Active Colonic Hemorrhage Confirmed by Dual-Energy CT

Submitted by Avneesh Gupta, MD
Boston University Medical Center
Clinical History:

- 60 year old male with acute abdominal pain
Figure 1. Conventional reconstruction from a single-phase contrast enhanced DECT demonstrates a hyperdense focus in the lumen of the mid ascending colon (arrow).
Figure 2. Virtual non-contrast (VNC) DECT reconstruction image demonstrates suppression of hyperdense focus in the ascending colon, confirming the presence of Iodine and active hemorrhage.
Figure 3. Iodine (water) pair DECT reconstruction supports the presence of iodinated contrast in the ascending colon (arrow).
Figure 4. Spectral Hounsfield Unit plot of hyperdense colonic focus demonstrates a downsloping attenuation curve, typical for Iodine.

Spectral HU curves are generated manually by the radiologist using a separate software program and by drawing a region of interest around the area to be analyzed. Because iodine appears very dense at lower keV levels close to its k-edge and progressively becomes less dense with increasing keV levels, the typical spectral HU curve for iodine is therefore downsloping.
Figure 5. In comparison, a flat curve (purple line) or slightly upsloping curve is typical for non-enhancing structures, indicating the lack of Iodine. A downsloping curve indicating the presence of Iodine in an enhancing structure (yellow line) is shown for comparison.
Figure 6. Catheter angiogram confirms active contrast extravasation in the ascending colon within an area of angiodysplasia (arrow), which was subsequently embolized.
Teaching Points:

✓ Dual Energy CT can be valuable in the setting of GI bleeding, resulting in improved diagnostic accuracy.
✓ Virtual non-contrast (VNC) reconstructions may be generated from post-contrast DECT images in lieu of performing conventional dedicated non-contrast images, resulting in reduced radiation dose.
✓ DECT can help to distinguish hyperdense enteric contents from intraluminal iodinated contrast extravasation using VNC reconstructions.
✓ Iodine (water) pair reconstructions can support the presence of intraluminal iodine.
✓ Spectral Hounsfield Unit curves may further increase diagnostic confidence for extravasated iodinated contrast based on curve morphology.
References