

Case Report: Conjoined Twins Evaluation Using *syngo* TWIST and *syngo* Diffusion Tensor Imaging

Michael Kean; Michael Ditchfield, M.D.; Wirginia Maixner, M.D.

Children's MRI Centre, Royal Children's Hospital, Parkville, Victoria, Australia

Patient history

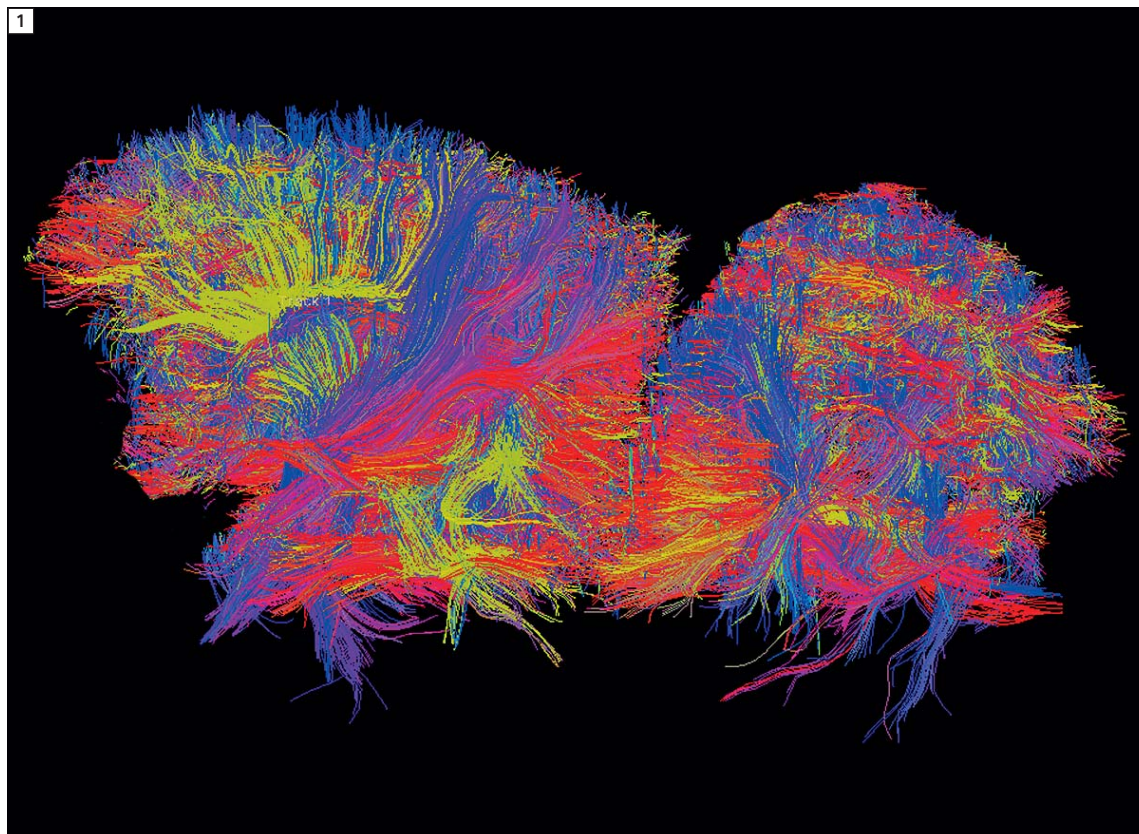
11-month-old* craniopagus conjoint twins were referred for evaluation of venous anatomy to plan separation surgery. Repeated MR examinations were undertaken to plan the surgery and MR venography using *syngo* TWIST enabled surgeons to study the results of embolization and surgical venous occlusion.

Sequence details

The patients were placed in a partial left decubitus position on the scan table of our MAGNETOM Trio, A Tim System. The decubitus position was necessary due to congestive cardiac failure brought about by twin–twin circulation. The Body Matrix coil was used as it provided a balance between signal-to-noise ratio

(SNR), the availability of integrated Parallel Acquisition Techniques (iPAT) and the volume of interest.

3D MPRAGE (TR 1900 ms, TE 2.6 ms, TI 900 ms, Flip angle 9°, FOV 270 mm, PAT factor 2, 320 x 90 %, 60 % phase oversampling) isotropic 0.9 mm resolution was initially performed to aide with pre-



1 *syngo* DTI allows to study the structural integrity of the cerebral nerve tracts of the conjoined twins in each dimension (resulting spatial resolution: 2.2 x 2.2 x 2.0 mm).

2A



2 1:1 3D plastic model to provide an anatomical depiction of the venous sinus and the skulls of the twins.

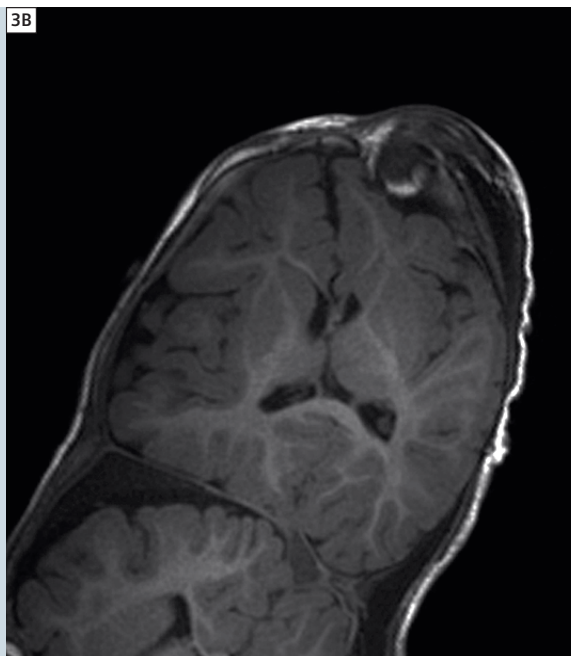
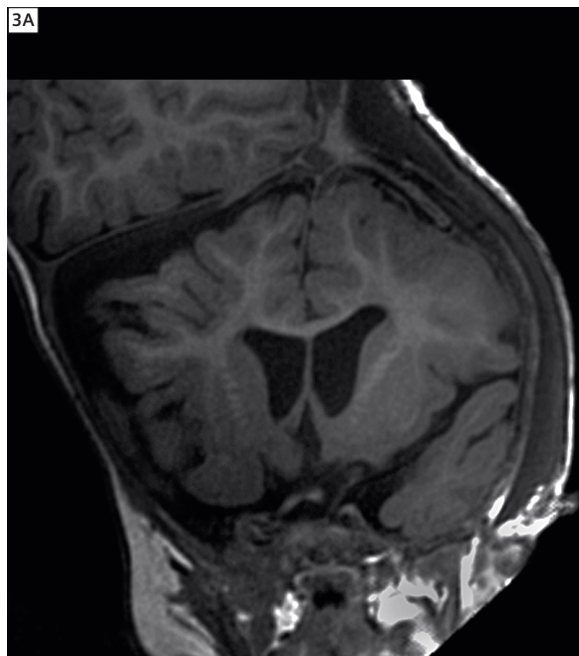
2B



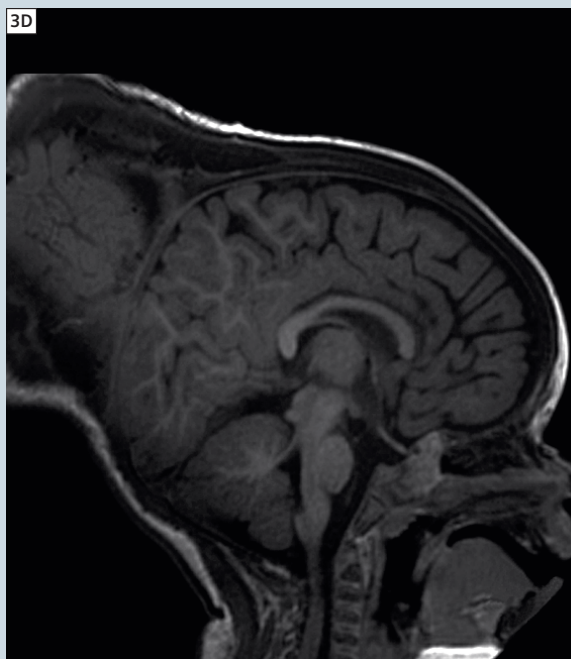
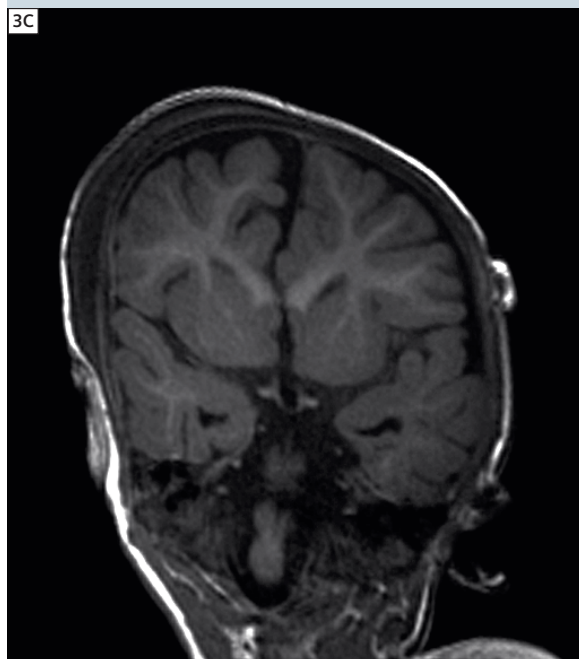
scribing T2-weighted imaging planes. The 3D data was loaded into the 3D card and true anatomical planes (axial, coronal and sagittal) were identified and image stamps saved that were then

imported into the Exam card. These image stamps were used to copy the image position to define the imaging planes for the anatomical acquisitions. T2-weighted Turbo Spin Echo (TSE) data

sets were obtained in three planes (TR 5000 ms, TE 144 ms, 2 Acquisitions, spatial resolution 0.6 x 0.5 x 3.5 mm. *syngo* DTI acquisition was performed using TR 10460 ms, TE 90 ms, B = 1000,



3 To aid with sequence planning in this complex case and to identify the true anatomical planes for both twins, a 3D MPAGE measurement was performed initially and loaded into the 3D task card. The true anatomical planes could then easily be identified and used for further planning of 2D MR imaging.

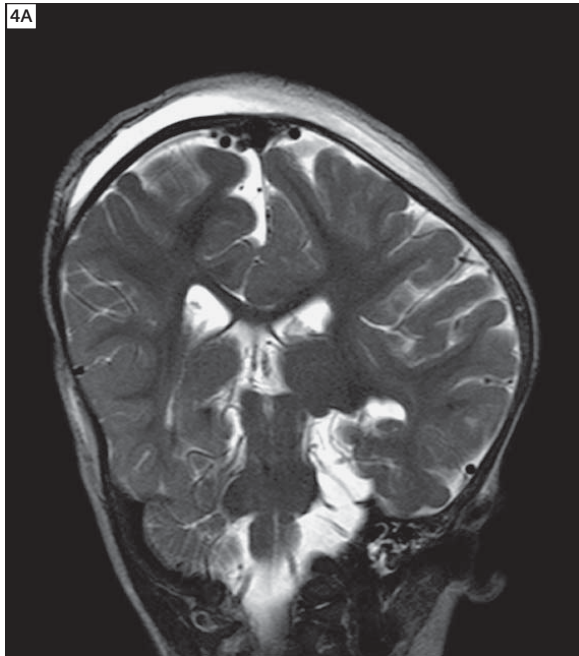


spatial resolution of $2.2 \times 2.2 \times 2$ mm, 60 directions, PAT factor 2, FOV 280 mm, 80 slices.

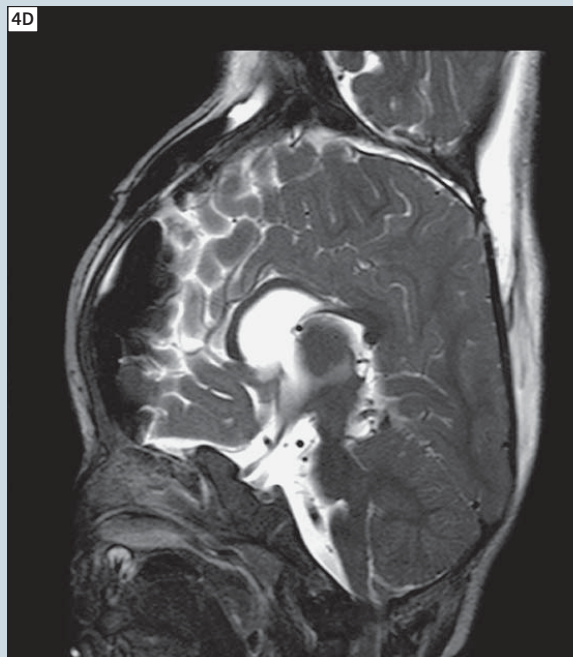
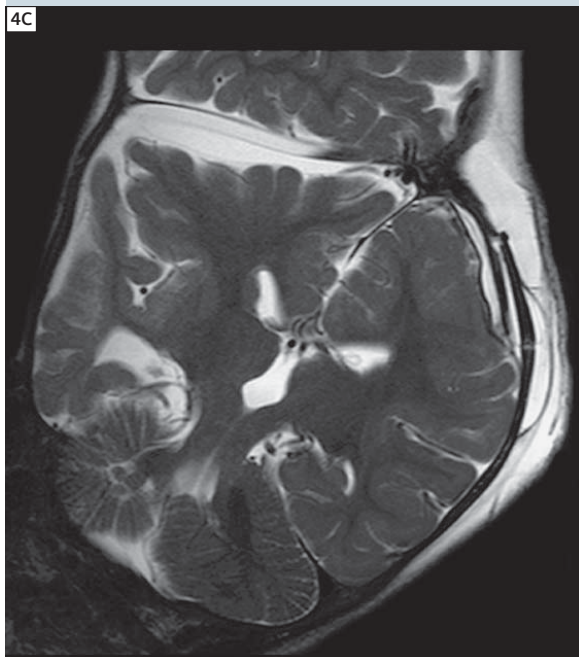
syngo TWIST imaging to evaluate the twin-twin venous connection was per-

formed. Each twin was injected separately. TR 2.56 ms, TE 0.95 ms, spatial resolution $1.2 \times 0.8 \times 1.2$ mm (FOV 320, $384 \times 70\%$), slice resolution 64%, PAT factor 4, 20 measurements, virtual

temporal resolution 2.29 sec, *syngo* TWIST sampling central A = 33% peripheral B 50%. TWIST images show clearly the communicating vein between the twins. These images proved to be



4 *syngo* SPACE was used to generate a high resolution data set with high T2 contrast. In combination with the 3D task card, an interactive and detailed image analysis can be performed retrospectively, improving the overall diagnostic accuracy.



useful in guiding the partial embolization and the following ligation process.

Comments

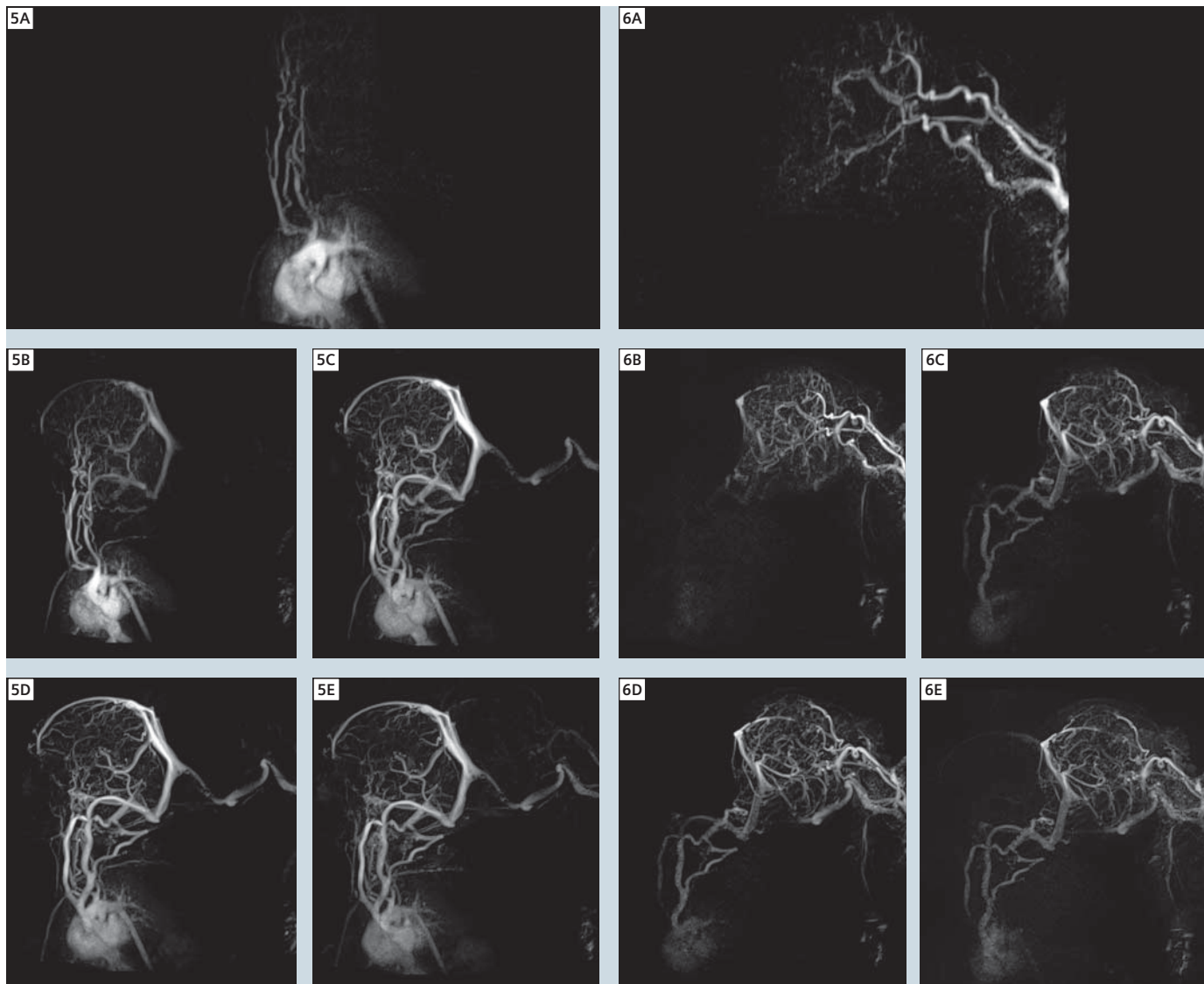
The use of *syngo* TWIST aided the surgical planning (4D InSpace) because it could be viewed as individual 3D volumes or as a dynamic 4D model.

Data was used to generate a 3D physical model to plan subsequent surgeries. The neuroradiologists and neurosurgeon found the TWIST acquisitions more beneficial in planning surgery.

* The safety of imaging fetuses/infants has not been established.

Contact

Michael Kean
Children's MR Centre
Royal Children's Hospital
Melbourne, Australia
michael.kean@rch.org.au



5 6 *syngo* TWIST was used to evaluate vessel anatomy and especially to visualize the twin-twin venous connection; contrast media was injected in each twin separately. With a virtual temporal resolution of 2.29 sec and a resulting spatial resolution of 1.2 x 0.8 x 1.2 mm, *syngo* TWIST could provide detailed information about the anatomical and functional relationship of the venous connection between the twins (5A–E twin I, 6A–E twin II).