Dual Source CT: Visualization of Brain Vessel Connection of Siamese Twins

SOMATOM Definition Dual Energy scanning

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HISTORY

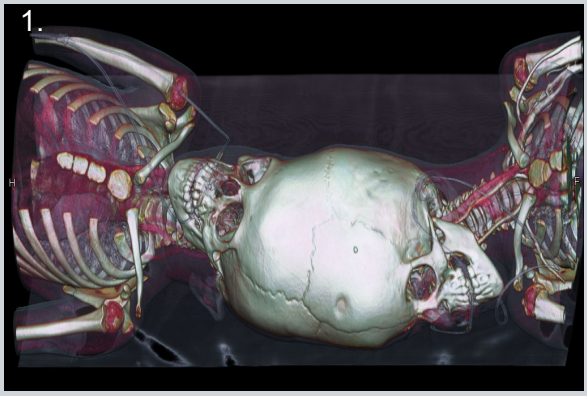
Two children, 3.-year-old female twins, fused at the cranium since birth (craniophagus), were transferred to the department of radiology for preparation for separation. For the pre-operative diagnosis and surgery planning, a CT-Angiography was performed to evaluate the vascular communications between the connected brain tissues of both children. The dissection of these communications was the key challenge for the separation procedure. In preparation for the CT scan and for brain vessel visualization, twin one was injected before twin two and finally, both were injected simultaneously.

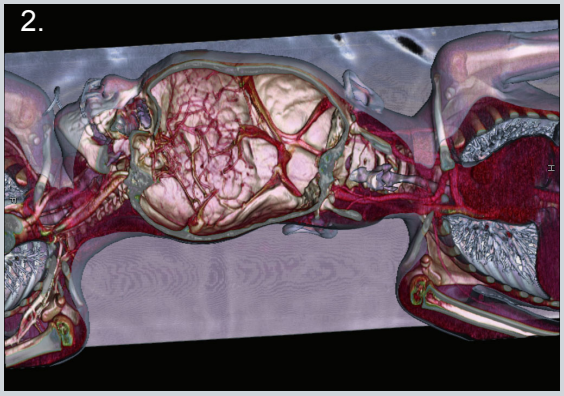
DIAGNOSIS

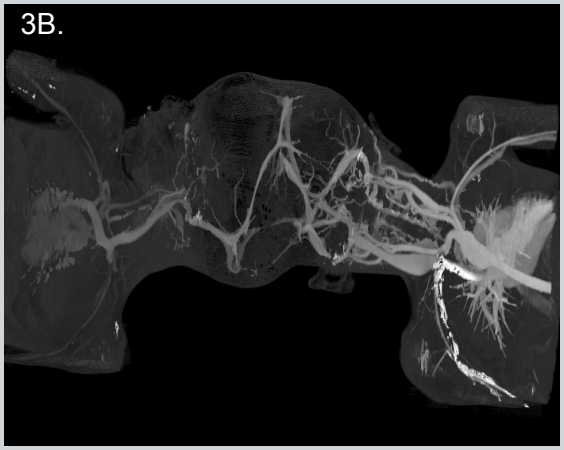
The CT imaging revealed both venous communications as well as arterial connections. The arterial communications were well visualized in the superficial cranial branches of the external carotid. The superficial temporal and frontal artery of twin one and the superficial temporal and occipital artery of twin two were found to be communicating. This brain vessel anomaly was recognized to be the reason for volume overload in the brain tissue of twin two, thus resulting in hypertensity.

COMMENTS

The results of the CT imaging provided excellent orientation for the surgical team to prepare a safe separation of the twins.
A CT-Angiography was selected over an MR-Angiography due to the very short scan time required. This allowed a short sedation time, lowering the sedation risks for the children while concurrently delivering excellent image quality. With Dual Energy CT-Angiography, small vascular communications could be visualized that are critical in a pre-operational workup. This information is important to know exactly – before starting a surgery of this difficulty and severity.







1. Overview with volume rendering technique (VRT) showing the connection of both skulls.
2. Blood-flow through the connected head-vessel system of the conjuncted twins, demonstrated by VRT during administering contrast medium into artery system of twin one (left person 3A). Venous drainage can be found in the brain of twin two (right person 3B).
3. MIP visualization of vessel connection: in-flow of contrast media into the arteries of twin one (Fig.3A) with drainage via the venous vessel system of twin two (Fig. 3A) and vice versa in a second CT-scan afterwards (Fig.3B).

EXAMINATION PROTOCOL

Scanner	*SOMATOM Definition*
Scan area	*Head CTA*
Scan length	*500mm*
Scan time	*16s*
Scan direction	*Cranio-Caudal*
kV	*140/80*
Effective mAs	*70/297*
Rotation time	*0.5s*
Slice collimation	*0.6mm*
Reconstructed slice thickness	*0.6mm*
Increment	*0.4mm*
Kernel	*H10f*