

2023 MID-ATLANTIC CONFERENCE
11th ANNUAL CURRENT CONCEPTS IN
VASCULAR THERAPIES

2023

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CEPHALIC VEIN THROMBOSIS
WITH ILLUSORY AIR SIGN

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VASCULAR THERAPIES

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Podiatric Evaluation of Atherosclerosis: When Should the PCP Send a Patient to Podiatry?

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Disclosures

- None pertinent to the subject matter of this lecture.

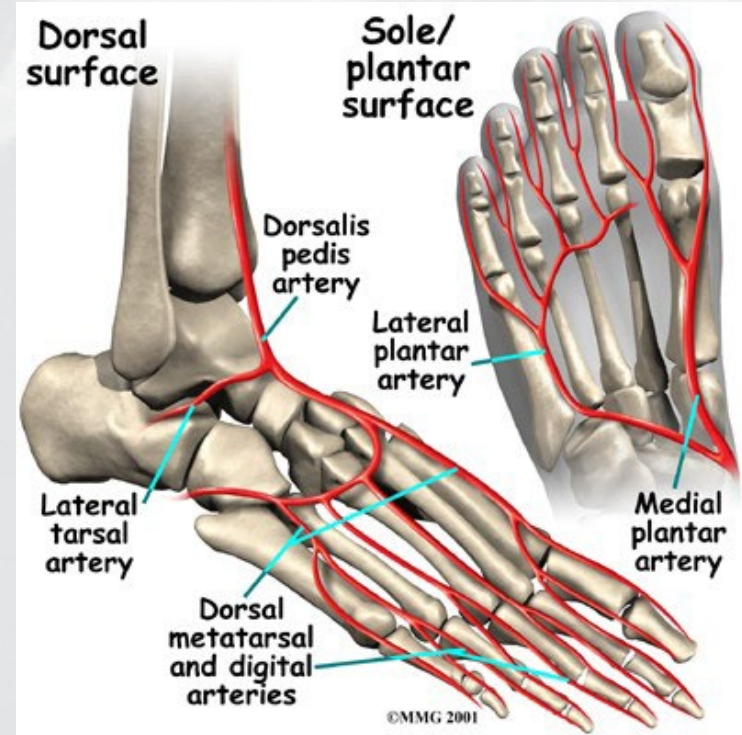
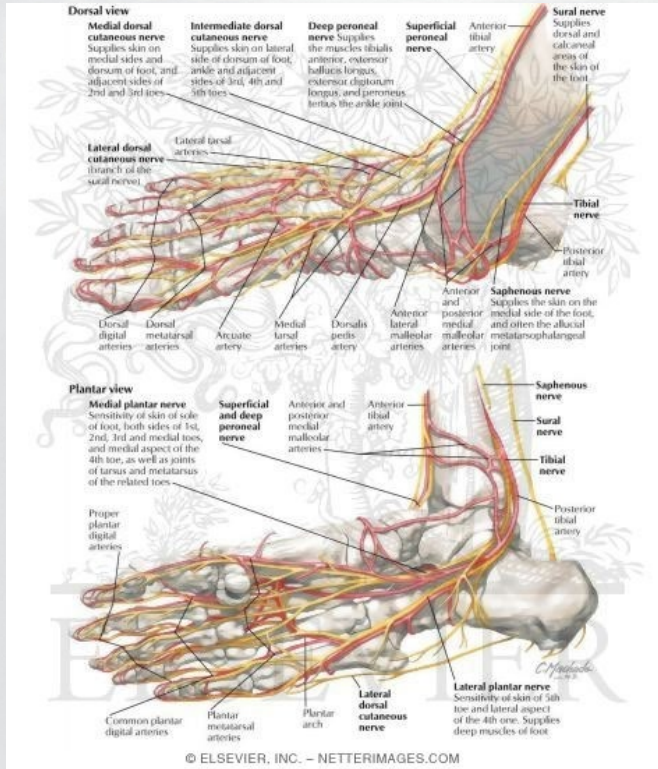
Diagnosis of Atherosclerosis

- Primary testing: Angiogram, PVL/PVR, Arterial Duplex
- Risk Factors: Cholesterol tests, Chest x-ray, Glucose and HbA1c

When to place referral?

- Foot Exam
 - Orthopedic: Foot pain, weakness, pain on ambulation, “pain resolving with hanging foot off the bed”
 - Derm: Xerosis, Tinea Pedis, Ecchymosis, Tightening, Gangrene
 - Neurological: Decreased or Altered Sensation, Positive Tinel’s Sign

Foot Vascular Anatomy



Foot Vasculature

- Dorsalis Pedis, Posterior Tibial, and Peroneal Arteries
 - DP and PT palpable, Peroneal not palpable
 - All 3 dopplerable
 - PT artery provides dominant flow to the foot
 - mean flow for lower extremity: 284+/-21 mL/min in the common femoral (CFA); 152+/-10 mL/min in the superficial femoral (SFA); 72+/-5 mL/min in the popliteal; and 3+/-1 mL/min in the dorsalis pedis.
 - Collateral Flow
 - Antegrade versus Retrograde

Vascular Exam

- Vascular Exam
 - Pulses
 - Dorsalis Pedis and Posterior Tibial Arteries: Are they palpable?
 - Doppler: Monophasic, Biphasic, Triphasic?
 - Capillary Refill for Digits
 - Edema
 - Mottled appearance

Doppler

- **Triphasic:** the result of the combination of ventricular systole, elasticity of the blood vessels and the backflow caused by the closing of the semilunar valves.
- **Biphasic:** the result of ventricular systole and the elasticity of the blood vessels.
- **Monophasic:** the flow of blood is no longer pulsatile.

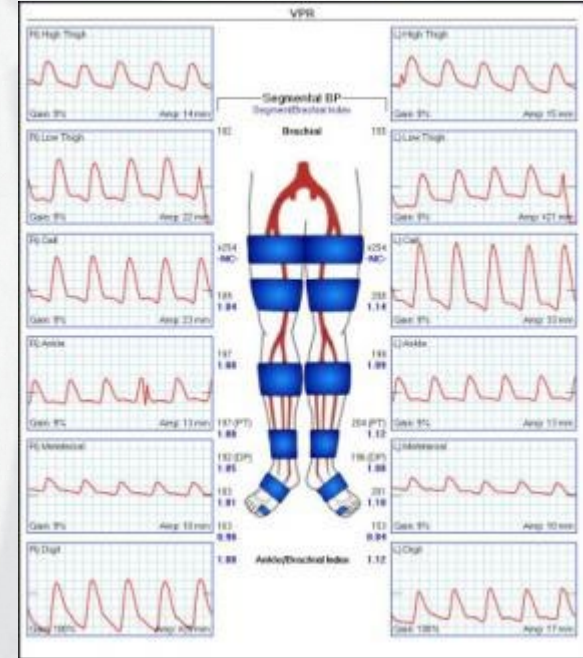
Advanced Studies

- PVL/PVR
 - Review waveforms and ABIs/TBIs
 - Diagnostic Angiogram
 - Non-compressible vessels

Clinical Presentation	Ankle-Brachial Index
Normal	> 0.90
Claudication	0.50-0.90
Rest pain	0.21-0.49
Tissue loss	< 0.20

Values >1.25 falsely elevated; commonly seen in diabetics

Am J Cardiol 2001; 87 (suppl): 1D-13D
NEJM 2001; 344: 1698-1671



Differentiating Advanced Studies

- PVL versus Arterial Duplex indication
 - Duplex indicated in setting of prior bypass graft
- Venous FYI: Venous study to rule out DVT will assess for Venous Valvular Reflux: No need for separate order. Venous Duplex assess for graft harvest for bypass.

Diabetic Patients

- Prolonged hyperglycemia is a high risk factor for atherosclerosis
 - Insulin is an anabolic hormone, and its deficiency leads to various metabolic abnormalities in proteins, lipids, and carbohydrates while lipid metabolism alteration is a risk factor for atherosclerosis
 - Also linked to oxidative stress and altered protein kinase signaling

Diabetic Patients

- DM is one of the most common co-morbidities within the U.S. 37.3 million, or 1 in 10, Americans diagnosed with DM
- Cost for DM management per year is \$327 billion dollars
- Increased risk of mortality due to DM
- Diabetic foot ulcers are a common problem in our field
- Arteries at 5 cm above the ankle were more severely stenotic in diabetics than in non-diabetics (Mozes, et al)

Diabetic Patients – Why Important?

Infection Concerns

- Noted increased risk for deep space infection in DM patients with ulcers versus non-diabetic patients. Incidence of deep wound infection in diabetic patients was reduced after implementation of a protocol to maintain mean blood glucose level less than 200 mg/dL (Zerr, et al, 1997)

Surgical Intervention

- 59.3% of participants underwent further surgery following initial surgical treatment. During 12 months, 45.7% of participants presented with a new ulcer at a different site. (Vassallo, et al, 2019)

Diabetic Patients – Why Important?

- Out of 90 diabetic patients with first-ray amputations, 60% went on to a second amputation, 21% a third amputation, 7% a fourth amputation, 11% had a TMA
- 49% of patients with amputations developed a contralateral foot infection within 18 months following an amputation, and 50% of patients who undergo a lower extremity amputation will require an amputation on the contralateral limb within 2 years (Yao et al, 2012)
- 1-year survival of 77% after TMA, 79% after midfoot amputations, but only 53% following BKA or AKA (Stone, et al, 2005)
- Vascular optimization's role in limiting repeat procedures
- Conservative consideration



Atherosclerosis and Amputation

- Vascular relationship is key
 - Angiogram with possible intervention for optimization
 - Reviewing Imaging
 - Antegrade versus retrograde approach
 - Artery supply in relationship to procedure need

Atherosclerosis and DM

- Diabetes mellitus has been associated with a 2- to 4-fold increase in the prevalence of PAD.
- Of those with PAD, $\approx 20\%$ to 30% have diabetes mellitus. Within the population of PAD, the estimated prevalence of diabetes mellitus ranges from 27% to 76% .
- Those with DM and PAD carry a risk of amputation that is $4\times$ higher than the national average.
- Studies have demonstrated that 25% to 90% of amputations within studied populations are associated with diabetes mellitus.
- 50% of patients with a diabetic ulcer have PAD (Barnes, et al)

Atherosclerosis and Amputation

- Amputation Data
 - Amputation rates had steadily declined from 1996 to 2011 in patients not affected by DM and PAD
 - Compared to those with PAD and DM, a California study from the same group as above focused on those with ulceration found amputation rates increased nearly 3-fold between 2005 and 2013, from 10% to nearly 30%, among patients with diabetes mellitus and PAD

Patient Expectations

- Care team
- Small Vessel Disease
 - Compromise of digital arteries
 - Unable to pursue intervention
 - Blood thinners, topicals
- Surgical planning and expectations
- Conservative Management
- Annual to Semi-annual follow ups with ABIs can limit risks

Thank you!

- Questions?

References

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[Healing and Mortality Rates Following Toe Amputation in Type 2 Diabetes Mellitus - PubMed \(nih.gov\)](#)
[Hemoglobin A1c predicts healing rate in diabetic wounds - PubMed \(nih.gov\)](#)
[Glucose control lowers the risk of wound infection in diabetics after open heart operations - PubMed \(nih.gov\)](#)