



Case Based Teaching: Manifestations of Systemic Diseases on the CV System

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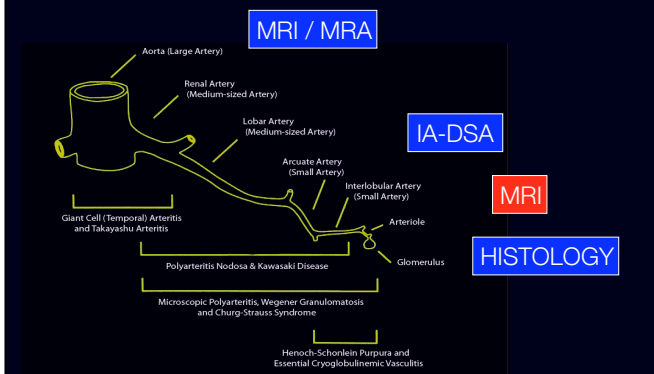
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ISMRM 2009 | Honolulu, HI

MR Tools For Imaging the Vasculature

What can we image?

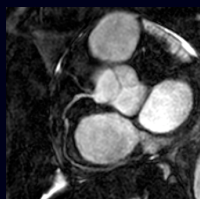


Imaging of Vessel Lumen

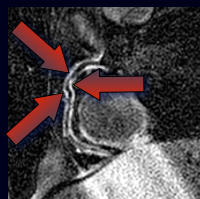


Imaging of Vessel Wall

- (x) Inversion Recovery
 - single, double, triple, quadruple



bSSFP



Double IR

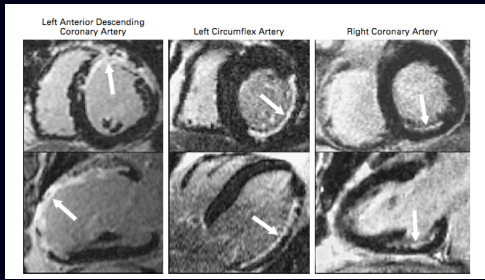
Cardiac Function

- standard bFFE/TrueFISP/FIESTA sequences



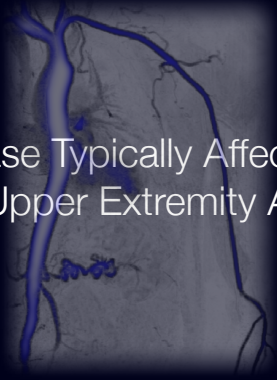
Microvascular Dysfunction

- Late enhancement



Kim, NEJM 2000; 343: 1445-1453

Disease Typically Affecting Larger Upper Extremity Arteries



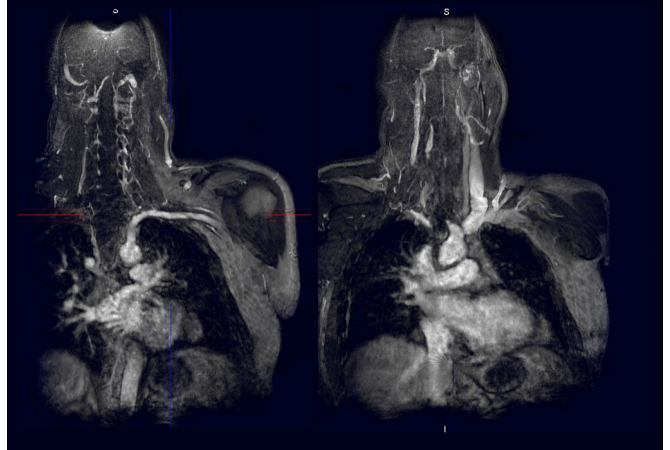
1st dynamic

2nd dynamic

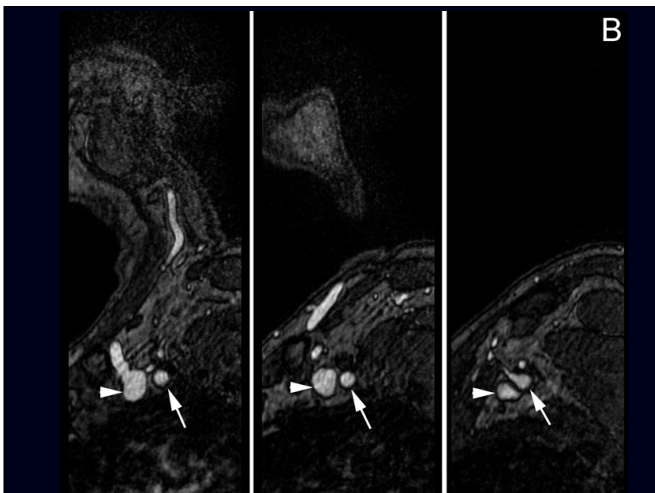


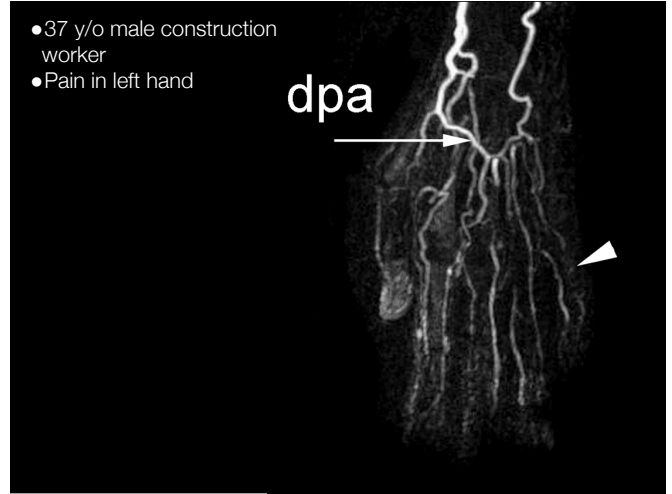
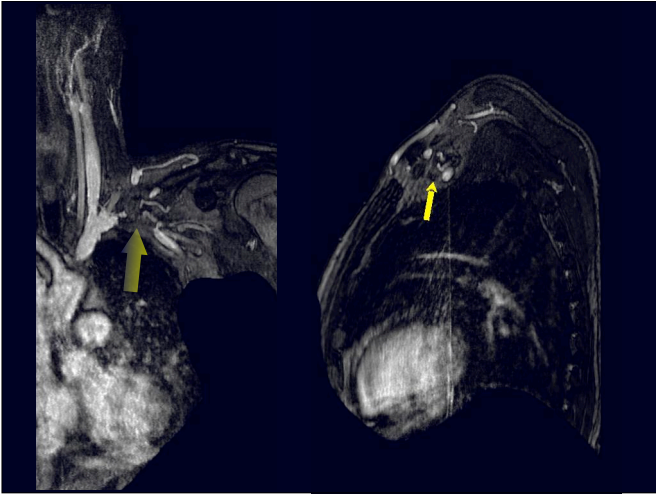
Arterial cMPR

Venous cMPR



B





Hypothenar Hammer Syndrome

- Finger ischemia due to embolic occlusion of digital arteries coming from ulnar artery
- caused by repetitively striking objects with heel of hand
- typically seen in carpenters, mechanics, mountain bikers, staplers

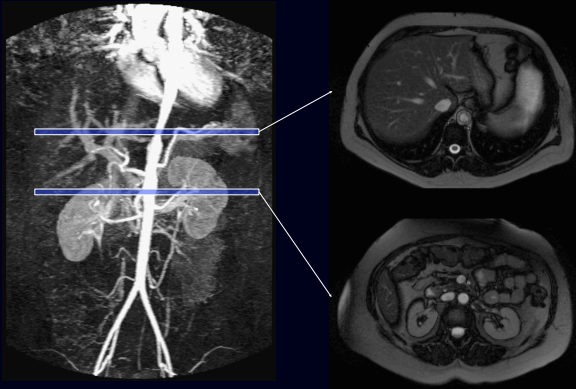
Vasculitis

- Inflammation of vessel wall
 - infectious and non-infectious etiology
 - any type, size
 - any organ
 - wide variety of signs and symptoms
- Accurate identification important
 - substantial differences in prognosis

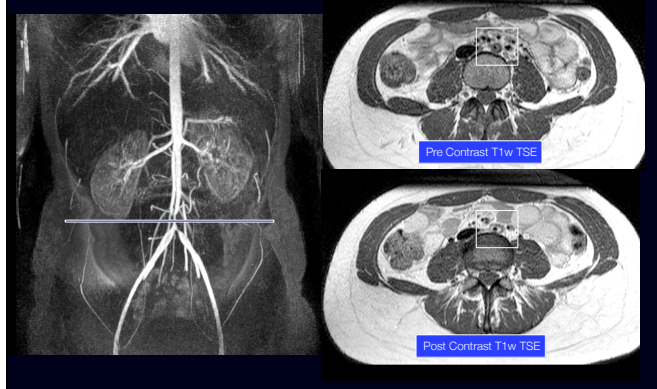
高安右人博士!



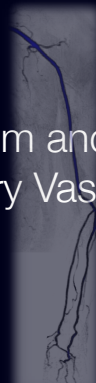
Vessel Wall Imaging



Vessel Wall Imaging



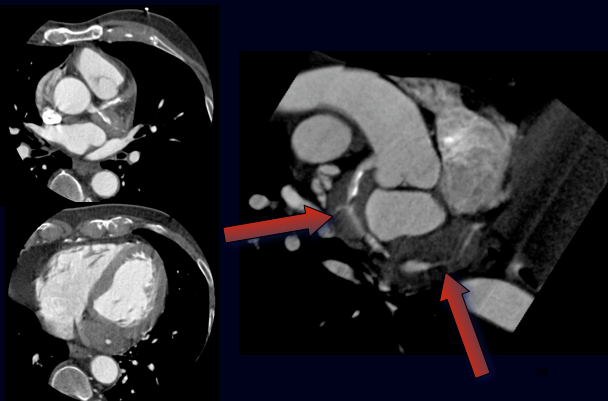
Medium and Small Artery Vasculitis



72 y/o male presenting with CP



Incidental discovery of Kawasaki



11 y/o with claudication

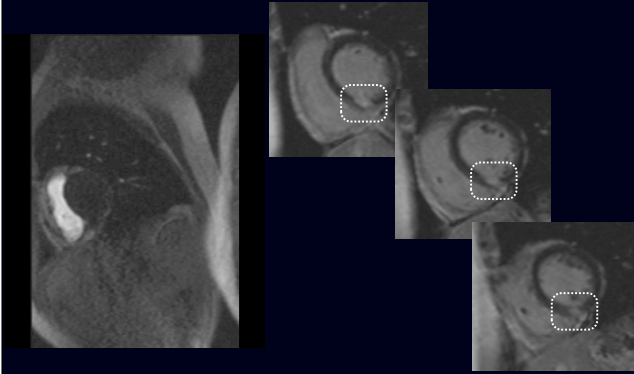


- iliac aneurysm
- right common femoral pseudoaneurysm
- right popliteal artery occlusion
- left popliteal artery aneurysm

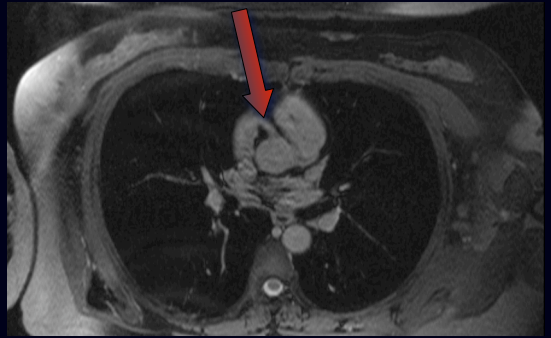


Courtesy of Prof. Martin Prince, MD, PhD, Cornell University, NY, NY

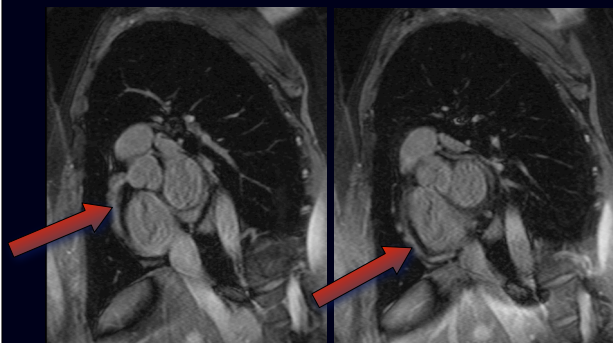
44 y/o female with SLE presenting with CP



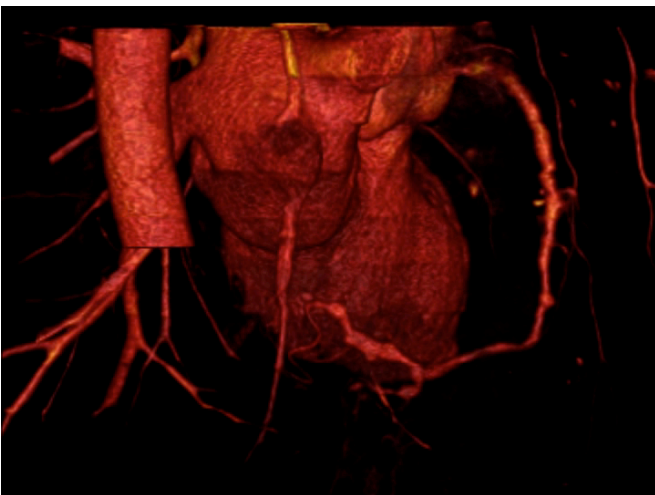
44 y/o female with SLE presenting with CP



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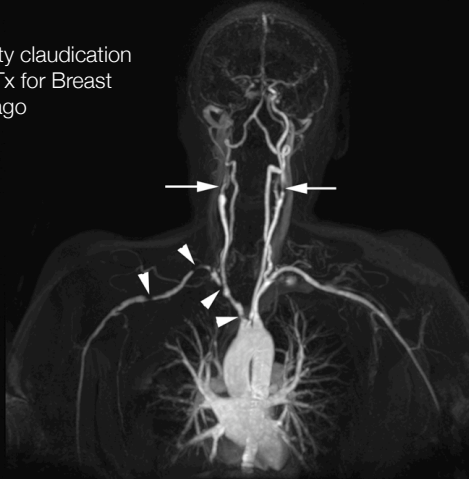


44 y/o female with SLE presenting with CP



Other Diseases

- 75 y/o Female
- Upper extremity claudication
- S/P radiation Tx for Breast cancer 20 yrs ago

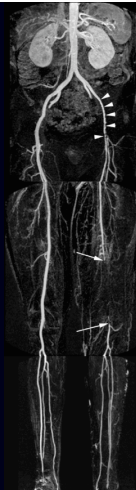


- 65 y/o female
- Intermittent claudication
- S/P radiation Tx for sarcoma >20 yrs ago



Radiation Induced Fibrosis

- History is key to diagnosis
 - Previous radiotherapy at location of narrowing
 - Up to decades ago
 - FMD is key differential
- May present with full spectrum of PAOD
 - Intermittent Claudication
 - Chronic Critical Ischemia
 - Embolization



- 38 y/o Female
- Bilateral Intermittent claudication



Fibromuscular Dysplasia

- Non-atherosclerotic, non-inflammatory arteriopathy of medium sized arteries
 - typically affects women of childbearing age
 - 60-75% renal involvement
 - important cause of renovascular hypertension
 - 25-30% cerebrovascular involvement
 - up to 10% peripheral arterial involvement
- Typical “string of beads” sign at angiography



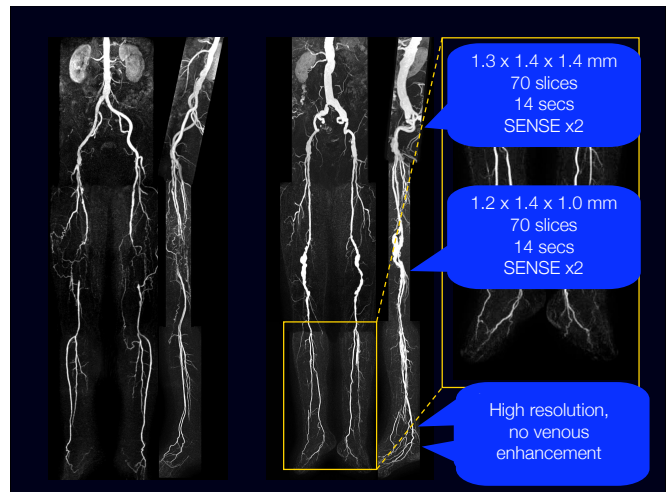


Congenital Aortic Hypoplasia

- Rare disorder presenting in childhood
- Developmental narrowing of abdominal aorta
 - Renovascular hypertension
 - Intermittent claudication

Prakken.....Leiner, Pediatr Radiol 2006;36:57-60

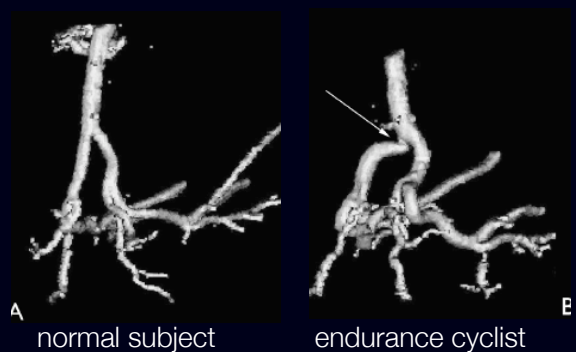
Lower Extremity MRA



Fontaine II – Intermittent Claudication



MRA Images obtained with flexed hips

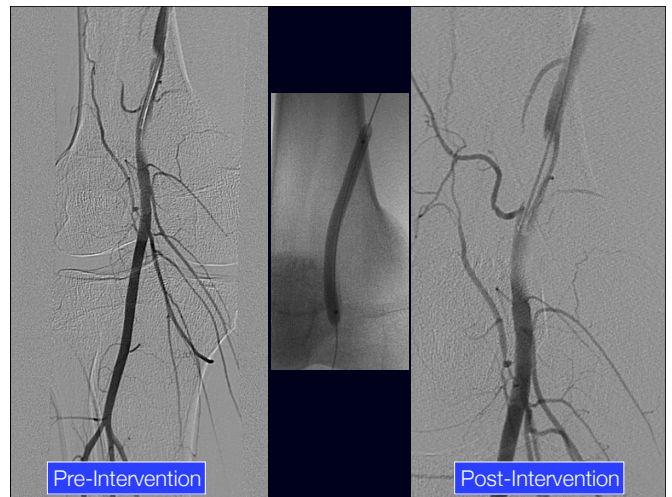


Courtesy of Dr. Goof Schep, MD, Veldhoven, The Netherlands

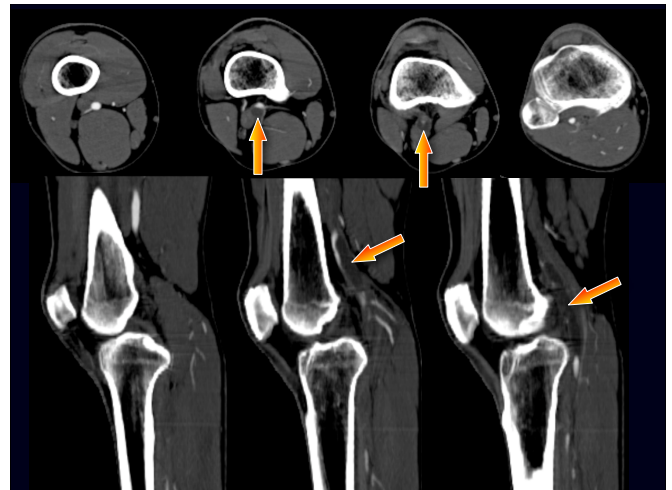
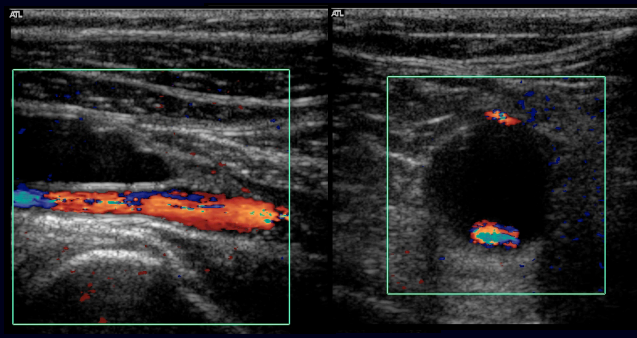
Iliac Artery Syndrome in Cyclists

- Recently described entity¹
- External iliac artery endofibrosis due to repetitive trauma and bending
- Young endurance cyclists
 - Frequency of up to 1:5 athletes
- No classic risk factors for atherosclerosis

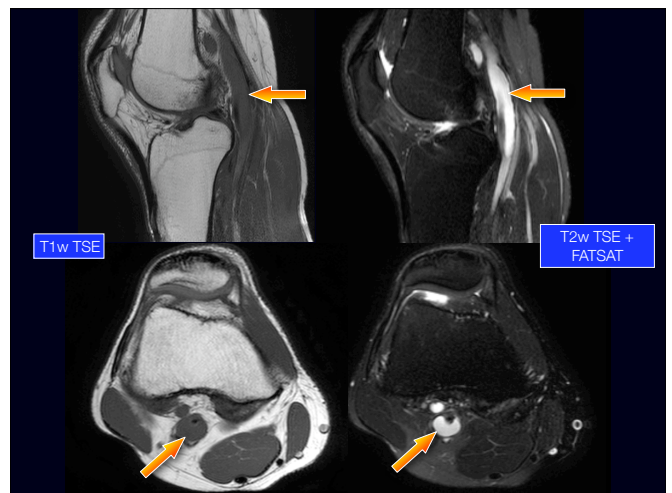
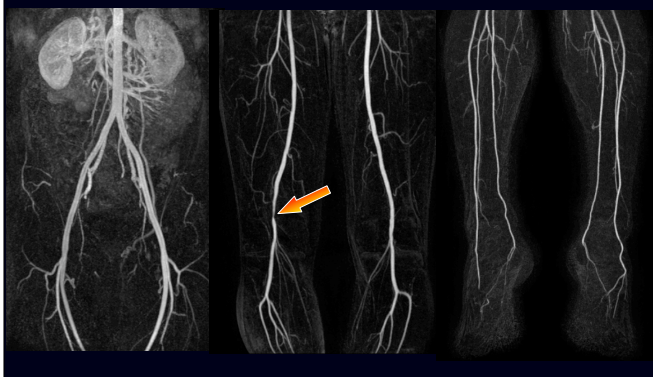
1) Schep, Lancet 2002;359:466-73



42 y/o male smoker
Intermittent Claudication Right Leg



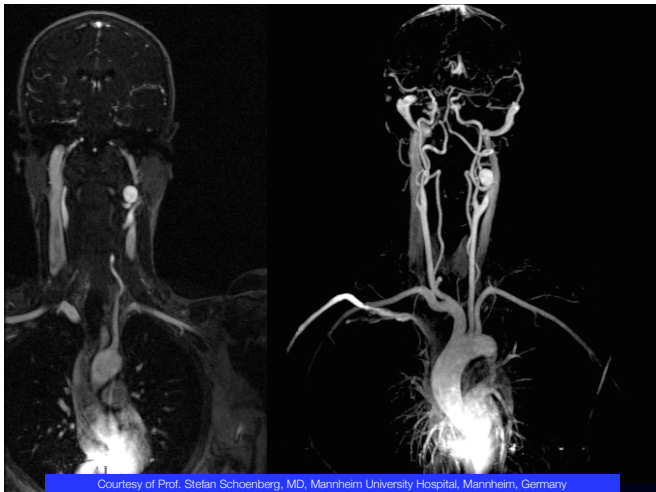
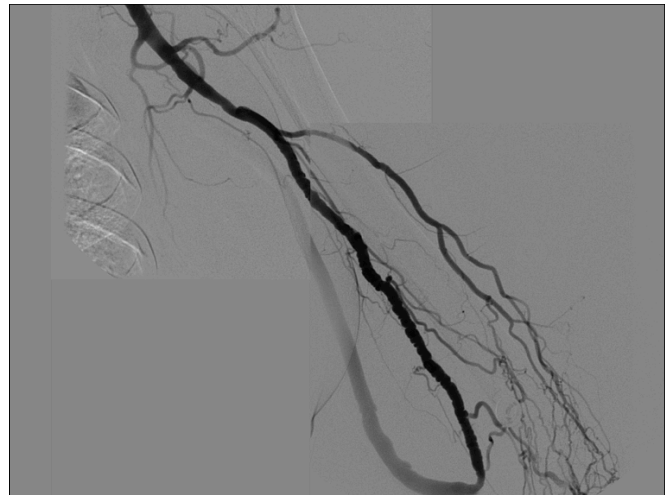
Smooth Segmental Stenosis
in Right Popliteal Artery



Cystic Adventitial Disease

- Rare cause of intermittent claudication^{1,2}
- Sometimes mass
- Caused by mucoid cysts in peripheral arterial wall
 - Most often popliteal artery
 - Segmental smooth luminal narrowing
 - Diagnosed confirmed with additional T1w and T2w imaging

1) Peterson, AJR 2003;180:621-5 2) Wright, RadioGraphics 2004; 24: 467-479



Courtesy of Prof. Stefan Schoenberg, MD, Mannheim University Hospital, Mannheim, Germany

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Luscher et al. Mayo Clin Proc 1987;62:931-52; Gray 1996

Summary and Conclusions

- MRI techniques are well suited to detect and characterize vasculopathies in large and medium arteries
- MRI can also image consequences of small vessel injury
- Well suited for follow-up
- History incongruent with typical atherosclerotic patient should prompt consideration of uncommon arteriopathies
- Uncommon causes predominate in upper extremity
- Consider (large) differential diagnosis

