

# Case Reports: Time-Resolved MRA Evaluation of Pelvic Congestion Syndrome

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## Case 1 Incompetent ovarian valves

### Patient history

36-year-old female with ovarian cyst found on ultrasound and pelvic pain. A pelvic MRI was ordered for further evaluation.

### Sequence details

*syngo* TWIST, 3D coronal (with coronal and sagittal MIP reformats), 40 partitions, 3 mm thickness, TR 2.54 ms, TE 1.01 ms, 88 s acquisition, 1.5 s/frame temporal resolution, 58 frames, 320 resolution, 400 mm FOV, 100% phase FOV, 78% phase resolution, 82% slice resolution, 1 average, 650 Hz/pixel BW, 25° flip angle.

Images have been acquired using our 1.5T MAGNETOM Avanto (software version *syngo* MR B15A) and the Body and Spine Matrix coils.

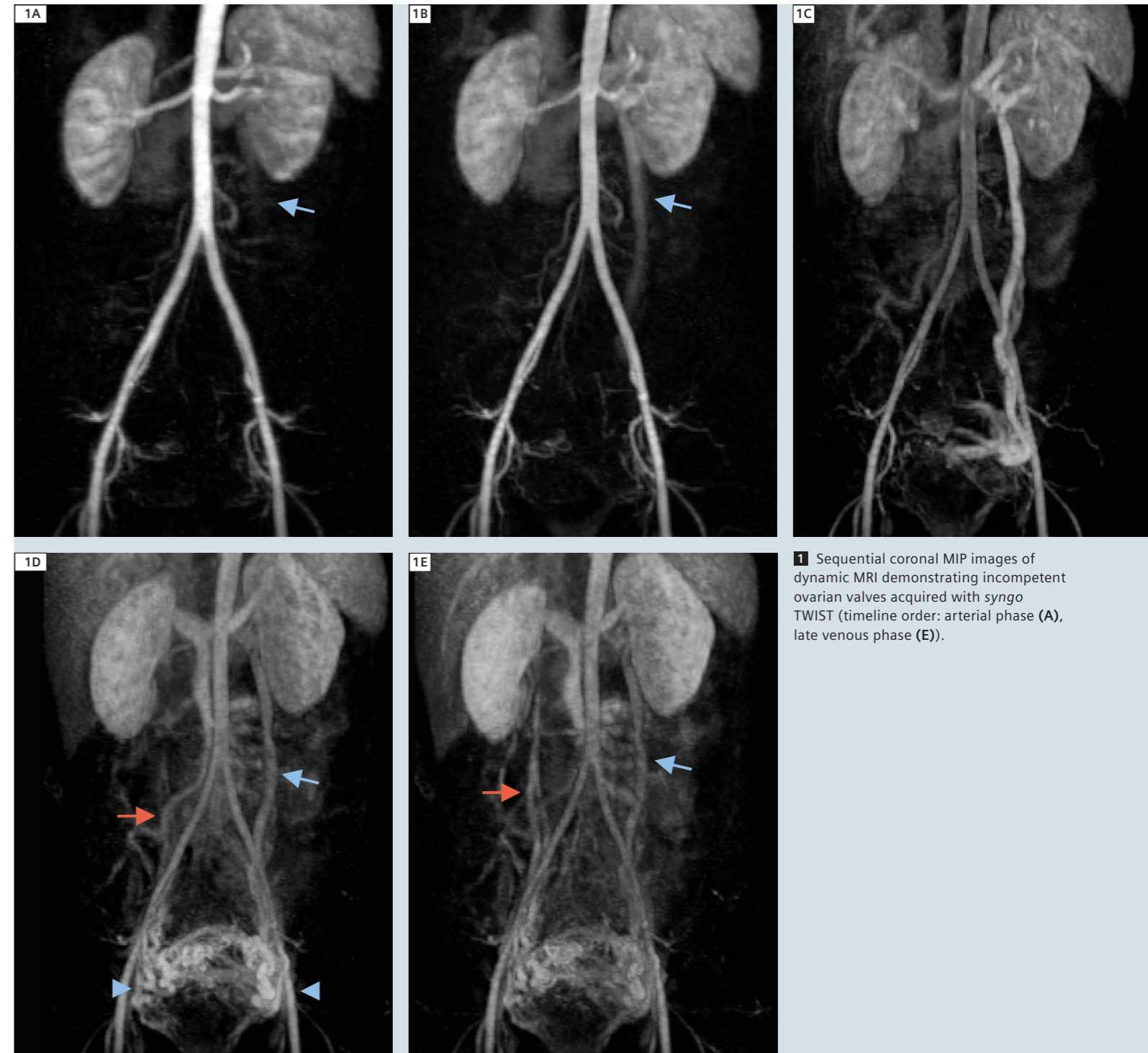
### Imaging findings

The time-resolved coronal maximum intensity projection (MIP) images are shown in order during the mid arterial phase (A), late arterial phase (B), early venous phase (C), and mid venous phase (D). The left ovarian vein (blue arrows) is dilated and periuterine varices are present (arrowheads). The right ovarian vein (red arrows) is also prominent during the venous phase.

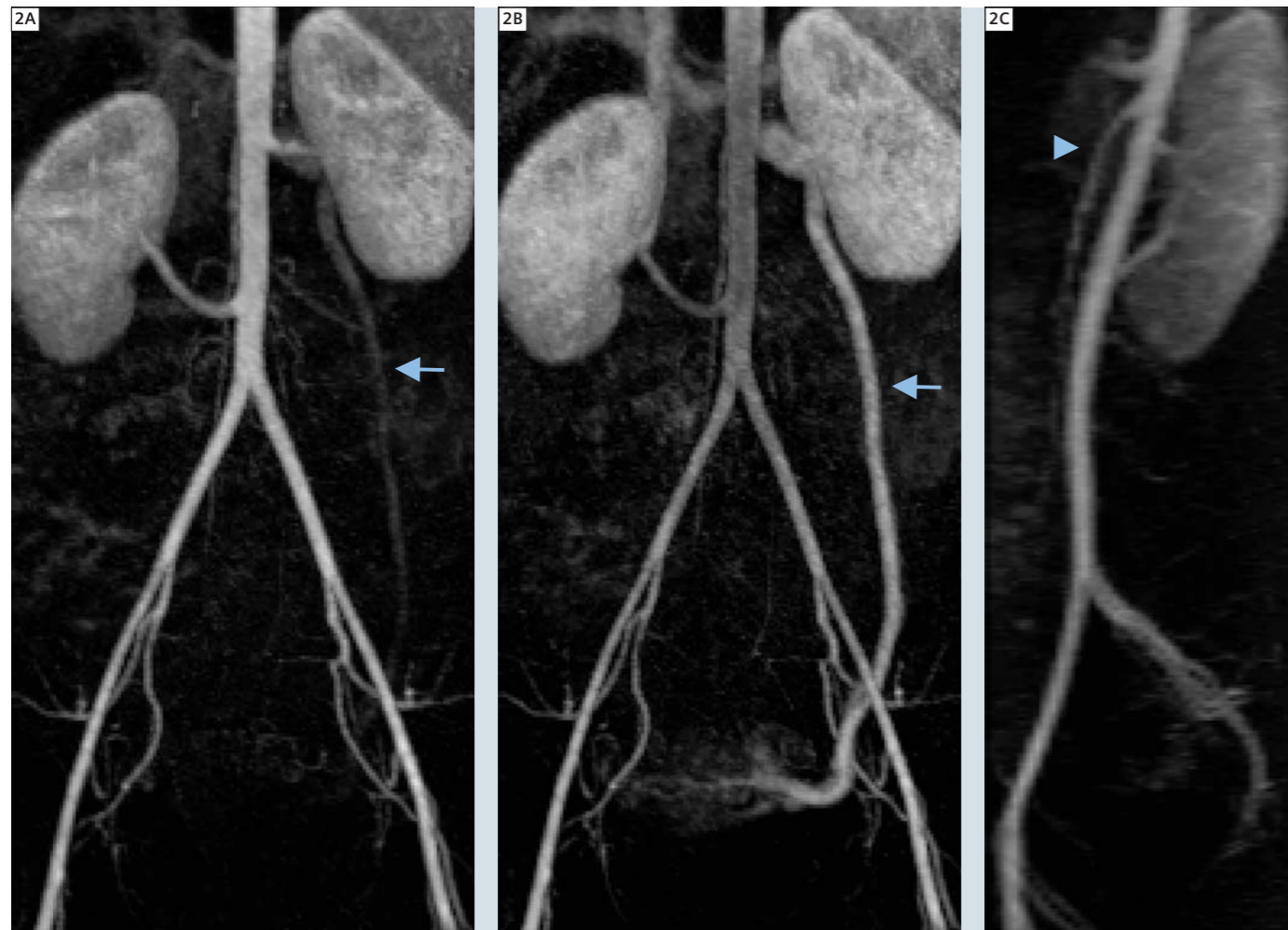
### Results and discussion

The bilateral ovarian vein dilation and periuterine varices can be detected with many imaging modalities, such as static CT, MR, and ultrasound. However, by examining the temporal appearance of

contrast in these time-resolved MRA images, it is evident that flow in the left ovarian vein is occurring caudally in a retrograde fashion. Therefore, the left ovarian vein valves are incompetent. Incompetent ovarian valves are the cause of pelvic congestion syndrome in women, which can cause chronic pelvic pain. On the other hand, examination of the temporal appearance of contrast throughout the right ovarian reveals that flow is in an anterograde fashion.



**1** Sequential coronal MIP images of dynamic MRI demonstrating incompetent ovarian valves acquired with *syngo* TWIST (timeline order: arterial phase (A), late venous phase (E)).



2 Sequential coronal MIP images of dynamic MRI in case of renal vein entrapment syndrome acquired with *syngo* TWIST (late arterial phase (A), early venous phase (B), sagittal view (C)).

### Case 2 Renal vein entrapment syndrome

#### Patient history

27-year-old female for MRI follow up of an ovarian cyst.

#### Sequence details

*syngo* TWIST, 3D coronal (with coronal and sagittal MIP reformats), 40 partitions, 3 mm thickness, TR 2.54 ms, TE 1.01 ms, 92 s acquisition, 1.6 s/frame temporal resolution, 58 frames, 320 resolution, 400 mm FOV, 80% phase FOV, 78% phase resolution, 82% slice resolution, 1 average, 650 Hz/pixel BW, 25° flip angle. Images have been acquired using our

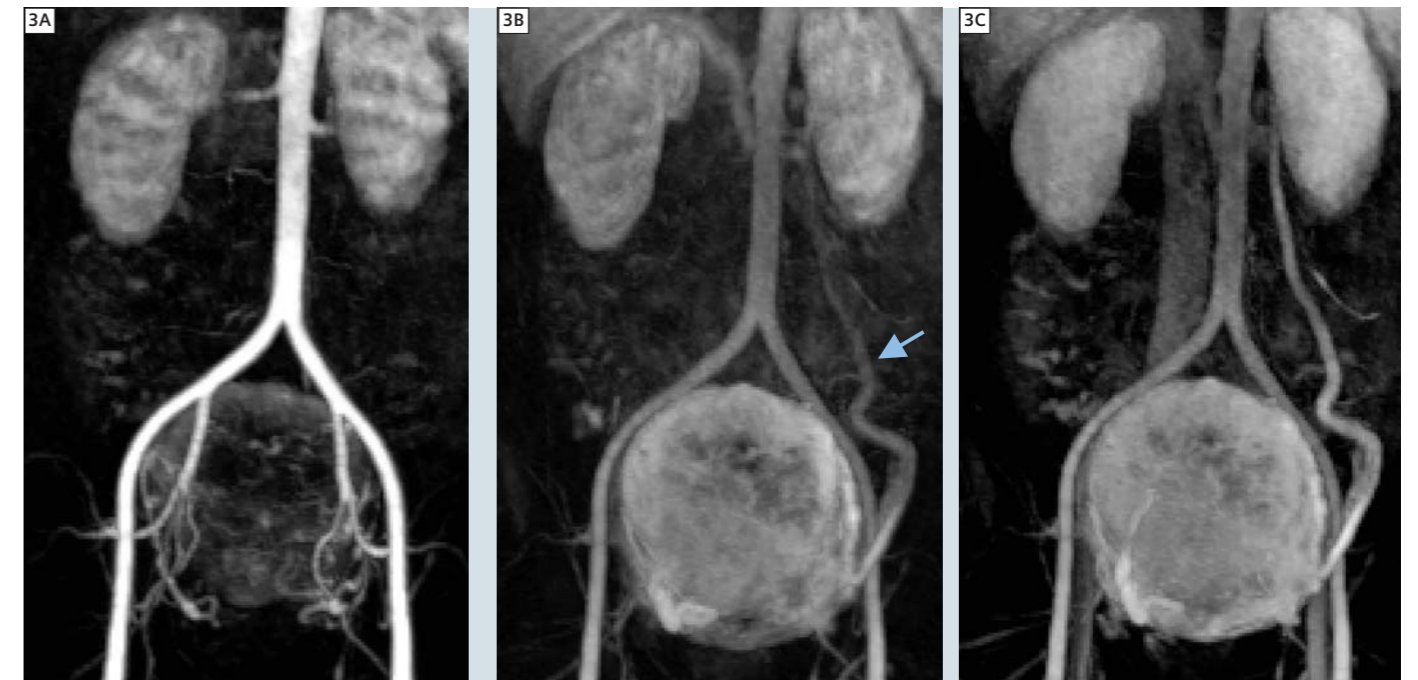
1.5T MAGNETOM Avanto (software version *syngo* MR B15A) and the Body and Spine Matrix coils.

#### Imaging findings

Again, sequential coronal MIP images during the late arterial phase (A) and early venous phase (B) demonstrate a prominent left ovarian vein (arrows). Additionally, the left renal vein is prominent in caliber, and appears to abruptly cutoff near the aorta with lack of continuity with the IVC. The sagittal MIP image during the arterial phase demonstrates that the superior mesenteric artery (SMA) (arrowhead) has a 34 degree angle with the aorta.

#### Results and discussion

Again, temporal examination of the coronal MIP images demonstrates retrograde flow through a dilated left ovarian vein. However in this case, the left renal vein demonstrates imaging characteristics compatible with 'nutcracker syndrome', also called left renal vein entrapment syndrome, which is caused by compression of the left renal vein between the SMA and aorta. Indeed, the angle between the SMA and aorta is unusually small (normal is greater than 60 degrees). This anatomic condition is a known cause of pelvic congestion syndrome.



3 Sequential coronal MIP images of dynamic MRI in case of uterine leiomyomata acquired with *syngo* TWIST (arterial phase (A), late arterial phase (B), and venous phase (C)).

### Case 3 Uterine leiomyomata

#### Patient history

37-year-old female with pre procedure MRI evaluation of uterine leiomyomata.

#### Sequence details

*syngo* TWIST, 3D coronal (with coronal and sagittal MIP reformats), 40 partitions, 3.3 mm thickness, TR 2.44 ms, TE 0.96 ms, 84 s acquisition, 1.4 s/frame temporal resolution, 58 frames, 256 resolution, 400 mm FOV, 81% phase FOV, 78% phase resolution, 82% slice resolution, 1 average, 650 Hz/pixel BW, 25° flip angle. Images have been acquired using our 1.5T MAGNETOM Avanto (software ver-

sion *syngo* MR B15A) and the Body and Spine Matrix coils.

#### Imaging findings

Coronal MIP images during the arterial phase, late arterial phase, and venous phase. A dilated left ovarian vein is again noted. A large leiomyomatous uterus is present.

#### Results and discussion

Although the venous phase image is quite similar compared to cases 1 and 2, temporal evaluation of the left ovarian vein opacification demonstrates normal antegrade flow. This underscores the utility of time-resolved MRA for the eval-

uation of pelvic congestion syndrome, since actual reflux is required to make the diagnosis.

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