Preplanning a vascular intervention
non-invasive imaging

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Disclosure

Speaker name:
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I have the following potential conflicts of interest to report:

✓ travel support, speaker honoraria

☐ Employment in industry

☐ Stockholder of a healthcare company

☐ Owner of a healthcare company

☐ Other(s)

☐ I do not have any potential conflict of interest
Imaging in peripheral artery disease

- Important requirements of imaging
  - high interdisciplinary traceability
  - high confidence for therapeutic decision-making
    - endovascular – surgical – hybrid intervention

- Diagnosis of PAD should be made by
  - history
  - physical examination
  - non-invasive testing
Preliminary considerations

- Patient’s specific conditions
  - kidney disease, diabetes mellitus
  - contrast medium allergy
  - native vessel disease or follow-up (i.e. stents)
  - rest pain

- Safety issues
  - radiation exposure
  - metallic foreign bodies, certain medical implants

- Patient’s preference
  - claustrophobia
Essentials for preplanning

- Assessment of in- and outflow
  - location, extension and severity of lesions (TASC II)

- Plaque morphology
  - degree of calcification

- Pre-selection of devices
  - wires, balloons, stents, atherectomy devices, etc

- Decision of vascular access site
  - femoral – popliteal – pedal – brachial
DUS

Strengths
- safe
- widely available & relatively cost-effective
- good diagnostic accuracy in detecting aortoiliac and femoropoliteal lesions (80%-89%)

Leiner T et al. Radiology 2005
Weaknesses

- inflow: abdominal girth, intestinal gas
- limited sensitivity in multilevel disease
- severe calcifications
- operator dependent
- time consuming

- no overview of the vascular tree
DUS vs CTA and MRA
Peripheral CTA

SFA occlusion
CTA - postprocessing

- MIP
  maximum intensity projection

- anatomical variants
- severity of calcification
CTA - postprocessing

- MIP
  maximum intensity projection

- VRI
  volume rendered images
  - anatomical variants
  - severity of calcification
  - craniocaudal extent of occlusions
  - collateral vessel status
CTA - postprocessing

- MPR multiplanar reformation
- CPR curved planar reformation
  - visualization of vessel lumen
  - lumen assessable in any plain
CTA

- **Strengths**
  - rapid acquisition
  - high-resolution volumetric dataset
  - evaluation of associated conditions

- **Weaknesses**
  - radiation exposure, iodinated CM
  - time-consuming postprocessing
  - calcifications tibioperoneal
Advantages

- no radiation exposure
- calcifications are not mapped
CE-MRA

Limitations – stents
- lumen may be obscured by susceptibility artifacts
- imaging characteristics dependent on material and orientation of the stent

MRA vs CTA
CE-MRA

- Limitations – venous contamination
  - particularly in the setting of CLI

- Solution
  - time-resolved imaging
Sectional imaging – renal function

- Normal renal function
  - either CE-MRA or CTA

- Mild to moderate renal insufficiency
  - CE-MRA (macro cyclic agents), cautious CTA

- GFR < 30mL/min per 1,73m²
  - DUS and/or non CE-MRA

- Dialysis dependent
  - CTA
Effects and costs of MRA – CTA – DUS

DIPAD-Trial
multicenter RCT comparing non-invasive imaging

Ouwendijk R et al. AJR 2008

- MRA and CTA
  - provided a significant higher therapeutical confidence in making a therapeutic decision
  - significantly less additional imaging

- Total costs significantly higher for MRA and DUS
Conclusion

- In native vessel disease, non-invasive imaging is recommended before vascular interventions (TASC II guidelines, ESC, ACC/AHA)

- Choice of imaging modality depends upon
  - patients specific factors
  - local expertise
  - safety profile
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