

# Pseudocirrhosis due to aggressive dose reduction techniques

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## **CASE SUMMARY**

A 66-year-old female with a history of atrial fibrillation, hypertension, and diabetes presented to the emergency department with chest pain and shortness of breath. Laboratory analysis including CBC, CMP and D-Dimer were unremarkable. Brief physical examination revealed lungs which were clear to auscultation bilaterally, regular heart rate and rhythm without murmur and a soft non-tender abdomen without evidence of ascites.

During her initial evaluation, the emergency department team elected to perform a CT pulmonary angiogram (CTPA) due to patient's complaints of chest pain and shortness of breath and history of prolonged immobility to evaluate for pulmonary embolus.

## **IMAGING FINDINGS**

No evidence of pulmonary embolism was identified to a sub-segmental level. However, apparent morphologic

changes of cirrhosis of the liver were noted incidentally (Figure 1). These findings were new when compared to a CT of the abdomen and pelvis performed just two weeks prior (Figure 2). A follow-up liver ultrasound revealed no sonographic evidence of cirrhosis (Figures 3 and 4).

## **DIAGNOSIS**

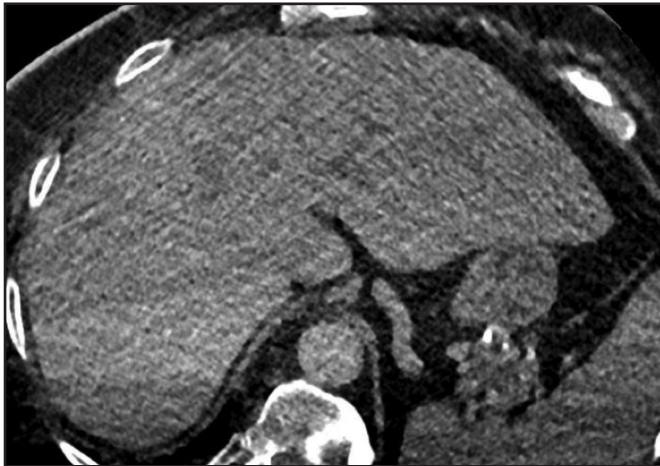
Pseudocirrhosis due to aggressive dose reduction techniques

## **DISCUSSION**

Minimizing radiation dose to patients is an important factor to consider when optimizing computed tomography protocols. However, the benefits of radiation dose reduction must be carefully weighed against the ultimate goal of achieving a diagnostic quality examination. A known disadvantage of dose reduction is image quality degradation due to increased image noise from quantum mottle.<sup>1</sup>

CTPA and low dose screening chest CT are examples of examinations that accomplish diagnostic goals with aggressive dose modification.<sup>2,3</sup> The success of these low dose examinations utilizes advances in contrast media injection and the inherent contrast of aerated lung. Unfortunately, dedicated imaging of abdominal organs often depends upon discerning subtle differences in attenuation, which is hampered by decreases in radiation dose and subsequent increases in image noise.

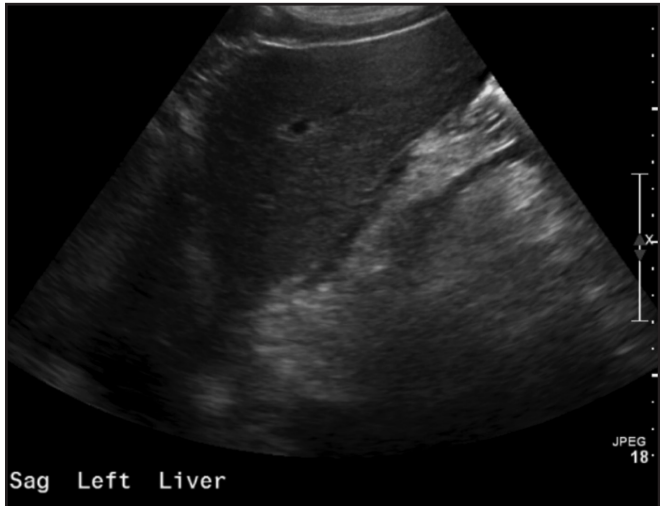
We have observed the nodular contour of the liver classically described in patients with hepatic cirrhosis on a large number of patients undergoing CTPA with aggressive dose modification. Follow up with other imaging modalities revealed no evidence of hepatic pathology. Currently, there is no description in the literature of dose reduction techniques leading to the misdiagnosis of liver cirrhosis. In order to increase awareness of this diagnostic pitfall and



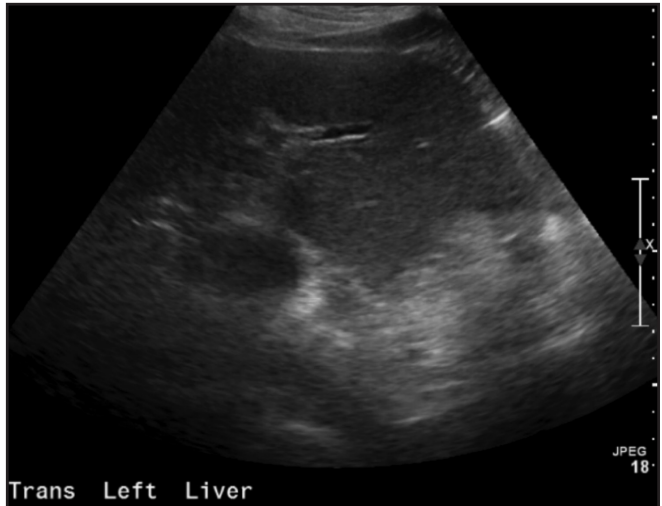
**FIGURE 1.** Axial CT image through the liver from a CTPA. Macronodular appearance of the liver surface, particularly the left hemiliver, giving the impression of cirrhosis.



**FIGURE 2.** Similar image on the same patient as in Figure 1 approximately 2 weeks prior during a CT of the abdomen and pelvis without reduced radiation dose demonstrating normal liver contour.



**FIGURE 3.** Ultrasound of the same patient was performed after the findings on Figure 1 due to concerns for cirrhosis. Ultrasound shows a smooth liver surface without any evidence of nodular surface. The remaining portions of the ultrasound exam were also normal.



**FIGURE 4.** Transverse ultrasound image of the left hemiliver in the same patient shows a smooth liver wall without evidence of nodularity.

due to the rapidly evolving use of low dose techniques, it is important to continue to explore and understand both their limits and advantages.

### CONCLUSION

This case demonstrates the false appearance of a cirrhotic liver based on its macronodular surface and heterogeneous parenchyma. Comparison studies on ultrasound and CT without employing low dose techniques demonstrate a normal liver contour. Without prior knowledge of this phenomenon, the

interpreting radiologist is more likely to incorrectly diagnosis cirrhosis.

### REFERENCES

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3. Aberle DR, Adams AM, Berg CD, Black WC, Clapp JD, Fagerstrom RM, et al; National Lung Screening Trial Research Team. Reduced lung-cancer mortality with low-dose computed tomographic screening. *N Engl J Med*. 2011;365:395-409.

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