

Case Report: QISS MRA at 3T

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Quiescent Interval Single-Shot (QISS) MR Angiography (MRA) has been shown to be a robust technique for non-contrast MRA of the peripheral vasculature at 1.5T. At 3T, early versions of the sequence offered greater signal-to-noise ratio (SNR) than at 1.5T, but were occasionally compromised by inversion pulse insufficiency due to B₁ inhomogeneities. This gave rise to poor venous suppression particularly in the abdominal and pelvic region. We had the opportunity to try a WIP version of the QISS MRA sequence with a modified FOCI pulse which was hoped to overcome aforementioned B₁ inhomogeneities and improve venous suppression whilst maintaining small vessel visualisation on 3T.

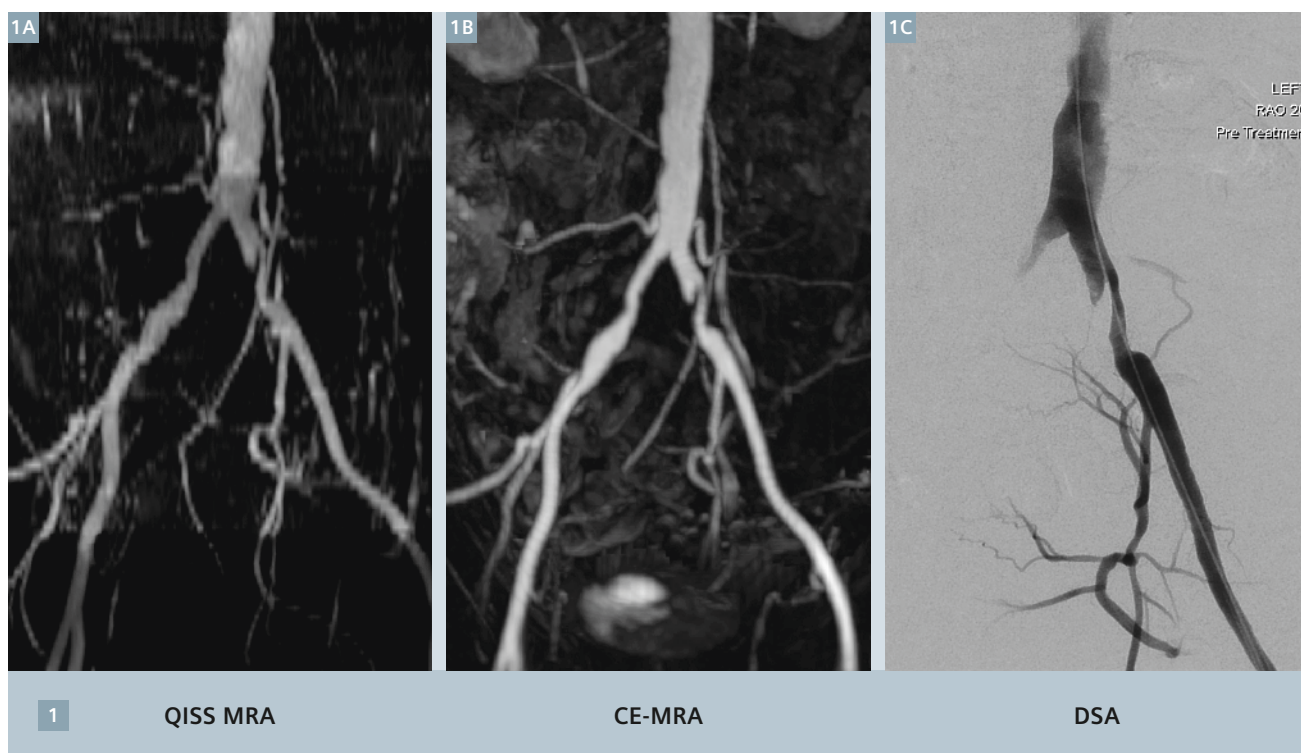
We present a case of a 69-year-old male who was referred with short distance left leg claudication, and reduced left femoral pulse, query iliac artery disease. He had a history of smoking 10 cigarettes per day. The patient was imaged on the 3T MAGNETOM Skyra (Siemens Healthcare, Erlangen, Germany) using the peripheral matrix coil in combination with the spine and body matrix coils. ECG gating was achieved using the Siemens wireless PMU.

At the time of imaging the patient had a heart rate of 68 bpm and a recent eGfr of 70 ml/min / 1.73 m².

QISS MRA sequences using TrueFISP readout were acquired as a vessel scout technique as this provides an

excellent overview for planning subsequent contrast-enhanced (CE) MRA imaging. The standard QISS MRA was used which consists of 1 x 1 x 3 mm contiguous axial slices, single slice per RR interval, flip angle 90°, iPat 3, 40 slices per station. We acquired the abdominal stations during quiet respiration as we found our elderly population cope with this better than with breath-holds and there is no time penalty between techniques.

As per our standard protocol subsequent CE-MRA imaging was performed using diluted 20 ml Multihance (Gadobenate dimeglumine) + 10 ml 0.9% NaCl, followed by 0.9% NaCl flush. A test bolus of 1.5 mls contrast @ 2 ml/s followed by 20 ml 0.9% NaCl was sampled using a dynamic 2D FLASH single



slice positioned at the level of the aortic bifurcation to determine the arrival time of the contrast in the abdominal aorta. Next the tibial arteries were imaged using time-resolved TWIST MRA sequence using 4 ml diluted contrast and a 20 ml NaCl flush delivered @ 2 ml/s. Finally, the full peripheral arterial tree is imaged from above the renal arteries to the pedal arteries using 22-23 ml diluted contrast delivered as follows:

Dual-phase contrast injection:
10 ml @ 2 ml/s, followed by
13 ml @ 1.5 ml/s then an NaCl flush
of 20 ml @ 1 ml/s.

Findings included a high-grade stenosis of the mid left common iliac artery. There was also a mild-moderate stenosis of the proximal right common iliac artery. Femoral and popliteal arteries were of normal calibre. There was three vessel run-off to each calf, with severe disease of the left anterior tibial artery and vessel occlusion by mid-calf.

Follow-up DSA confirmed QISS MRA and CE-MRA findings, and the left common iliac artery lesion was treated by angioplasty and stenting with an 8 x 40 mm self-expanding stent, post dilated to 7 mm.

In this case QISS images correlated excellently with the CE-MRA images and subsequent DSA imaging as seen below. We have found that the optimized FOCI pulse is particularly effective in the aorto-iliac region and this case demonstrates very nicely

how this new version of the sequence (now product) performs compared to CE-MRA and also DSA.

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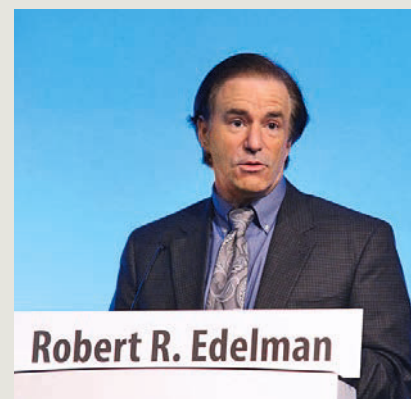
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Advances in Non-CE MR Angiography

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