

Case 10

Dual Energy CT Myelography Used to Detect Spontaneous Spinal Cerebrospinal Fluid Leaks

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HISTORY

A 35-year-old female patient was referred to the Department of Radiology complaining of headaches and neck stiffness for the past 17 days. The headaches were relatively mild in the supine position and became severe in an upright position. She denied any history of recent trauma and had received two weeks of conservative treatment in the local hospital with no relief. Neurological exams were normal at admission. Contrast-enhanced cerebral MRI showed bilateral dural thickening (Fig. 1). The lumbar puncture revealed a low cerebrospinal fluid (CSF) pressure of 40 mmH₂O in lateral decubitus position. 10 ml Omnipaque (300 mg I/ml) was then injected and a Dual Energy CT myelography (DECTM) of the entire spine was performed.

In accordance with the DECTM results, targeted epidural blood patch followed and the patient was discharged 3 days later with total pain relief.

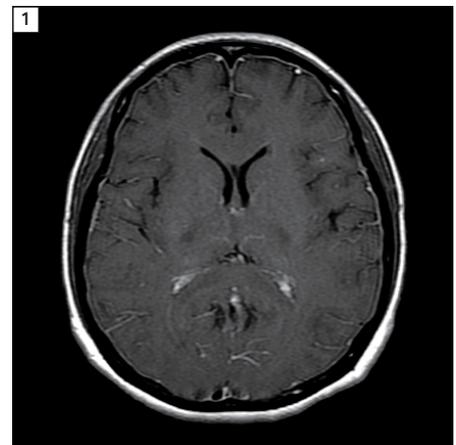
DIAGNOSIS

The DECTM images showed bilateral CSF leaks at the cervicothoracic junction extending into the paraspinal soft tissues. The contrast media and the bones could be easily distinguished by DECT

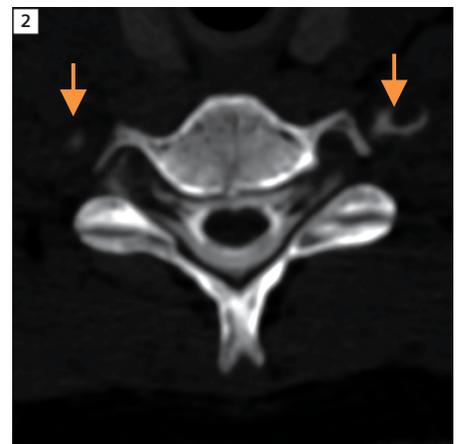
images. Both the virtual non-contrast (VNC) image and the iodine map were generated to display the precise point of leakage and both showed consistent results.

COMMENTS

Spontaneous intracranial hypotension (SIH) is an increasingly recognized cause in cases of newly occurrent, daily persistent headaches. This is due to low CSF volume, usually secondary to an occult spinal leak. The most common presenting symptom is orthostatic headaches. DECTM has been shown to be the method of choice to accurately define the location and extent of the CSF leak. The visual demonstration of DECTM is superior to the traditional CTM and therefore can improve diagnostic confidence and better the communication between patients and physicians.



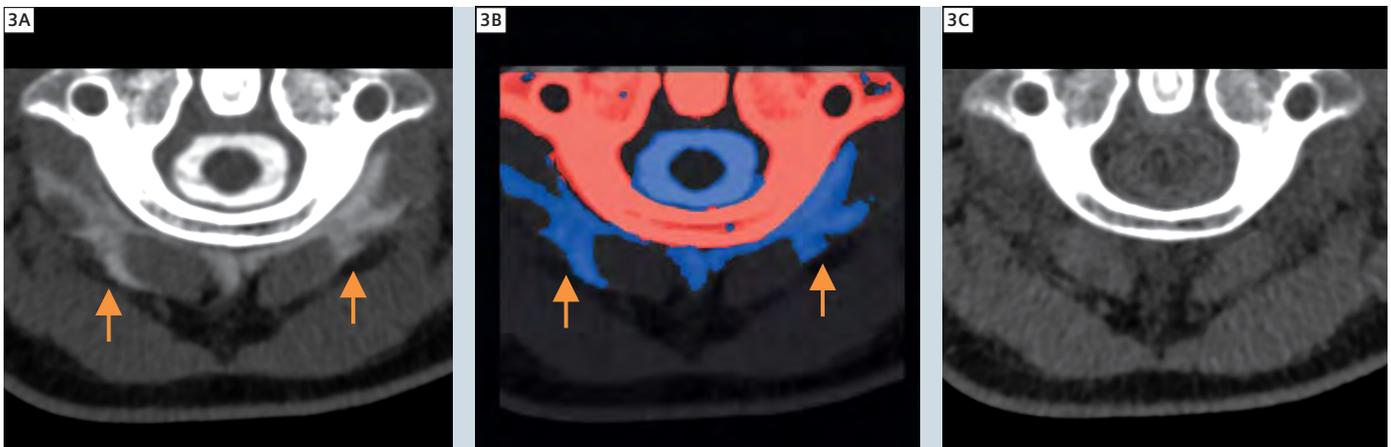
1 Contrast-enhanced head MRI image revealed bilateral dural thickening.



2 Axial CT image showed bilateral CSF leaks at the cervicothoracic junction extending into the paraspinal (C6-7) soft tissue (arrows).

EXAMINATION PROTOCOL

Scanner	SOMATOM Definition Flash		
Scan area	Spine	Slice collimation	40 x 0.6 mm for thoracic & lumbar segments 32 x 0.6 mm for cervical segment
Scan length	221 mm for cervical segment	Slice width	1 mm
Scan direction	Cranio-caudal	Reconstruction increment	0.7 mm
Scan time	10 s	Reconstruction kernel	D26f
Tube voltage	100 kV / 140 kV	Contrast	
Tube current	150 mAs / 92 mAs	Volume	10 ml
Dose modulation	CARE Dose4D	Flow rate	Manual injection
CTDI _{vol}	12.65 mGy	Start delay	30 min
DLP	304 mGy cm		
Rotation time	0.5 s		
Pitch	0.9		



3 CT myelogram demonstrated an extensive retrospinal CSF collection (Fig. 3A, arrows) at the C1–2 level. In 100 kV & 140 kV mixed image, the DECTM iodine map (Fig. 3B), presented clearly the iodine in blue (arrows) and the cortical bone in red. The virtual non-contrast image (Fig. 3C) showed the complete removal of the contrast. Please note that retrospinal fluid collection at the C1–2 level does not necessarily indicate the site of the CSF leak but a result of a large-volume CSF leak originating from the lower cervical spine.



4 Cervical CTM images demonstrated the accumulation of extra-arachnoid contrast material along the bilateral root sleeve. In the iodine map image (Fig. 4A), the iodine is marked in blue and the cortical bone in red. In standard VRT reconstruction (Fig. 4B – anterior view and Fig. 4C – posterior view, transparent mode), the iodine leak along the nerve root was shown in 3D with the vertebrae removed.