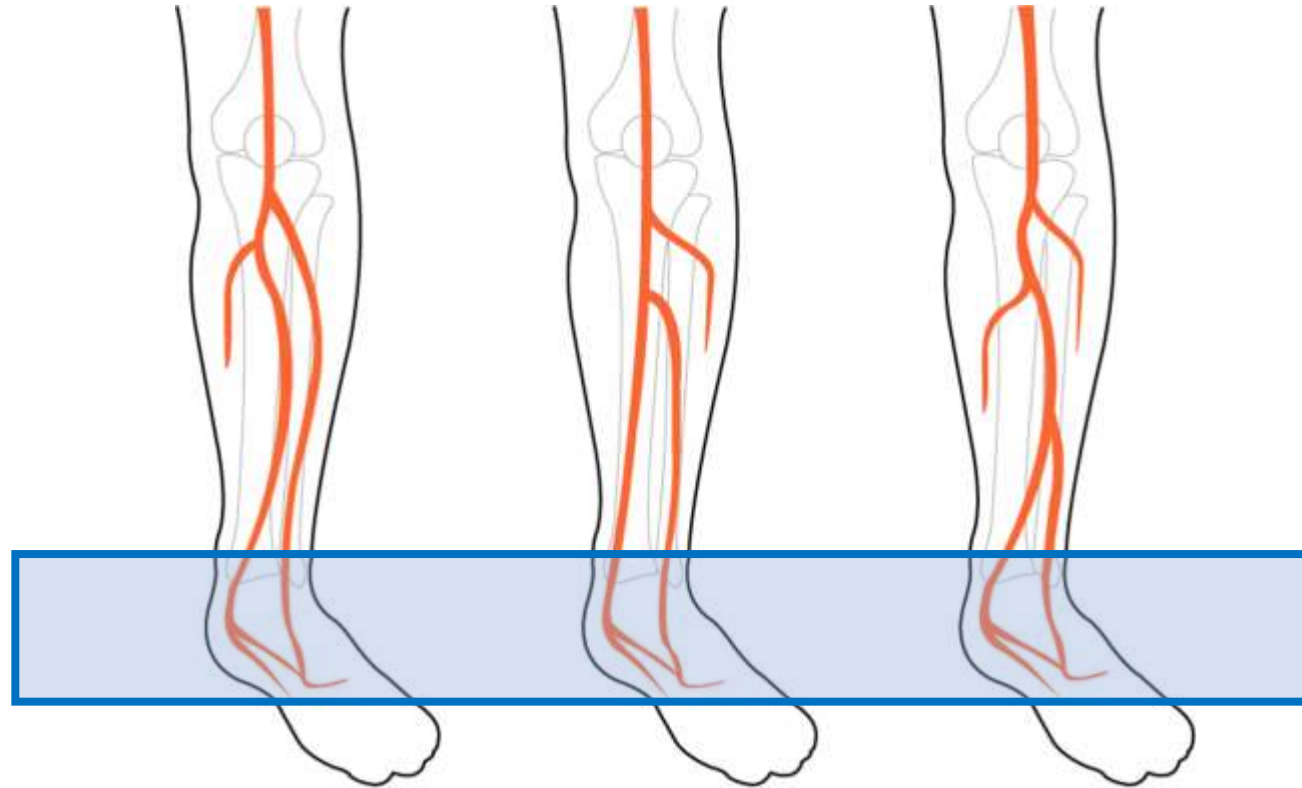
Anatomical variations of popliteal artery branch

Type III: Hipoplastic or aplatic branching with altered distal supply

Type III-A

Type III-B

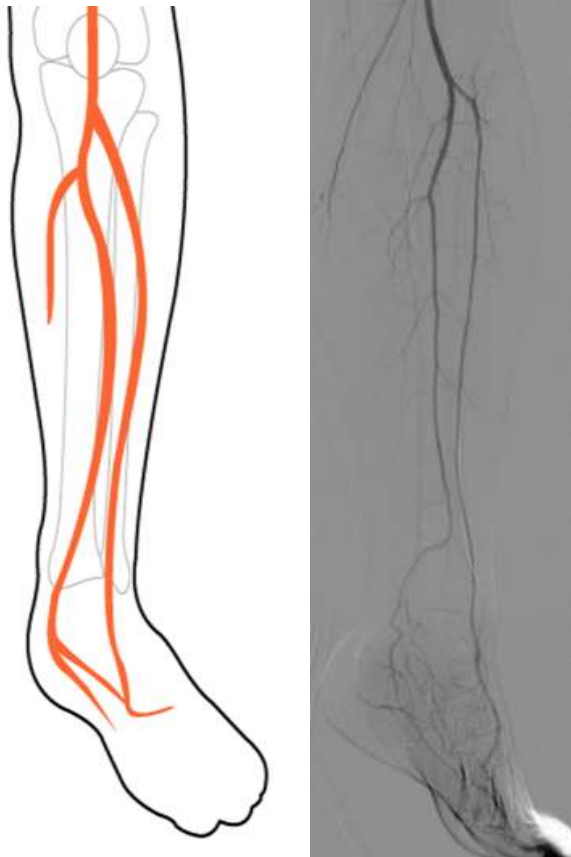
Type III-C



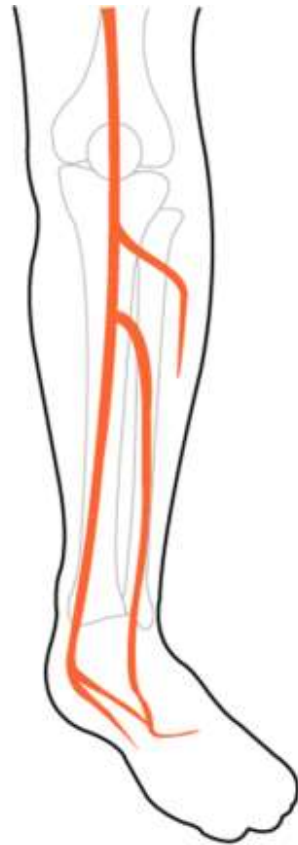
altered distal supply

Hipoplastic or aplatic branching with altered distal supply

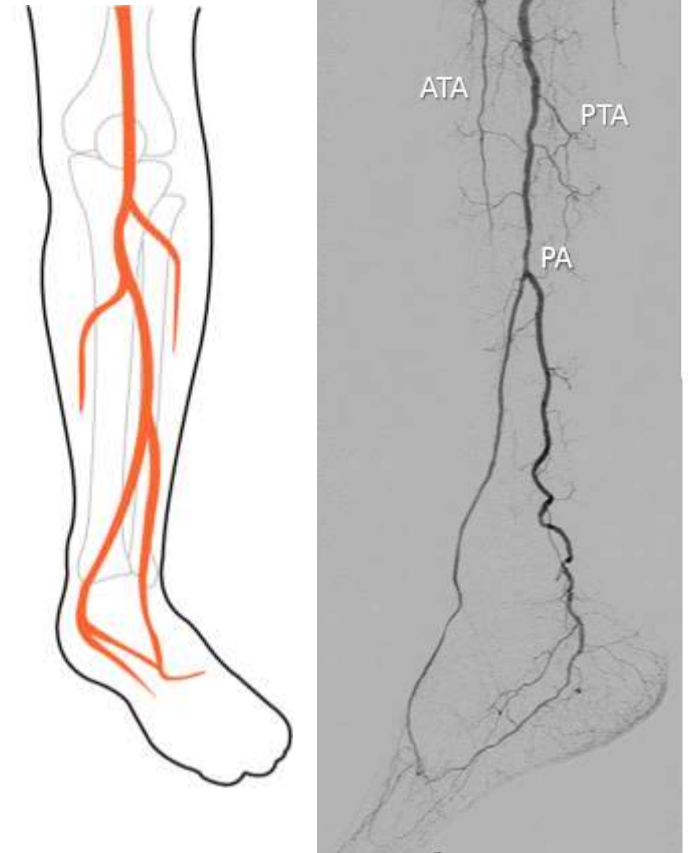
Type III-A



Type III-B



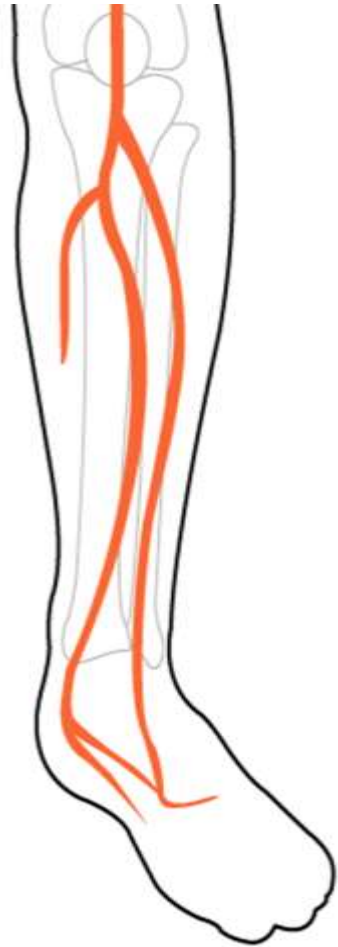
Type III-C



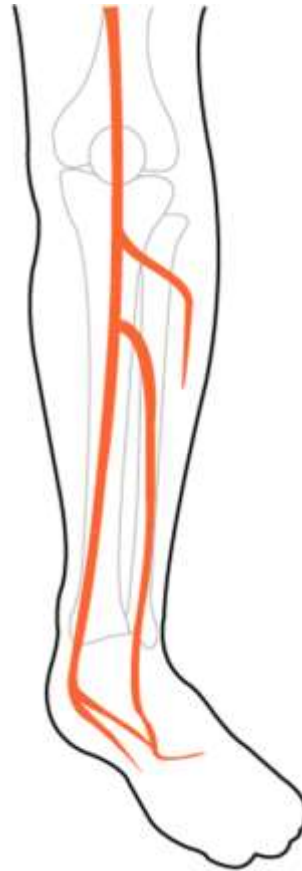
Anatomical variations

Type III: Dominant Peroneal

Type III-A



Type III-B



Hypoplastic PTA: Type III-A

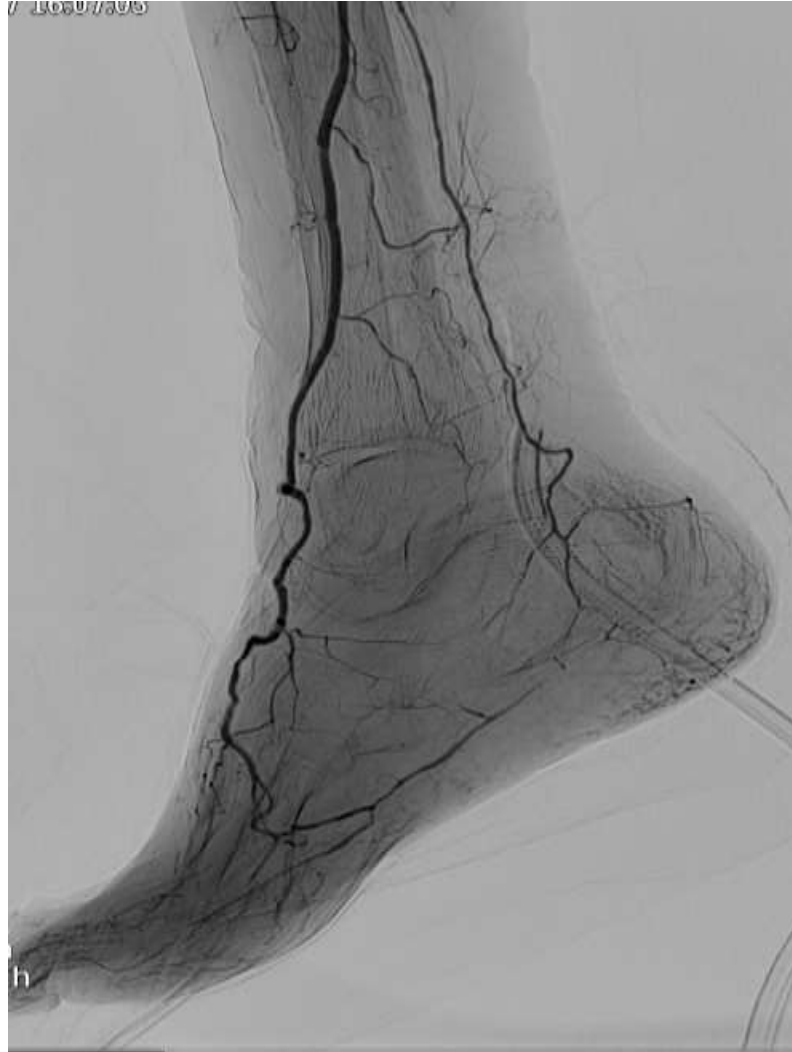


Altered supply → Type III

Peroneal to planter → Type IIIA



Hypoplastic ATA: Type III-B

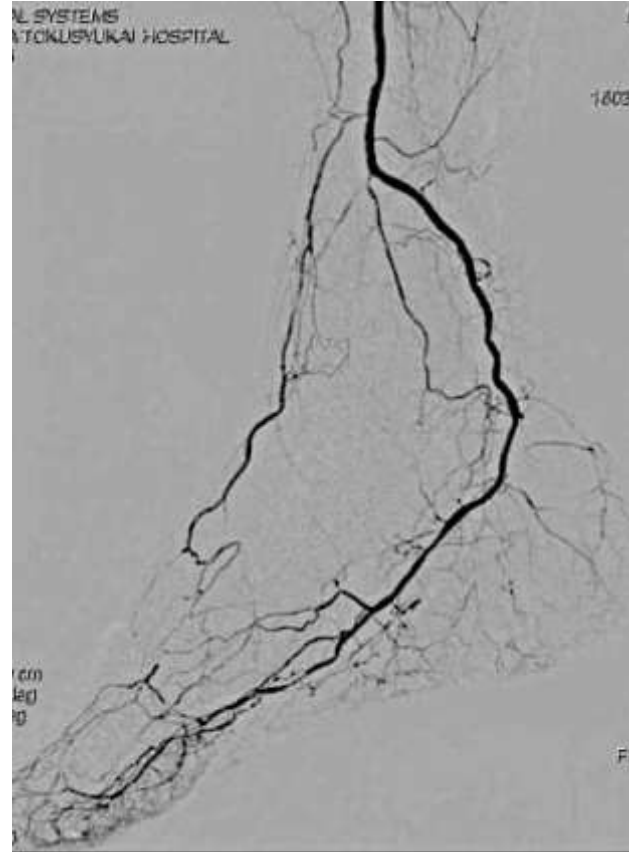
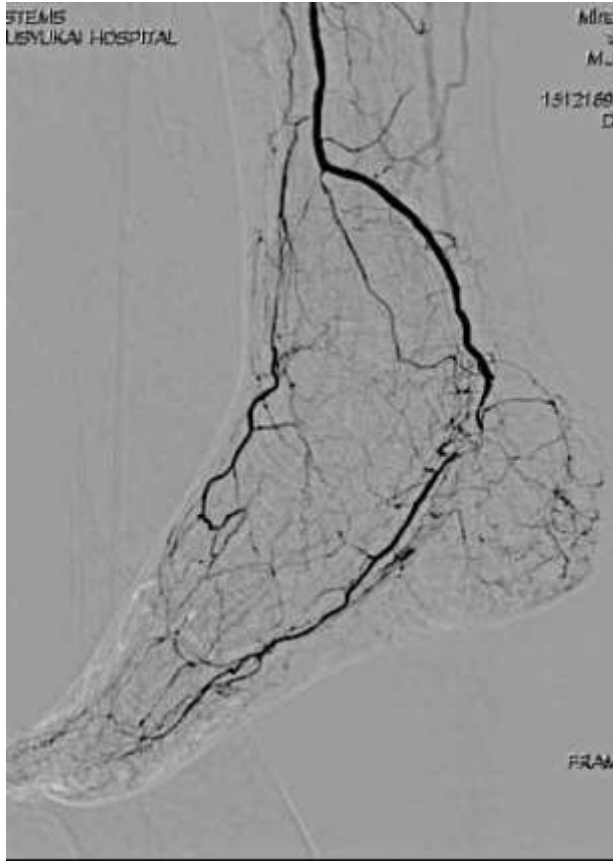


Altered supply → Type III

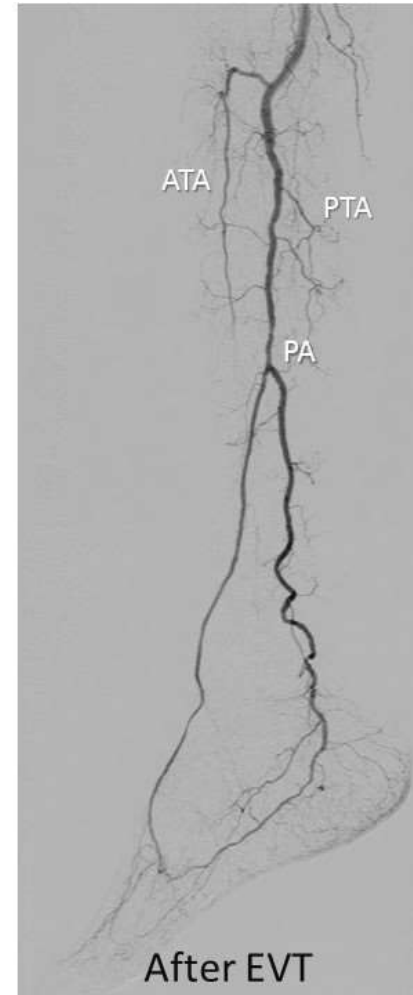
Peroneal to dorsal → Type III-B



Angioplasty to Peroneal to Planter Artery (Type 3-A)



Angioplasty to Peroneal to Dorsal Artery (Type III-C)

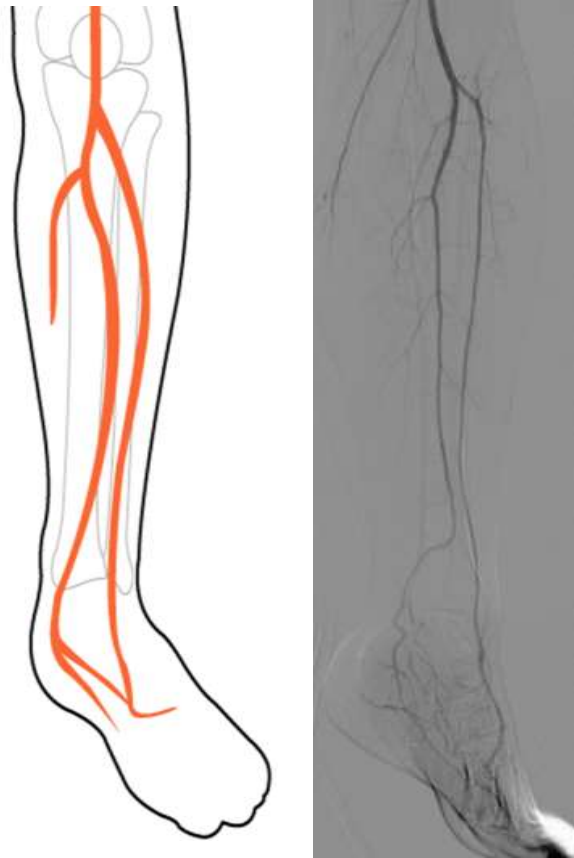


Courtesy by Dr. Tsubakimoto

Hipoplastic or aplatic branching with altered distal supply

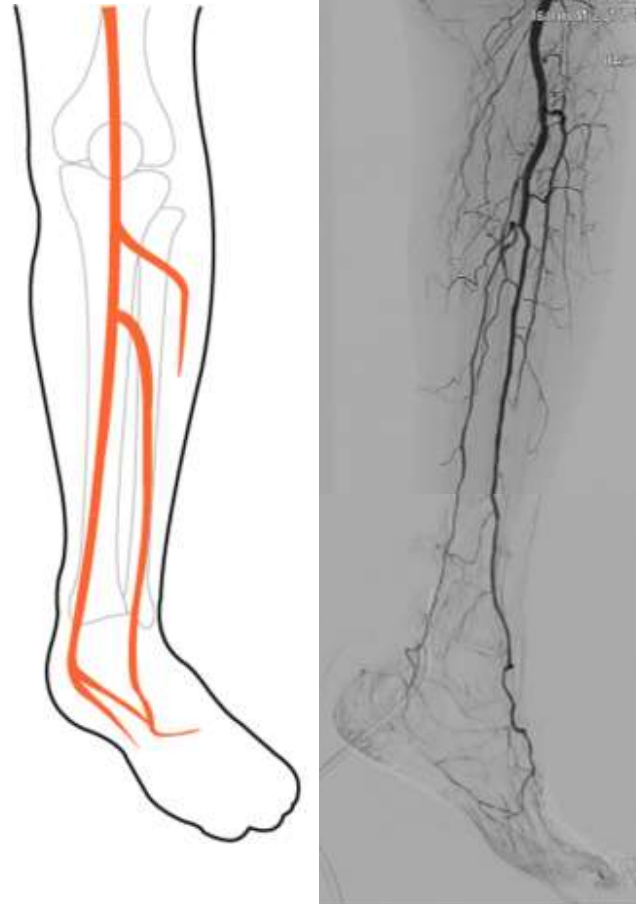
Type III-A

3.5~1.3%



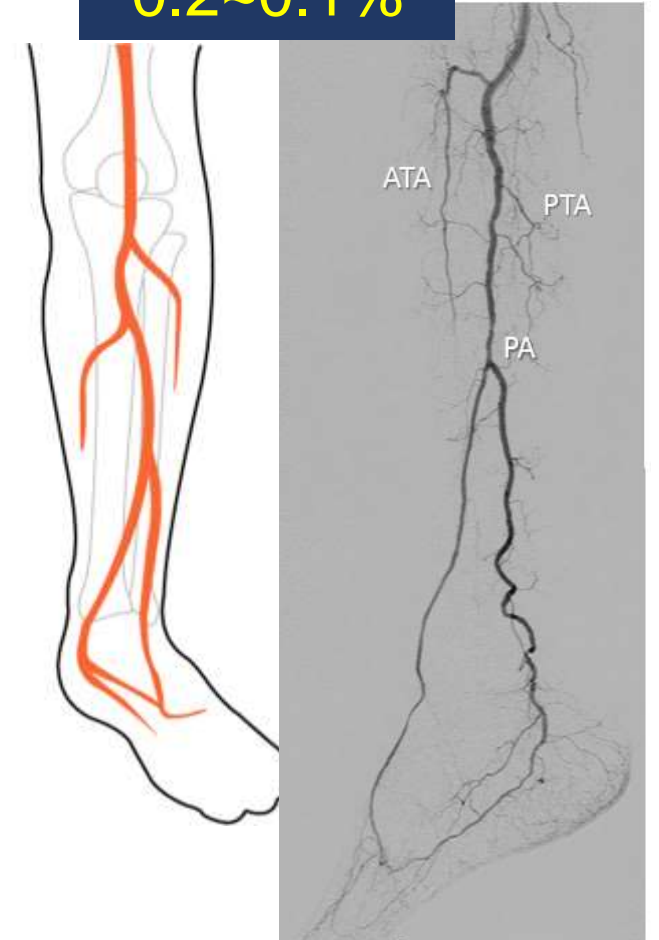
Type III-B

1.6~0.9%



Type III-C

0.2~0.1%



Comparison over 500 extremities by DSA and MDCT angiographic studies in popliteal artery variations

Ref	Year	N	IA(%)	IB(%)	IC(%)	IIA(%)	IIB(%)	IIC(%)	IIIA(%)	IIIB(%)	IIIC(%)
Demirtas H, et al. (1)	2016	1261	88.7	2.5	0.6	2.2	0.4	0.6	3.5	1.2	0.1
Calisirsir et al.(2)	2015	742	87	4.2	0.2	3.6	1.4	-	2.7	0.9	
Kil and Jung(3)	2008	1242	89.2	1.5	0.1	1.2	0.4	0	5.1	1.7	0.8
Day and Orme(4)	2006	1037	90.7	3.2	0.3	4.5	1.1	0.2	0.8	0.1	0.1
Kim et al(5)	1989	605	92.2	2.0	1.2	3.7	0.8	0.2	3.8	1.6	0.2
Pirker(6)	1970	2000	93.6	-	1.0	2.6	1.2	-	1.3	0.4	-



: MDCT



: DSA

- 1) Demirtaş H, et al. Diagn Interv Imaging. 2016;97:635-42.
- 2) Calisir C, et al. Jpn J Radiol 2015;33:13—20.
- 3) Kil SW, Jung GS. Cardiovasc Intervent Radiol. 2009;32:233-240
- 4) Day CP, Orme R. Clin Radiol. 2006;61:696-699tschr Geb Rount
- 5) Kim MD, et al. Ann Surg. 1989;210:776-781
- 6) Pirker. Fortschr Geb Rountgenstr Nuklearned. 1970;112:731-745

Top 4 common variations of popliteal artery branch



Type II A: High ATA

This angiogram shows a high tibial artery (ATA) branching off the popliteal artery at a high level, well above the knee joint. The main popliteal artery continues down the leg, with several smaller branches visible.



Type I B: Trifurcation

This angiogram illustrates a trifurcation of the popliteal artery. The main artery splits into three distinct branches: one continuing down the leg, and two others branching off at different levels, one higher and one lower than the main stem.



Type III A: PR-Planter

This angiogram shows a popliteal artery that branches into a posterior tibial artery (PTA) and a plantar artery. The plantar artery runs along the bottom of the foot, providing blood flow to the plantar surface.



Type III A: PR-Dorsal

This angiogram shows a popliteal artery that branches into a posterior tibial artery (PTA) and a dorsal artery. The dorsal artery runs along the top of the foot, providing blood flow to the dorsal surface.

Conclusion

- ✓ Variation of popliteal artery can be seen in almost 10%
- ✓ The most common variations were a high ATA (type IIA), followed by trifurcation (type IB), distal PTA replaced by PR (type IIIA) and distal ATA replaced by PR (type IIIB)
- ✓ Awareness of the terminal branching pattern before intervention enhances the planning and could reduce unexpected arterial injury



Thank you for your attention