

Traumatic Bone Marrow Edema of the Lower Limb

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History

A 35-year-old male patient, complaining of pain in the right knee following a road traffic accident four hours ago, presented himself to the emergency department. Physical examinations revealed no external wounds around the right knee joint. The ordered X-ray examination was negative. Dual Energy CT (DECT) was requested for further evaluation.

Diagnosis

DECT images showed a hyperdense area on the lateral aspect of the right proximal tibia, suggesting a bone marrow edema. No signs of fracture were seen in CT images. Magnetic resonance imaging (MRI), performed the same day, ruled out ligamentous injuries and confirmed bone marrow edema in the same area.

Comments

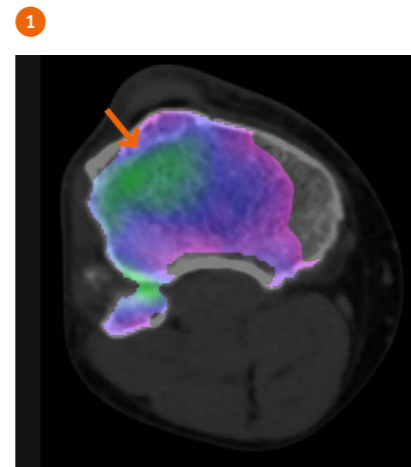
Bone marrow edema, usually caused by trauma, is hardly detectable in conventional CT since it produces very subtle changes in CT attenuation values and densities. To overcome this challenge, a new application named *syngo*.CT DE Bone Marrow was introduced. It acquires the attenuation measurements from two different kV settings and calculates a virtual non-calcium (VNCa) image, using the three-material decomposition method. To further improve the assessment of the marrow space, a special filter technique, the Selective Photon Shield, is also applied, enabling a significant separation of the energy spectrum at 80 and 150 kV settings. In this case, CT assessment helped the physicians reach a confident diagnosis. ●

Examination Protocol

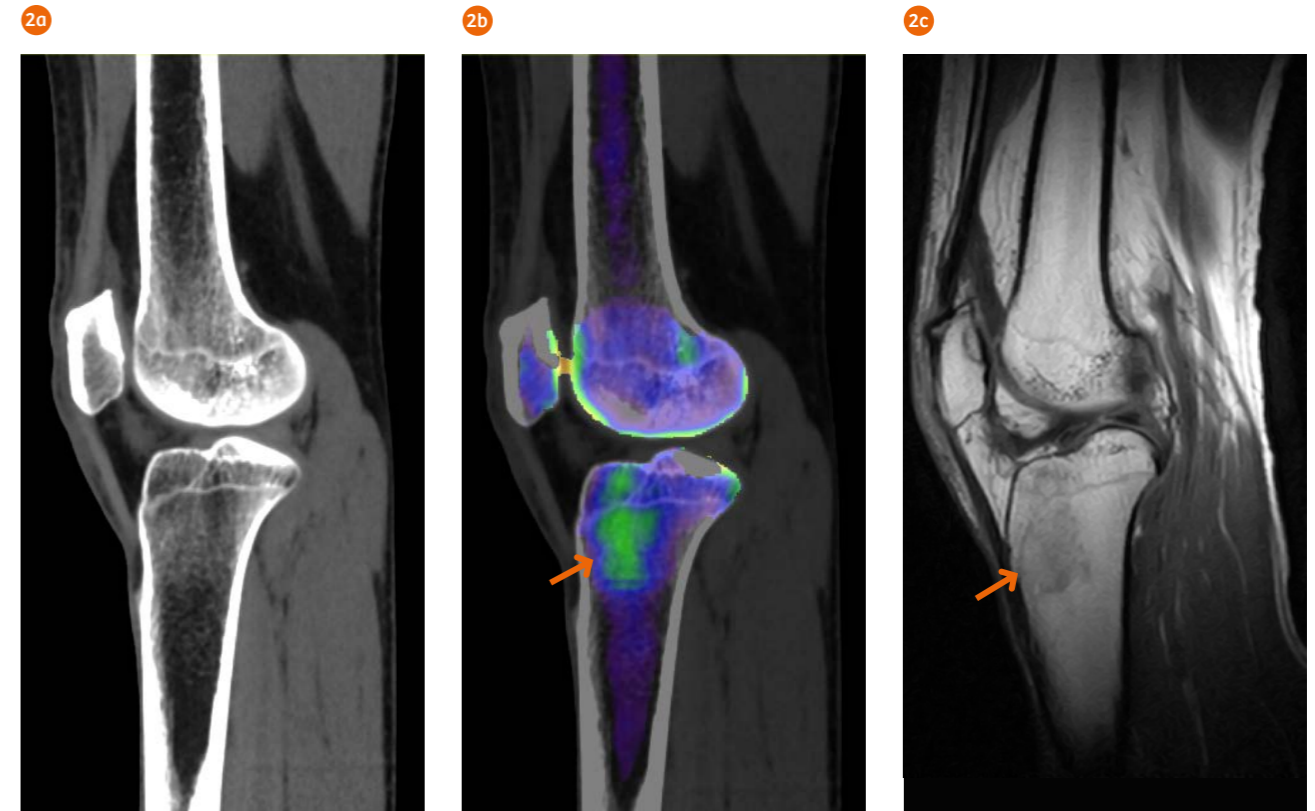
Scanner	SOMATOM Force		
Scan area	Knee joints	CTDI _{vol}	6.67 mGy
Scan mode	Dual Source Dual Energy	DLP	184.5 mGy cm
Scan length	245.7 mm	Rotation time	0.5 s
Scan direction	Cranio-caudal	Pitch	0.6
Scan time	5.2 s	Slice collimation	128 × 0.6 mm
Tube voltage	80 / Sn150 kV	Slice width	1.0 mm
Effective mAs	161 / 108 mAs	Reconstruction increment	0.7 mm
Dose modulation	CARE Dose4D™	Reconstruction kernel	Qr44 (ADMIRE 4)

The outcomes by Siemens Healthineers customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that other customers will achieve the same results.

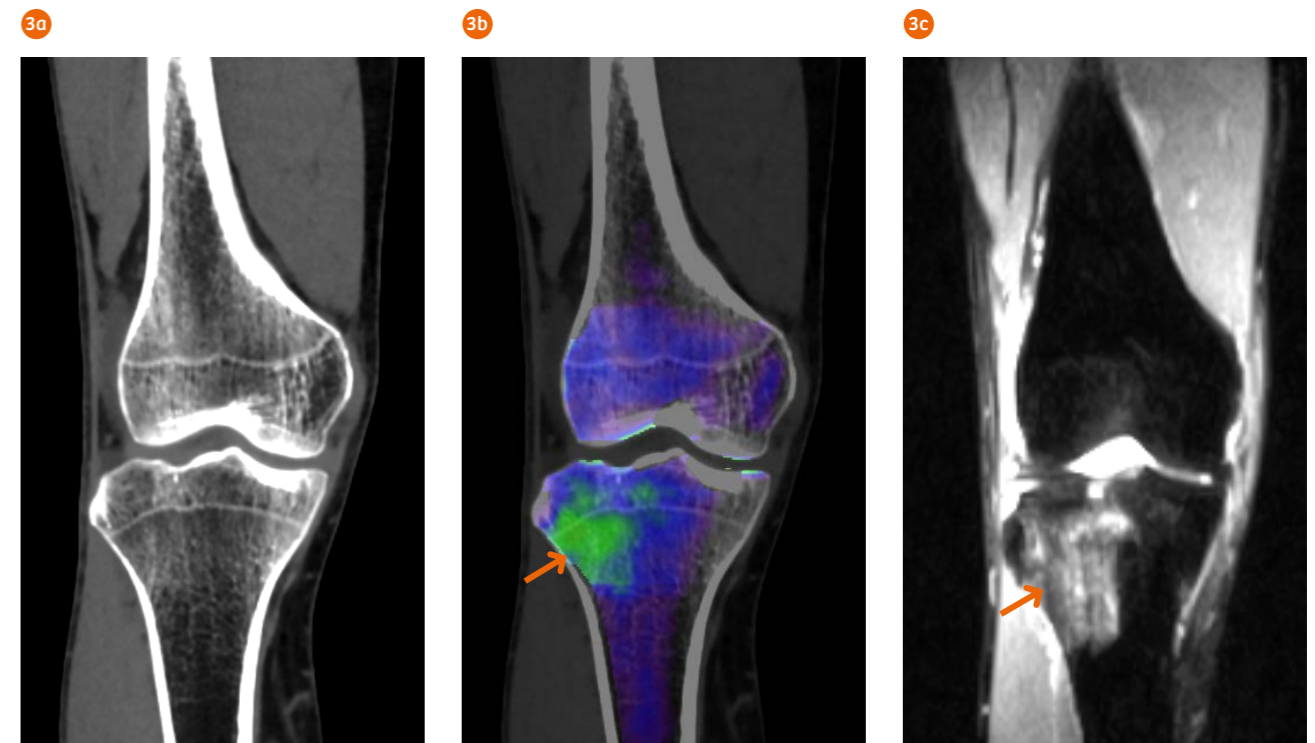
In clinical practice, the use of ADMIRE may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task.



1 An axial DE VNCa image depicts bone marrow edema (arrow) on the lateral aspect of the upper right tibia.



2 Sagittal views of a CT (Fig. 2a), a DE VNCa (Fig. 2b), and a T1-weighted MR (Fig. 2c) image of the right knee joint show no fractures but bone marrow edema (arrows) on the lateral aspect of the proximal tibia.



3 Coronal views of a CT (Fig. 3a), a DE VNCa (Fig. 3b), and a STIR MR (Fig. 3c) image of the right knee joint show no fractures but bone marrow edema (arrows) on the lateral aspect of the proximal tibia.