

# Diagnostic imaging methods in the examination of peripheral vessels

## Skiagraphy

On a native skiagraphic examination, we will only see calcifications in the walls of arteries in atherosclerosis or mediocalcinosis and metallic stents or vascular clamps.

X-ray wrist: mediocalcinosis, rhizarthrosis (<http://atlas.mudr.org/Case-images-Rhizarthrosis-mediocalcinosis-577>)

## Ultrasound

Ultrasound examination allows to assess the morphology of the vascular wall, the flow in the lumen.

Will display:

- expansion of the vessel wall in atherosclerosis, calcification in the artery wall, atheroma plaques;
- stenosis or occlusion of a vessel: proof of narrowing of the vessel, acceleration of the flow at the site stenosis, aliasing (turbulent flow);
- vascular aneurysm: widening of a blood vessel;
- thrombosis of a vein: display of a thrombus with flow loss in color recording, incompressible vein lumen;
- venous insufficiency in valvular insufficiency: flow reversal during '*abdominal press*';
- further enables flow estimation: e.g. for dialysis shunts.

Duplex US of lower extremity veins: subacute thrombosis (<http://atlas.mudr.org/Case-images-Thrombosis-of-femoral-vein-subacute-633>)

Duplex ultrasound of an artery of the upper limb: trombembolus a. axillaris (<http://atlas.mudr.org/Case-images-Trombembolus-of-axillary-artery-1024>)

## Angiography

Angiography is a skiagraphic examination of blood vessels after they are filled with contrast material. The peripheral vessels themselves (except as mentioned in the paragraph about skiagraphy) are not visible on the **native image**, after administration of contrast substance, their lumen is displayed. Imaging must be performed in at least two projections, as the stenosis may be asymmetrical and thus may not be visible in one projection. In addition to morphological diagnostics, it is possible to carry out selective blood sampling from vessels (e.g. for endocrine-active tumors of the pancreas or adrenal glands), selective introduction of catheters, e.g. for local chemotherapy (e.g. into the hepatic artery propria) and others.

## Digital Subtraction Angiography

Nowadays it uses digital *subtraction* angiography (DSA) where the mask of the native image is subtracted. In this way, non-vascular structures (bones, soft tissues) are suppressed in the image.

## Interventional angiography

Interventions can be performed during an angiographic examination, in particular:

- balloon angioplasty (PTA): dilation of a vessel with an introduced balloon after its inflation;
- introduction of stentss: to ensure long-term patency of the lumen;
- embolization: insertion of tissue glue, embologenic particles, spirals to stop blood flow in bleeding or tumors;
- local administration of drugs: especially thrombolytics.

AG dialysis shunt: balloon catheter dilatation of stenoses (<http://atlas.mudr.org/Case-images-Shunt-stenosis-angioplasty-786>)

AG of native dialysis shunt: balloon catheter dilatation of stenoses (<http://atlas.mudr.org/Case-images-Shunt-stenosis-angioplasty-native-shunt-787>)

AG Dialysis Shunt: Severe Stenosis, Balloon Catheter Dilatation, Thrombolysis (<http://atlas.mudr.org/Case-images-Shunt-stenosis-severe-balloon-angioplasty-PTA-thrombolysis-845>)

Phlebography of the lower extremity (<http://atlas.mudr.org/Case-images-Phlebography-394>)

## CT angiography

CT angiography is a diagnostic method to show blood vessels on CT. It is always necessary to administer iodine contrast agent. For angiography of arteries, contrast substance must be given at a sufficient speed (minimum 3 ml/s), for angiography of veins in a sufficient volume (over 100 ml). Although CT angiography is more commonly

used for the examination of large vessels, with the advent of multi-line devices, peripheral vessels can also be well visualized - for example, for planning subsequent interventional procedures. CT angiography is used especially where it is not possible to evaluate the peripheral vascular system well with an ultrasound examination and in trauma for the comprehensive evaluation of not only bone and soft tissue injuries but also vascular structures.

Angio-CT of the lower extremities: femoral artery occlusion and collateralisation (<http://atlas.mudr.org/Case-image-s-Obliterated-right-femoral-artery-and-collateralisation-VRT-131>)

Angio-CT of lower limbs: active bleeding in the thigh (<http://atlas.mudr.org/Case-images-Active-bleeding-in-the-thigh-70>)

Angio-CT carotid: stenosis of the internal carotid artery (<http://atlas.mudr.org/Case-images-Perilunate-luxation-427>)

## MR angiography

MR angiography has little application in the area of peripheral arteries due to poorer spatial resolution compared to other methods.

## Links

### External links

- Images at atlas.mudr.org (<http://atlas.mudr.org>)
  - Vessels (<http://atlas.mudr.org/Radiology-images-system-and-organ-Vessels-60>)
  - Angiography (<http://atlas.mudr.org/Imaging-images-by-modality-AG-Angiography-19>)
- Classification and tables in radiodiagnosis at mudr.org (<http://www.mudr.org/web/>)
- Teaching portal of the 1st Faculty of Medicine UK – Radiodiagnostics: ZM quiz during examination of peripheral vessels (<https://el.lf1.cuni.cz/p88909780/>)