



Controversies & updates in Vascular Surgery

Paris - february 09 2019

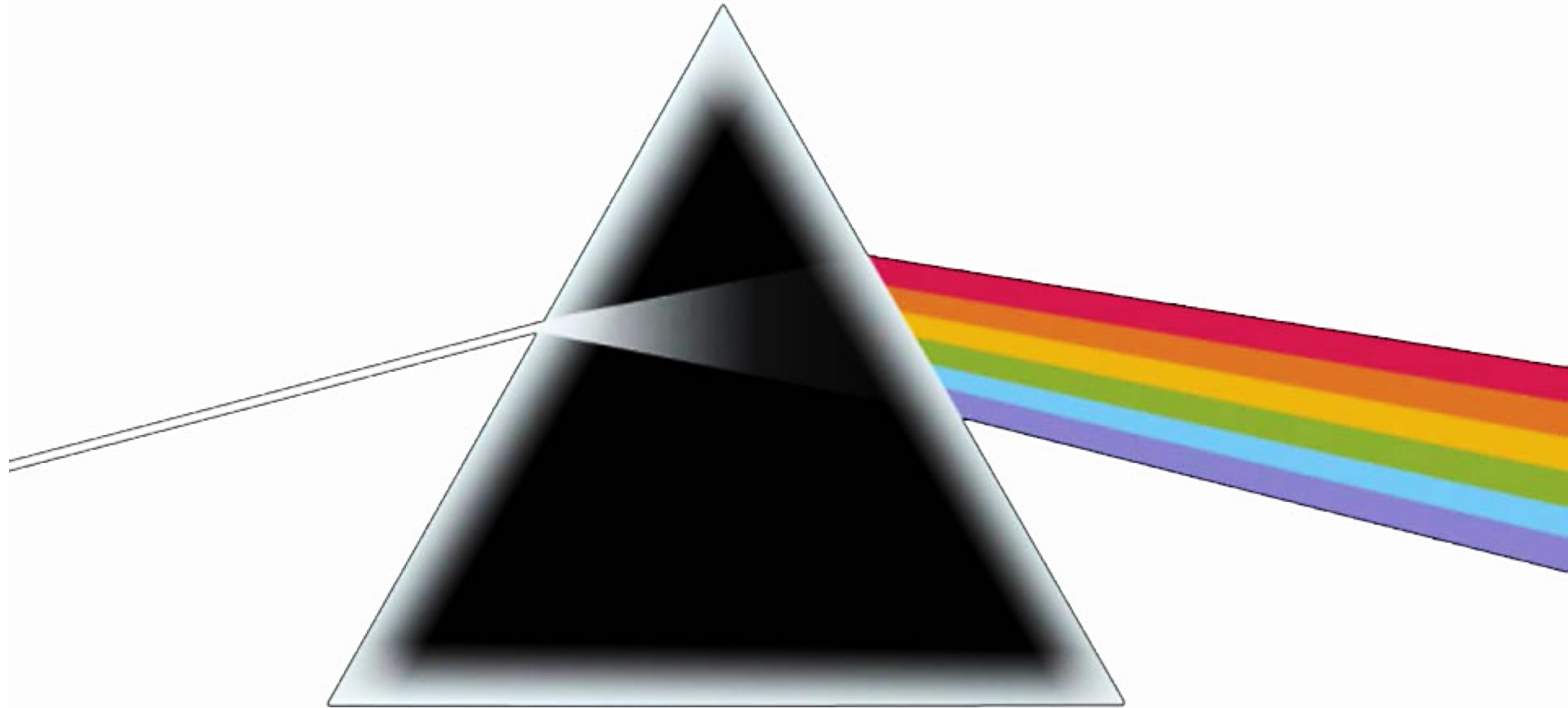
Venous session

Bone perforators

Pathogenesis and duplex investigation

Philippe LEMASLE

Le Chesnay - France



I have no financial relationship to disclose

bone perforator : bibliography

- 1962 (1 cas) Schobinger R and Weinstein CE. Varix involving the tibia. J Bone Joint Surg Am 1962; 44-A: 371-376
- 1997 (6 cas) - Boutin RD & al. Intraosseous venous drainage anomaly in patients with pretibial varices : imaging findings. Radiology 1997 ; 202 : 751-7
- 1999 (1 cas) - Diaz-Candamio & al. **Intrafibular varix** : MR diagnosis. J. Comput. Assist. Tomogr. 1999 ; 23 : 328-30
- 2000 (1 cas) - Peh WC. & al. Intraosseous venous drainage anomaly of the tibia treated with imaging-guided sclerotherapy. Br J Radiology 2000 ; 73:80-82
- 2009 (3/1 350) - Jung SC & al. Unusual causes of varicose veins in the lower extremities : CT, veinographic and Doppler US findings. Radiographics 2009 ; 29 : 525-36
- 2010 (1 cas) - Mirault T. Anomalie du drainage veineux intraosseux, une cause rare de varices pré-tibiales. J Mal Vasc 2010 ; 35 : 373-6
- 2010 (1 cas) - Lemasle P. Cas clinique in Atlas d'écho-anatomie - tome 7 : bases biophysiques de l'imagerie ultrasonore - Laboratoires Tonipharm.
- 2013 (1 cas) - Kwee RM & al. Intraosseous venous drainage of pretibial varices. Skeletal Radiol. 2013 ; 42 : 843-7
- 2014(2 cas) - Ramelet AA & al. MVC sur anomalie de drainage veineux intraosseux : perforantes osseuses ? Phlebologie 2014 ; 67 : 78-80
- 2016 (1 cas) - Barra de Moraes F. Intraosseous anomalous drainage : a rare case of pretibial varicos vein. Rev Bras Orto 2016
- 2016 (35 cas) - Ramelet AA & al. Anomalous intraosseous venous drainage : bone perforators ? Phlebology 2016 ; 32 : 241-8

bone perforator : typology

- sex ratio

		♀
Boutin RD	5	1
Dia-Candiamo MJ	1	
Peh WC	1	
Jung SC	1	2
Mirault T	1	
Lemasle P.	3	3
Ramelet AA	2	
Ramelet AA n=32 - 35 cas	19	13
Barra de Moraes	1	
	R = 1,7	
	34 (65%)	19 (35%)

- symptomatic varicose veins = 30/35 (86%) - Ramelet

- location

- tibia = 54/55 (98%)

- fibula = 1/55 (2%)

bone perforator : arterial vascularization

POST. TIBIAL artery



centromedullar or NUTRIENT a. of the tibia



bone cortical



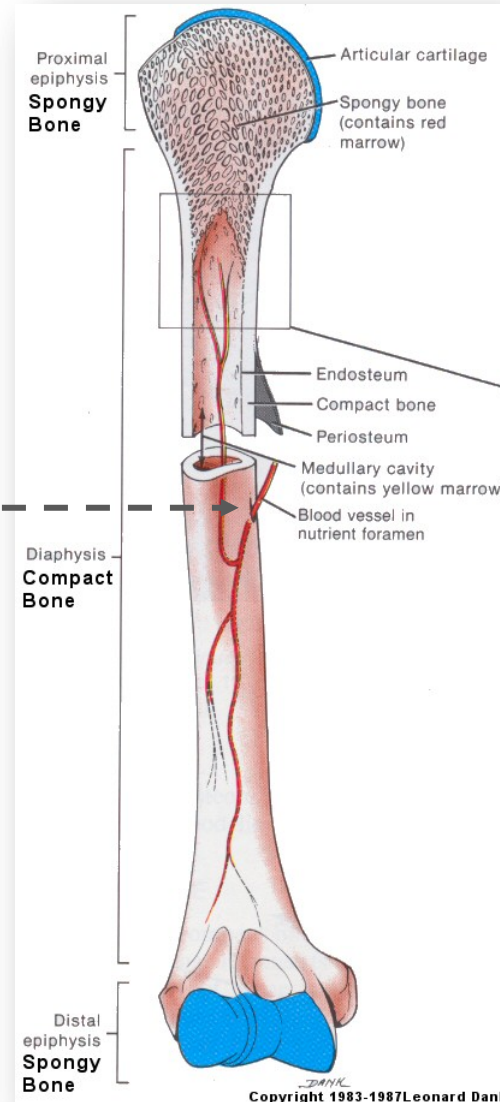
upper & lower tributaries



mesh medullar network



COMPACT BONE
≈ diaphysis



main feeder hole

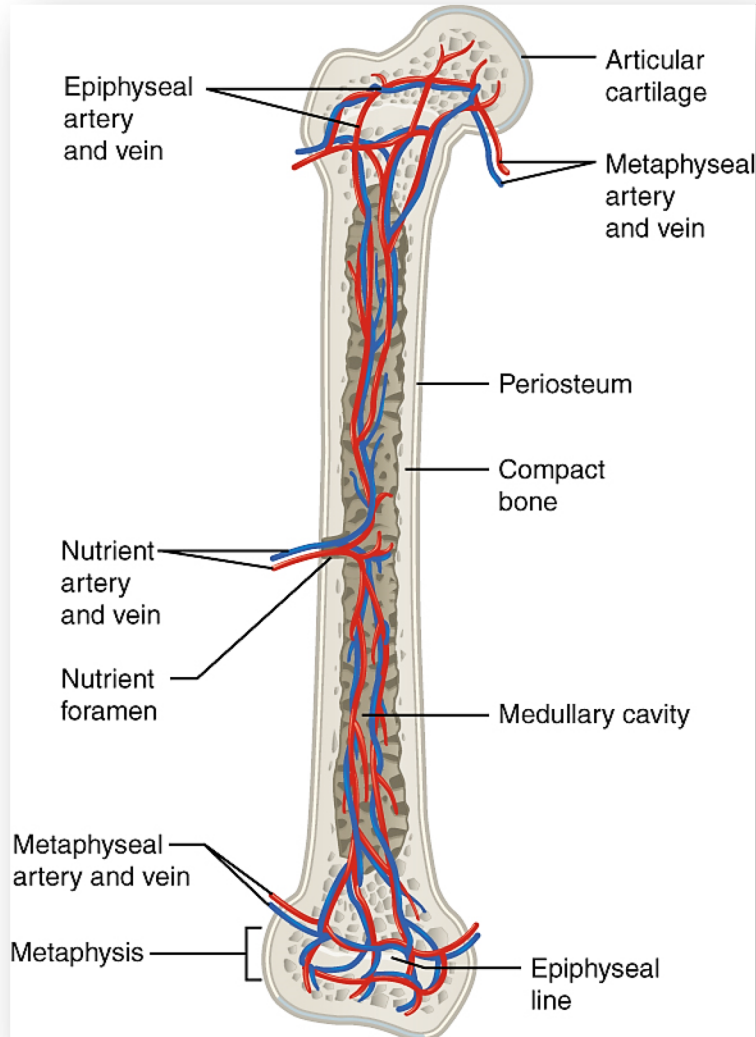
- **POSTERIOR** side
- middle 1/3

Jean Cruveilhier : 1791 - 1874

- 1828 : atlas d'anat. pathologique - T1
- 1834 : traité d'anat. descriptive

Léonard Dank

bone perforator : arterial vascularization



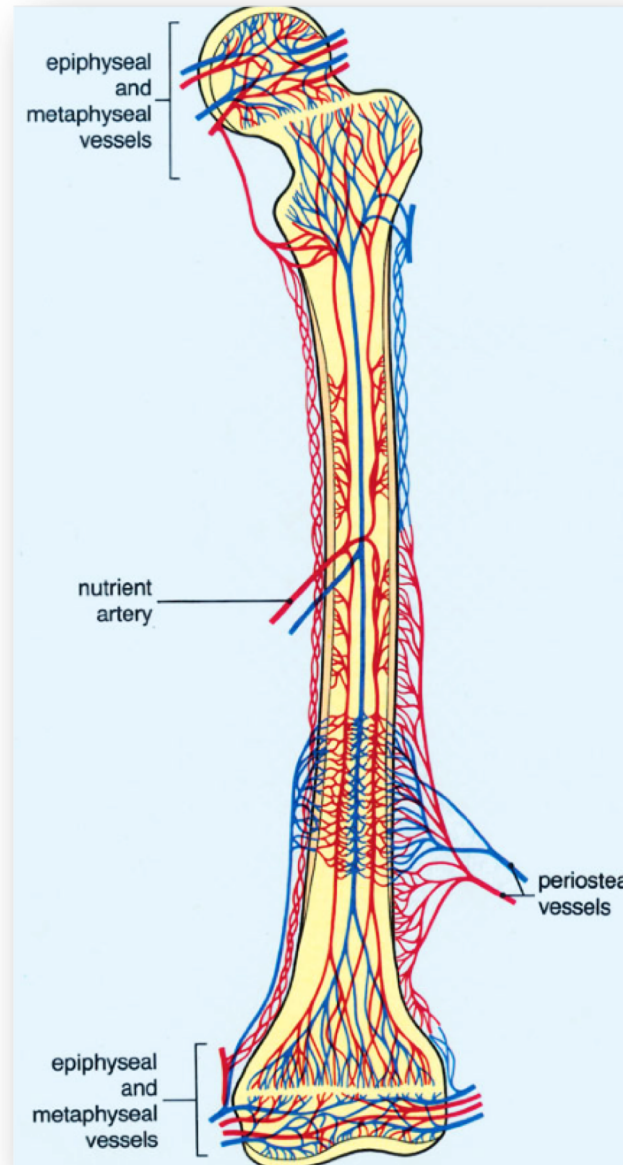
METAPHYSEAL α .

secondary
feeder
holes

CANCELLOUS BONE

*metaphysis
& epiphysis*

bone perforator : arterial vascularization



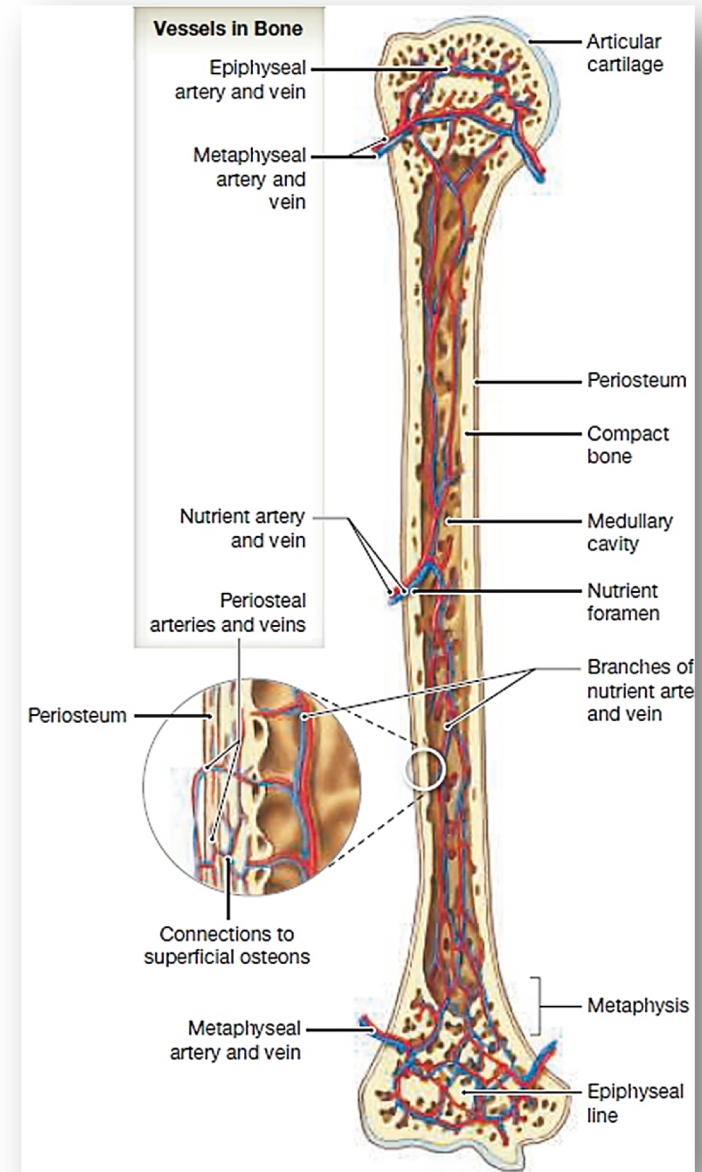
*inf. genicular arteries
+ tibial ANT + tibial POST
+ fibular arteries*

multiple
feeder hole

PERIOSTEUM

bone perforator : arterial vascularization

- 3 arterial networks
 - nutrient artery
 - metaphyseal arteries
 - periosteal arteries
- multiples arterial connexions
 - >> numerous transcortical holes
- parallel path of the veins
 - >> many physiological "bone perforator"



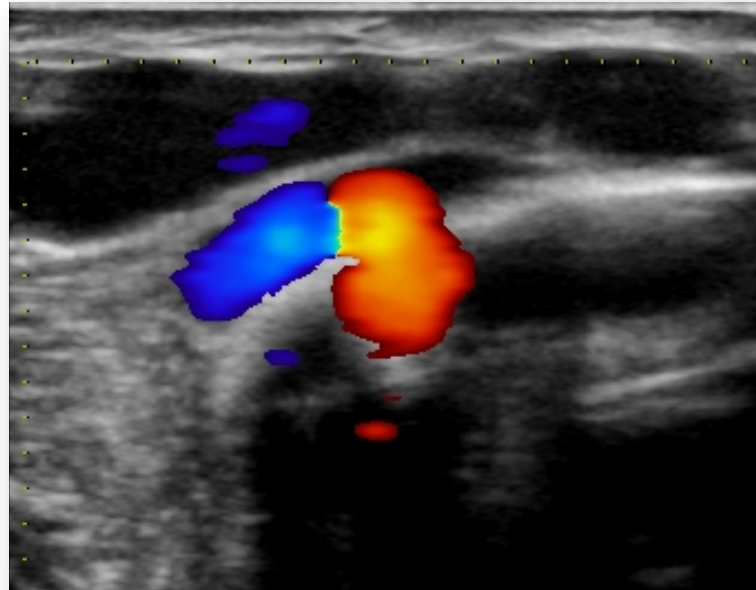
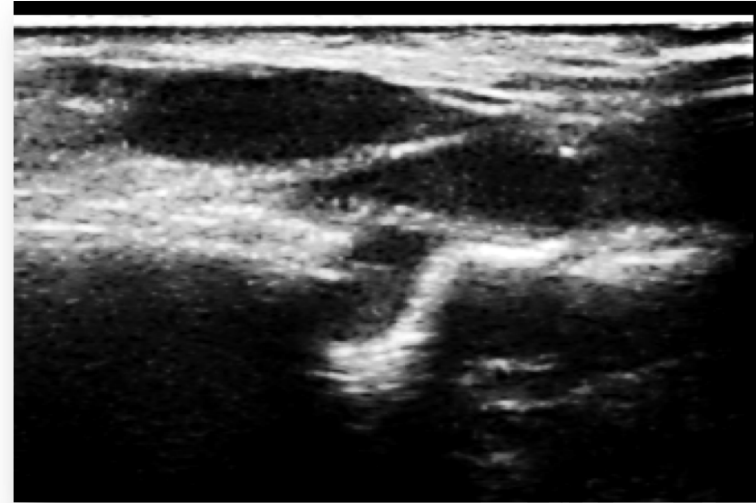
bone perforator : clinical aspect



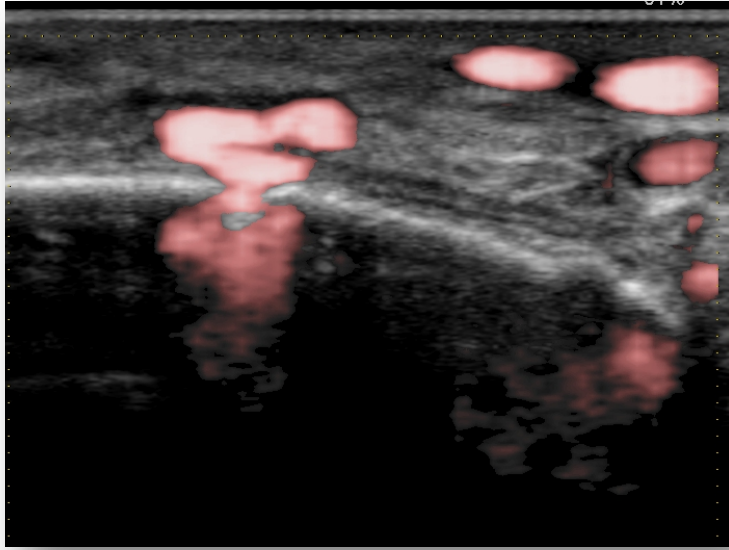
location

- in my practice, always on the anteromedial side of the middle 1/3 of the tibia
- Ramelet study
all patients with VV ou skin changes of the medial aspect of the tibia

bone perforator : duplex investigation

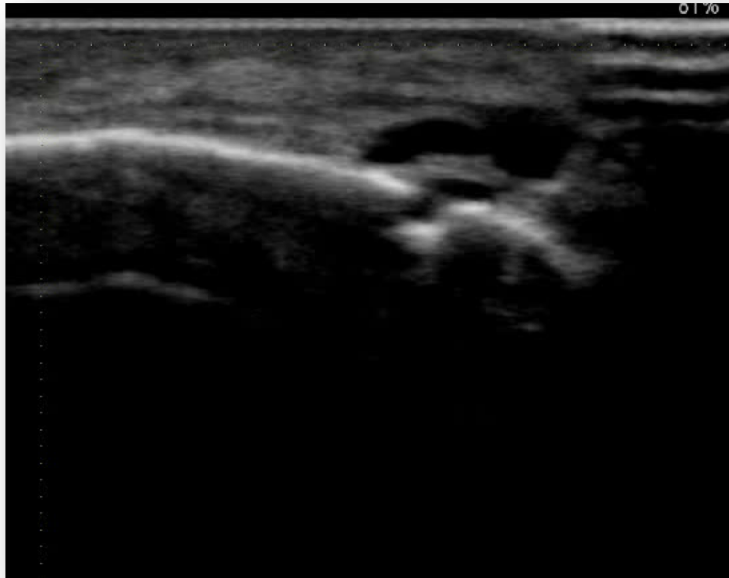


bone perforator : duplex investigation

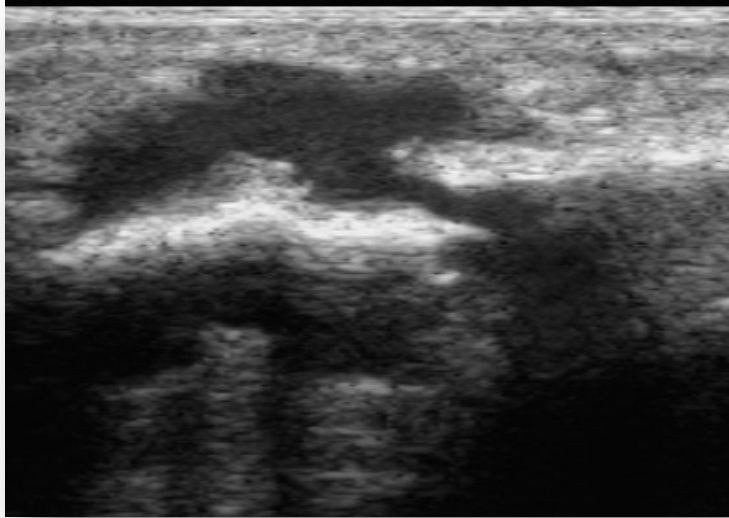


3 US criteria

- venous dilatations on the anteromedial side of the tibia
- cortical defect
- "reflux" through this cortical hole

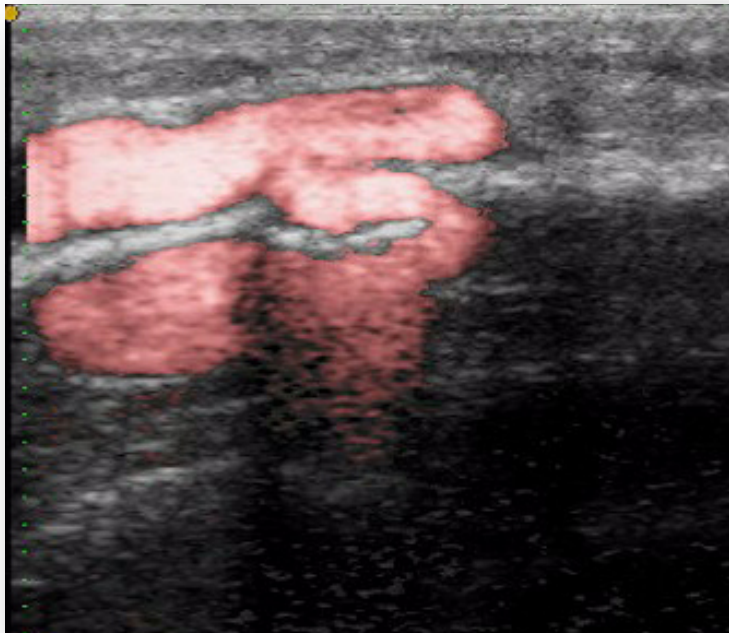


bone perforator : duplex investigation

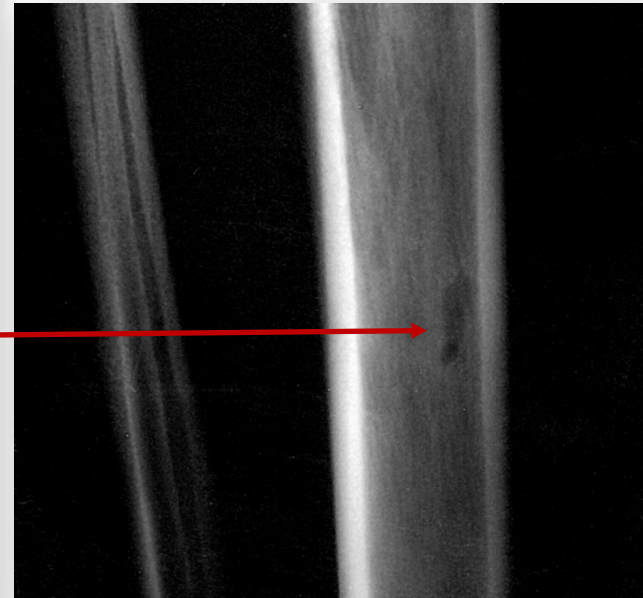
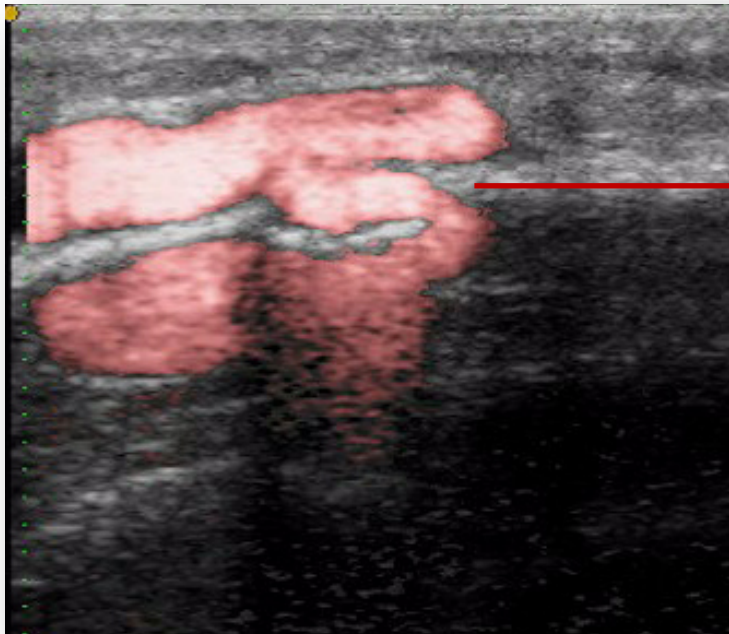
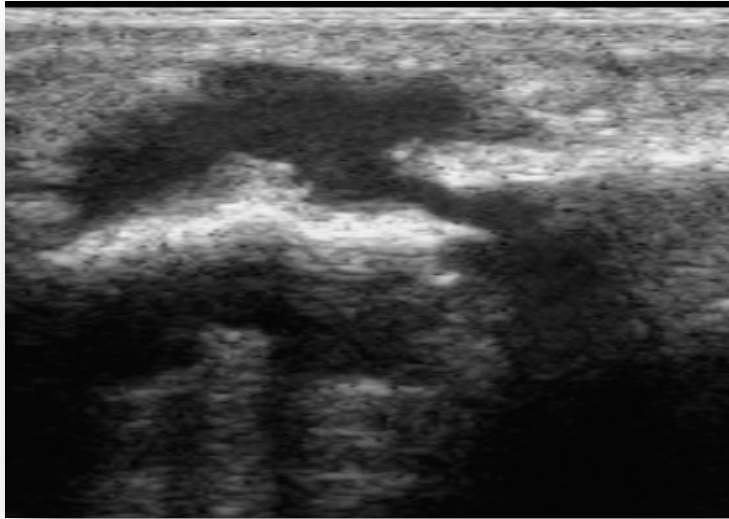


3 US criteria

- venous dilatations on the anteromedial side of the tibia above and below the cortical bone
- cortical defect
- "reflux" through this cortical hole

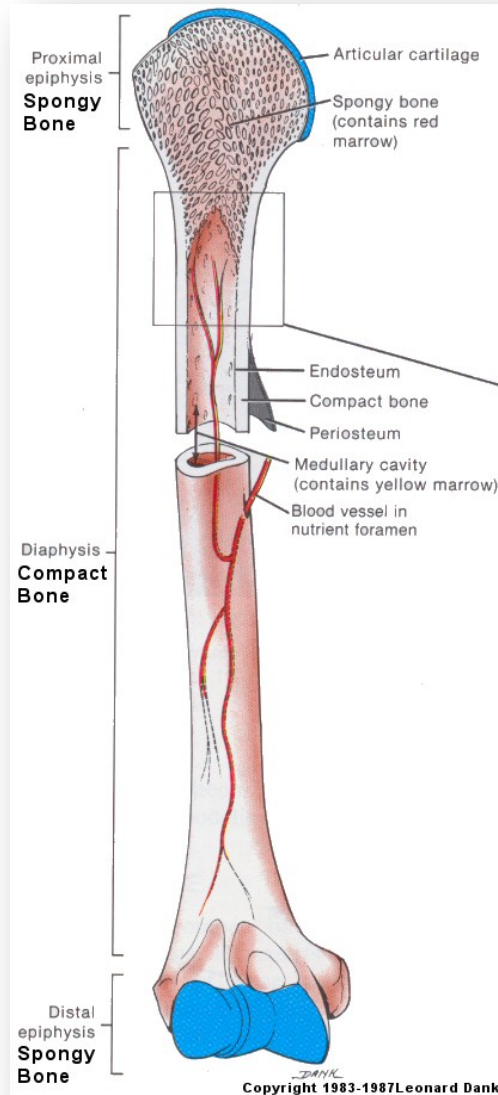


bone perforator : radiological image



bone perforator : pathogenesis

bone perforator : pathogenesis

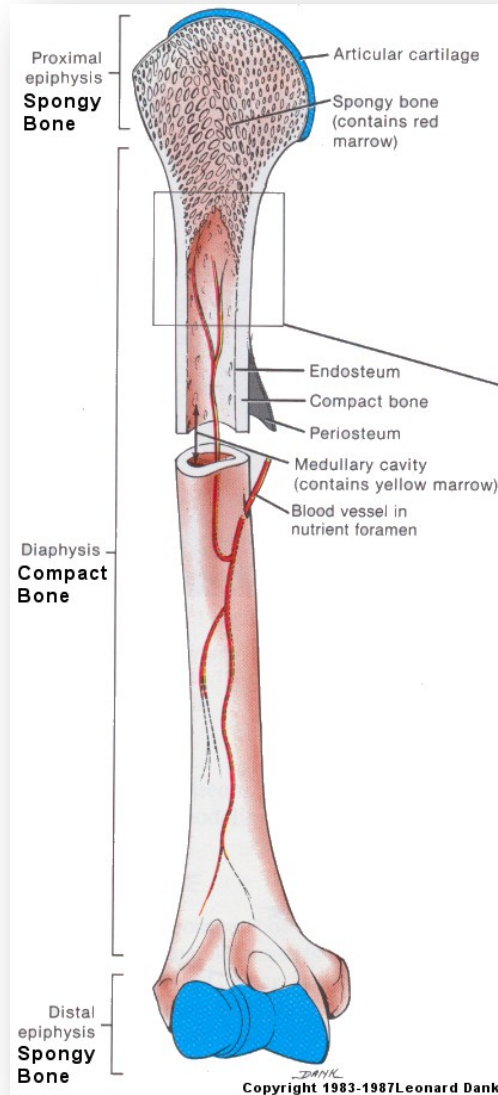


1 - CENTROMEDULLAR a.
= main artery

>> main bone venous drainage
= CENTROMEDULLAR v.

2 - this vascular pedicle goes through a hole located at the **POSTERIOR** face of the middle 1/3 of the tibia

bone perforator : pathogenesis



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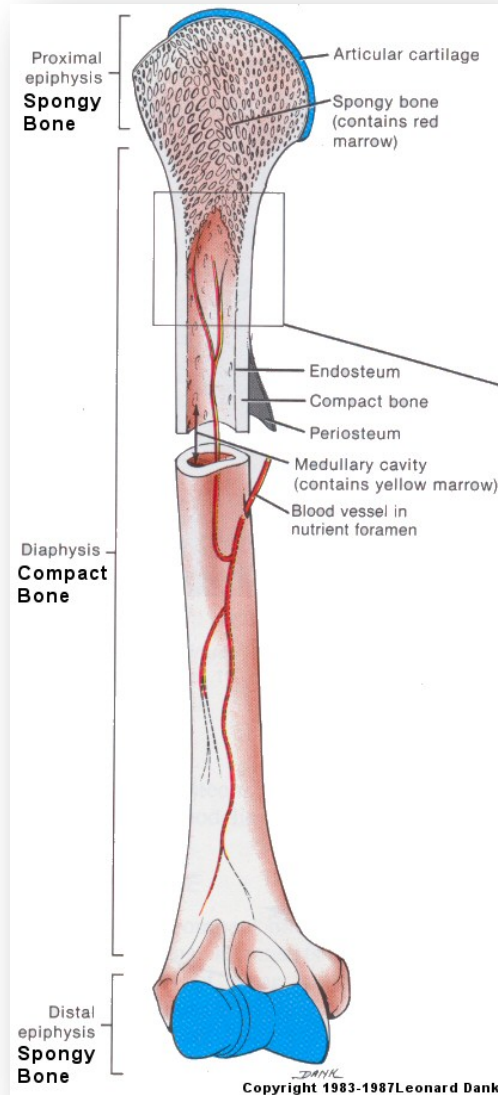
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= **CENTROMEDULLAR v.**

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but the main clinical expression is on the **MEDIAL** side of the tibia



bone perforator : pathogenesis



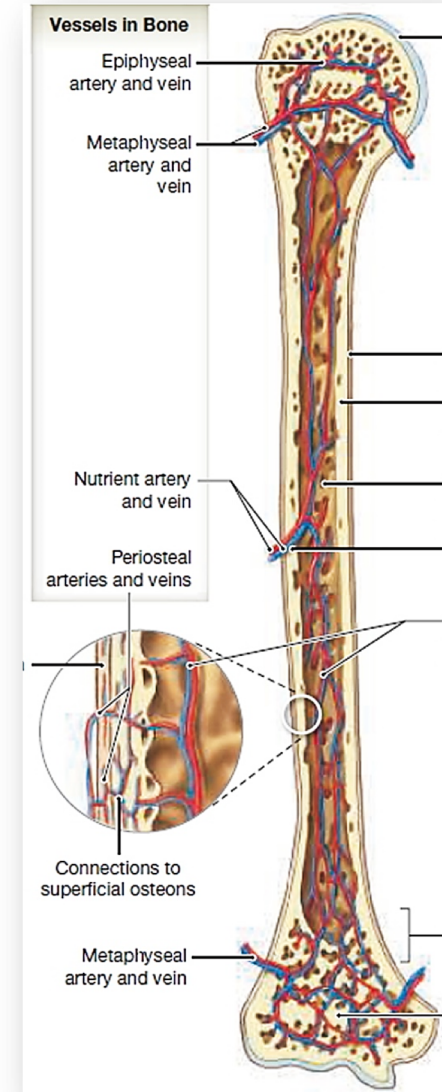
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2 - this vascular pedicle goes
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but the main clinical expression is on
the **MEDIAL** side of the tibia

probably communication
between periosteal & nutrient v.

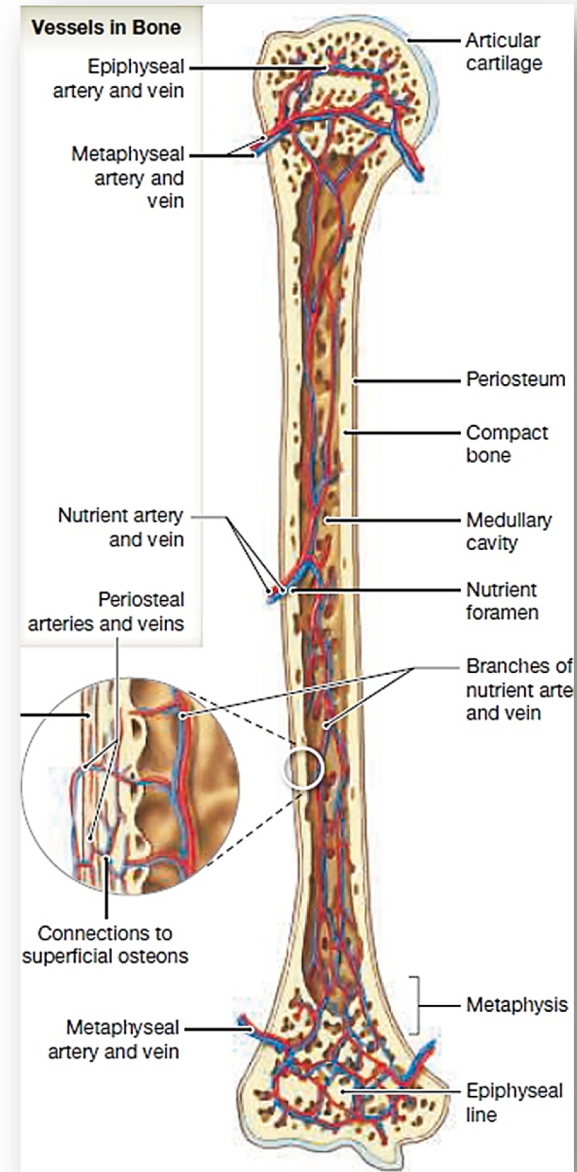


bone perforator : pathogenesis

Why intraosseous venous drainage is not done by the main vein ???

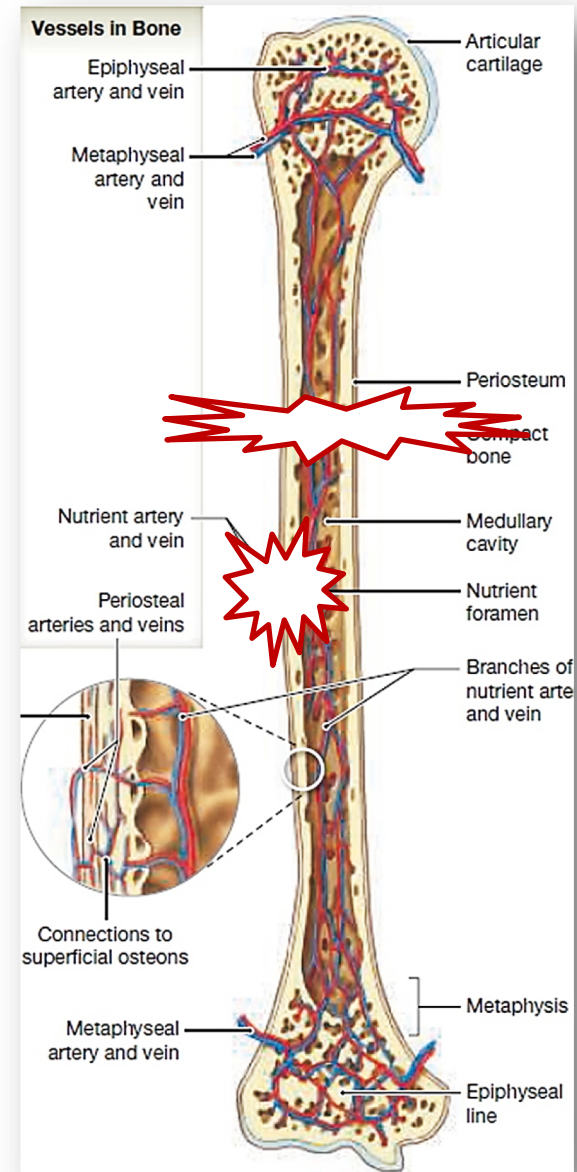
bone perforator : pathogenesis

- congenital malformations
 - absence of the posterior main feeder hole
 - hypo or agenesis of the nutrient vein
- >> interruption of the drainage of the nutrient vein



bone perforator : pathogenesis

- a trauma
 - local trauma
 - >> closing the feeder hole
 - diaphyseal fracture
 - >> interruption of the drainage of the nutrient vein

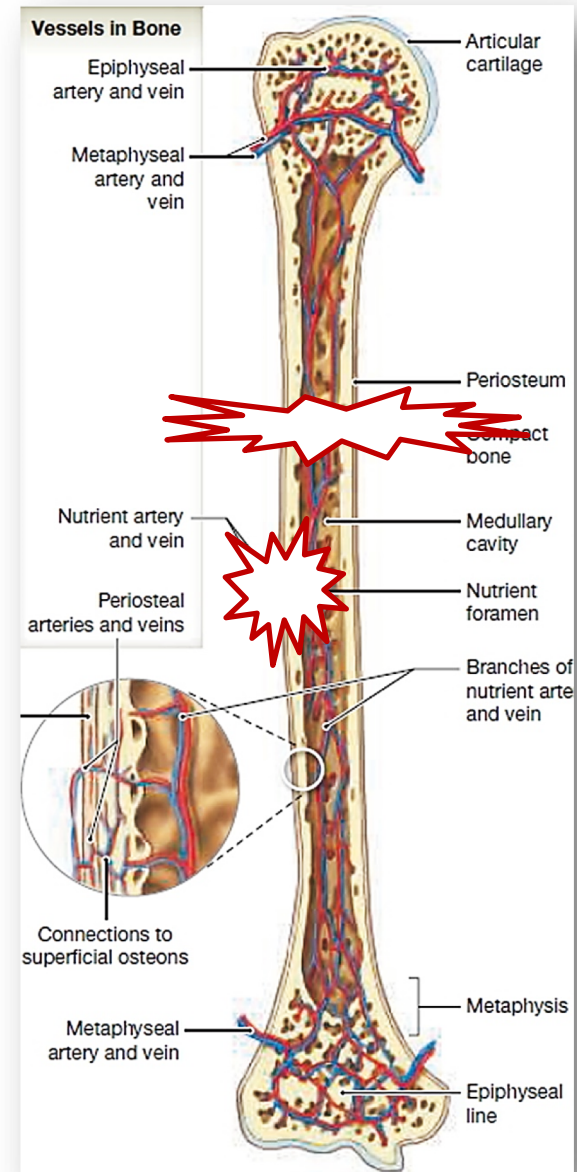


bone perforator : pathogenesis

- a trauma
 - local trauma
 - >> closing the feeder hole
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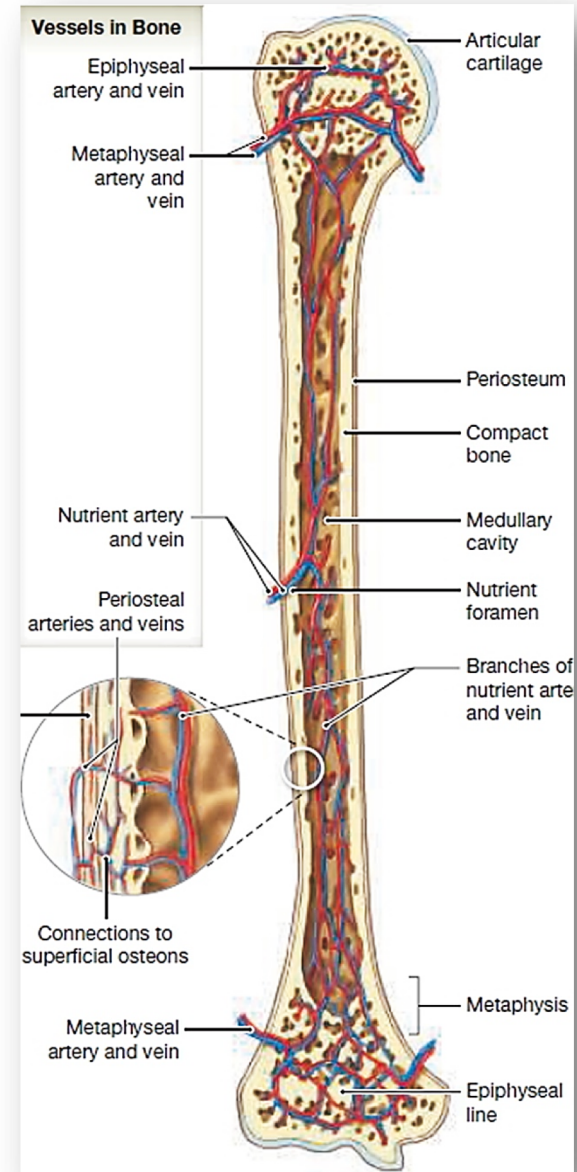
- >> interruption of the drainage of the nutrient vein

- but major traumatism of the leg in only 6/34 legs (12%)



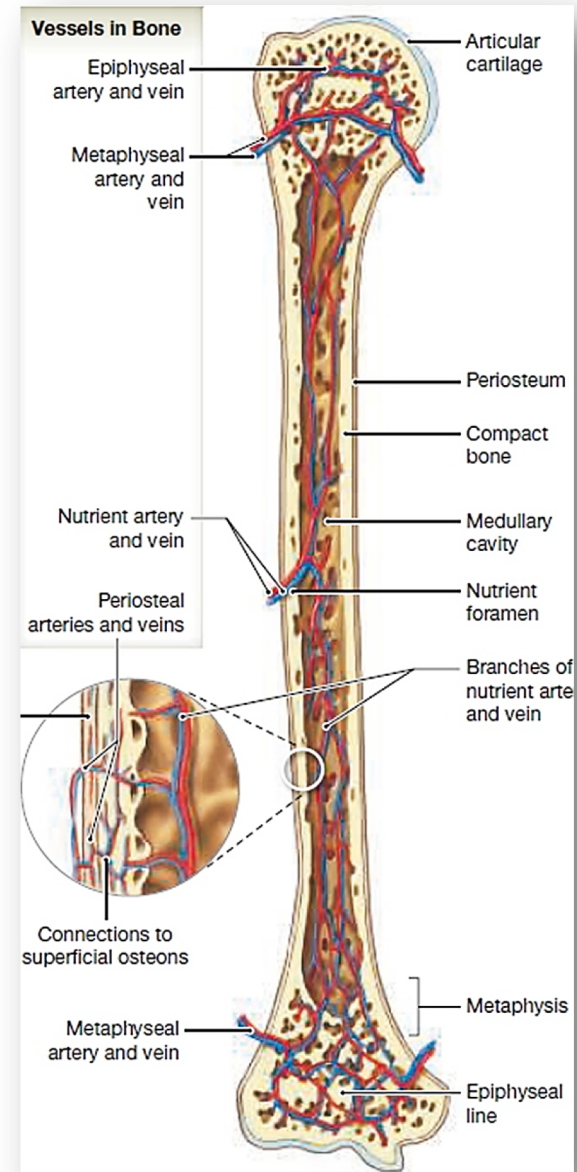
bone perforator : pathogenesis

- hyperpressure in the nutrient vein
secondary to
primitive or post-thrombotic reflux
in the posterior tibial vein
or more general venous insufficiency



bone perforator : pathogenesis

- hyperpressure in the nutrient vein secondary to primitive or post-thrombotic reflux in the posterior tibial vein or more general venous insufficiency
- but incompetent posterior tibial vein in only 3/35 legs (9%)



bone perforator : pathogenesis

why this pathology is only located in the tibia ?

- role of hydrostatic pressure ?
- role of mechanical stress ?

bone perforator : **conclusion**

- bone perforators are physiological
- **PATHOLOGICAL BONE PERFORATORS**
are the expression of anomalous intraosseous venous drainage
- no certainty about the mechanism - probable several possible causes +/- associated
- ultrasound diagnosis is easy

