Advanced peripheral arterial occlusive disease

Case Studies [1] | February 01, 2009

An 82-year-old man with advanced stage peripheral arterial occlusive disease presented with rest pain in his left lower leg and foot (Fontaine stage III). A second bypass had been necessary after initial femoropopliteal bypass of his left superficial femoral artery became occluded.

CLINICAL HISTORY

An 82-year-old man with advanced stage peripheral arterial occlusive disease presented with rest pain in his left lower leg and foot (Fontaine stage III). His left superficial femoral artery had previously been occluded and treated by femoropopliteal bypass. A second bypass had been necessary after occlusion of the first bypass. CT angiography of the lower extremity runoff was performed.
FINDINGS

Figure 1. Maximum intensity projection of lower extremity runoff. The standard peripheral CTA protocol, covering peripheral runoff from the renal arteries down to the feet, proved that the femoropopliteal bypass on the left side was not occluded. The right superficial femoral artery showed no significant stenosis but was aneurysmatic. Highly asymmetric contrast enhancement was observed in the lower leg, reducing diagnostic accuracy in the calf region. Contrast enhancement in the right lower leg was insufficient. In the left lower leg, severe venous overlay caused by an aneurysmatic superficial femoral artery on the right side and a bypass graft on the contralateral side made it difficult to evaluate the arteries.

Figure 2. Contrast enhancement of the lower leg during dynamic CTA at different time points. Addition of this time-resolved information revealed asymmetric enhancement in the lower leg. The initial enhancement of the left and right popliteal artery differed by 12.5 seconds. On the left side, only the fibular artery was continuous, while the other two vessels were occluded. On the right side, the anterior tibial artery showed only proximal enhancement and was then occluded in the distal vessel segments.

DISCUSSION

Asymmetric proximal stenoses or bypass grafts that alter blood flow in the lower leg can have an impact on diagnostic imaging. At the time of image acquisition, vessels on one side may not be enhancing, while those on the other side already show venous overlay.

Additional dynamic CTA of the lower leg, using multiple phases at different time points, can help evaluate lower leg vessels. Another advantage of dynamic CT acquisition is the evaluation of stenosis. The residual lumen can be especially difficult to assess in patients with peripheral arterial disease if multiple confluent or circular calcifications are present. Time-resolved information on arterial enhancement provides additional information for radiologists and vascular surgeons. We perform a dynamic scan that covers the lower leg, especially in severe cases of peripheral arterial disease.
This scan includes the lower popliteal artery, the trifurcation and the proximal and middle portions of the fibular artery, and the anterior and posterior tibial artery. To minimize radiation exposure, we limit the scan range to 27 cm and lower the tube current and voltage to 165 mAs and 80 kV, respectively. The mean effective dose of the additional dynamic CTA of the lower leg is less than 0.3 mSv.

CONCLUSION

Dynamic CTA is a helpful tool for the evaluation of lower leg arteries in patients with known peripheral occlusive disease.

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Disclosures:

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