TAVI SCREEING: AORTIC IMAGING WITH ULTRA-LOW DOSE CONTRAST

Image in cardiology

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The preferred route for transcatheter aortic valve implantation (TAVI) is via the femoral arteries. These vessels are frequently diseased in the typical elderly TAVI-candidate and therefore require a thorough pre-procedural evaluation. Failure to do so may result in vascular access complications with a high mortality risk. Rodés-Cabau, et al. showed 25% mortality within 30 days in cases with access site complications.[1,2] We therefore advocate imaging of the femoral vessels in all cases with either conventional angiography or CT-angiography.

Although conventional angiography can easily be obtained as part of the mandatory coronary angiogram for each patient, it cannot give information on circumferential calcification and the images have to be accurately calibrated prior to measuring vessel diameter. CT angiography can address these shortcomings, but it adds cost and contrast in an elderly patient population where renal dysfunction is frequent.

We describe a case where CT-angiography was required in a 92-year old man prior to TAVI. His renal function was known to be abnormal (serum creatinine level recently recovered from 200 to 178umol/L with an estimated GFR of 23ml/min). He had a previous coronary artery bypass operation and coronary angiography was performed via the right femoral artery. A total of 63ml of contrast was used and the pigtail catheter was left in the infra-renal aorta and secured to the skin in his groin. He was then moved to the Radiology suite for the CT-angiogram.

The CT scan was performed on a Siemens SOMATOM Sensation 40 MDCT. A non-contrast scan of the chest, abdomen and pelvis was acquired to assess arterial calcification as well as ensure optimum catheter position in the infrarenal abdominal aorta. Iodinated contrast (Ultravist 350mg I/ml) was mixed in a 1:4 dilution in a single chamber of the power injector, and connected to the pigtail catheter using a sterile technique with care taken to exclude all air. 40ml of the contrast-saline mixture (therefore only 10ml of contrast) was injected at rate of 4ml/s and with scan delay of 5 s. A helical CT of the lower abdomen and pelvis was obtained (scan parameters: 1mm slice thickness with reconstruct increment of 0.6mm, pitch 1.1, kV=120, mAs=120, FOV=362mm).

The pig-tail catheter was removed immediately after the procedure. Post-processing of the acquired images was performed on an Extended Brilliance Workspace, Phillips. This included three-dimensional volume rendered as well as multiplanar reformations for cross-section analysis of vessel calibre.

This image demonstrates that a high quality CT angiogram can be obtained with very little added contrast (10ml in this case) as opposed to both conventional and CT-angiography where 40-80ml may be required. This technique was recently described by Joshi, et al. who compared the images to those obtained from conventional angiography in 34 patients. They could prove that the technique provided adequate visualisation of the peripheral vessels and that conventional angiography missed circumferential calcification in 3 cases, arterial dissection in one case and inadequate vessel diameter in 8 cases (all correctly identified by intra aortic contrast injection CT angiography).[1]

Although this technique requires good coordination between the cathlab and the radiology suite, it is a worthwhile new development to consider in patients with borderline renal function.

Conflict of interest: none declared.

REFERENCES

1. Joshi SB, Mendoza DD, Steinberg DH, et al. Ultra-low-dose intra-arterial contrast injection for iliofemoral computed tomographic angiography. JACC: Cardiovascular Imaging. 2009;2:1404-1411.
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FIGURE 1: Coronal MIP (maximum intensity projection)
Reformatted image of the infrarenal aorta, iliac and common femoral arteries, demonstrating marked bilateral internal iliac artery occlusive disease, but adequate external iliac vessels for TAVI access. L hip prosthesis in situ, pigtail catheter at infrarenal level.