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Case Study Discussion
Ultrasound as an alternative to MRI

A teenage patient who has cerebral palsy and mixed spastic quadriplegia related to holoprosencephaly was seen today in rehabilitation for follow up. Patients' impairments include shunted hydrocephalus, hypotonia, spasticity, motor control and cognitive delays. All of her impairments contribute to functional limitations, including cognitive, feeding, ADLs, mobility, transfers, positioning and care. Diagnostic ultrasound was performed on her right ankle because of a 1 x 1 cm nodule noted in the ankle.

The patient was diagnosed with a mycobacterial infection, Mycobacterium Marinum. She has had several I&D's. This nodule/mass has been increasing in size over the past several weeks. There is the suggestion of performing an MRI under sedation; it was decided to perform an ultrasound in lieu of this.

A Terason t3000 Ultrasound System with a 12 MHz linear transducer was used to image the right ankle in multiple views. Transverse view of the anterior ankle demonstrated fluid collection around the tibialis anterior tendon. No mass was observed. Multiple views of the right medial ankle were obtained, superior and posterior to the malleolus. This revealed 1-1.9 x 1.2 cm mixed echotexture, cystic structure. This was non-compressible. This cystic structure lies adjacent to the medial malleolus, but does not communicate with the joint. The contents of the cystic structure was of mixed echotexture, including hypoechoic fluid and mixed echotexture material. **These findings are consistent with a cystic granuloma. No further tests are needed at this time.**

RIGHT ANKLE AT MEDIAL MALLEOLUS

Dr. Alter provides an image with this case which demonstrates the typical ultrasound appearance of granulomas – cystic, with mixed internal echotexture. Chronic inflammation around difficult-to-destroy pathogens, in this case mycobacterium marinum, leads to the accumulation of fluid and inflammatory debris within a cystic-like structure (granuloma). Fluid, such as water, doesn't reflect ultrasound, therefore, there's no echo. An object that doesn't produce an echo is said to be anechoic. Anechoic objects appear black on ultrasound images. Inflammatory debris, on the other hand, produces echoes that vary in intensity due to differences in stiffness and density, as well as due to the arrangement of the debris in a manner that variably reflects and refracts ultrasound. The histologic variability within a granuloma is represented on the ultrasound image as variations in brightness. The appearance of an object on an ultrasound image with mixed brightness is described as having "mixed echotexture."

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In this case, ultrasound was used as an alternative to MRI to significantly decrease the risk to the patient as well as provide a cost savings for the family and the insurance company. Ultrasound also reduced the discomfort and stress for this developmentally-delayed teenager who has cerebral palsy. This patient would have required sedation for an MRI. With previous sedation for MRI she developed pneumonia due to a compromised airway/GERD. The ultrasound was performed in the outpatient office and obviated the need for sedation. It also reduced inconvenience and time away from work and school for a family who travel great distances to come to appointments.

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