

Title:

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Spectral CT as a method for identifying radiolucent gallstones

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Dear Editor,

We present the case of an 82-year-old woman with history of right colon adenocarcinoma in whom a routine control scan is performed using a dual-layer detector spectral CT scanner.

Conventional CT scan images (a) show a dilated cystic bile duct (arrowheads) with no apparent cause of obstruction, finding also no lithiasis inside the gallbladder. Non-calcified gallstones are composed mainly of cholesterol and can have the same radiographic density as bile, making them hard or impossible to spot on conventional CT.

“Z Effective” is a spectral map that differentiates tissues according to their estimated atomic number, providing a color-coded overlay to the CT images. While bile and non-calcified gallstones share the same radiographic density, they possess different atomic numbers, thus spectral CT helps to easily identify radiolucent gallstones. In this color-coded map (b) cholesterol gallstones show a similar atomic number to subcutaneous and peritoneal fat and can be easily spotted obstructing the cystic duct (white arrow).

MR cholangiopancreatography was performed (c) confirming the presence of the stone in the proximal cystic bile duct (red arrow).

REFERENCES

1. Demirler Simsir B, Danse E, Coche E. Benefit of dual-layer spectral CT in emergency imaging of different organ systems. *Clinical Radiology* 2020;75(12):886–902.
2. Danse E, Jamali S, Hubert C. Spectral CT Detection of Entrapped Gallstone Based on Z-effective Map. *Journal of the Belgian Society of Radiology* 2018;102(1):53.

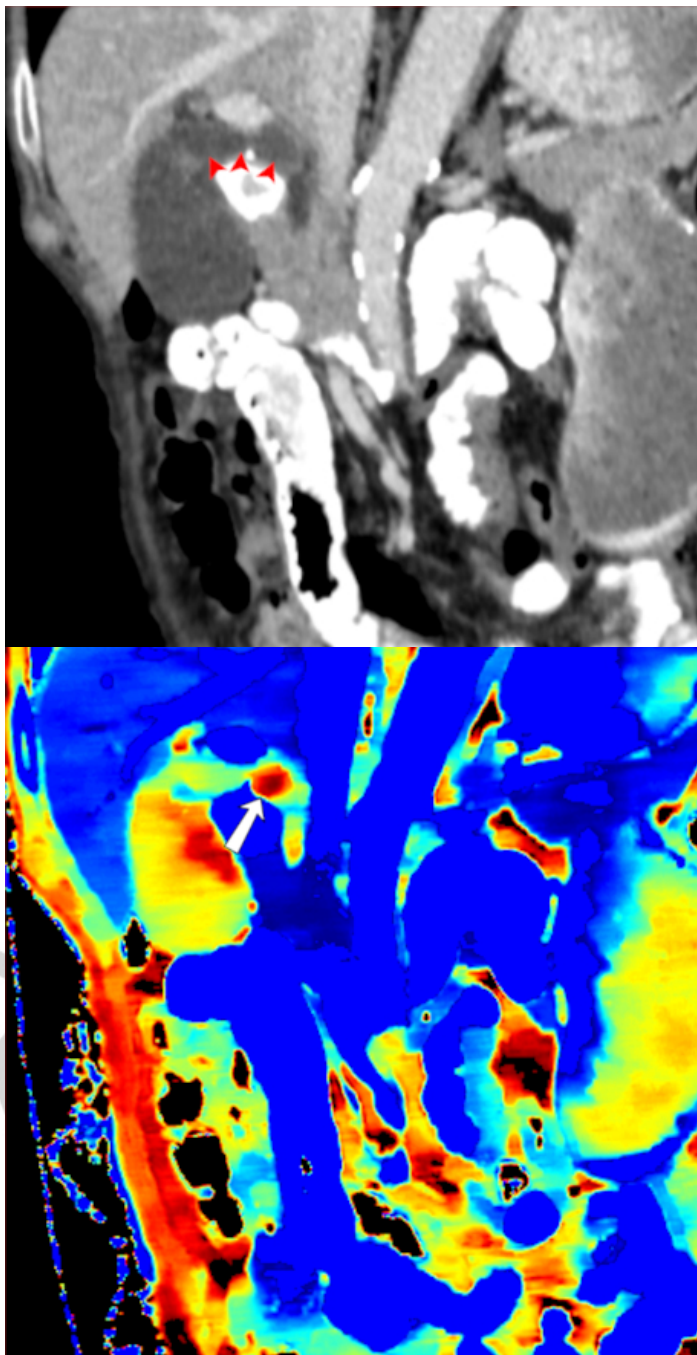




Figure (a): Conventional CT scan showing a dilated cystic bile duct with no apparent gallstones (arrowheads)**Figure (b):** Z Effective spectral map depicting a stone-like image in the cystic bile duct, with different atomic number than the rest of the duct's bile (white arrow), corresponding to a gallstone, invisible on conventional CT. **Figure (c):** Thick slice MR cholangiopancreatography of the same patient in which a filling defect can be seen on the cystic bile duct (red arrow) confirming the presence of the obstructing gallstone. Multiple cholelithiasis can be seen, which were not visible on the conventional CT images.