

Contrast-enhanced EUS in the evaluation of peritoneum and omentum in undiagnosed ascites

Dear Editor,

Advent of EUS has improved our diagnostic capability in patients with undiagnosed ascites.^[1] EUS, by providing high-resolution images, can directly visualize as well as sample peritoneal and omental deposits/thickening. EUS-FNA can help in identifying the etiology of peritoneal/omental deposits.^[2] Occasionally, FNA may be noncontributory and the patient may need repeat sampling. Contrast-enhanced EUS (CEUS) by providing information on enhancement pattern can help in the differential diagnosis of benign and malignant lesions.^[3,4] We retrospectively assessed CEUS features of malignant peritoneal and omental deposits/thickening in six patients with malignant ascites and compared them with tubercular peritoneal and omental deposits/thickening in seven patients with tubercular ascites. CEUS was performed by a linear scanning echoendoscope from the stomach and duodenum under conscious sedation using intravenous midazolam. On EUS, the thickened omentum is visualized as a sheet-like hypoechoic or echogenic structure adjacent to the gastric wall, and peritoneal nodules are seen as heteroechoic nodules hanging from the peritoneum into the anechoic ascites. After visualizing the lesion, 2.4-mL bolus of the US contrast agent Sonovue (Bracco, Milan, Italy) was injected followed by flushing with 10 mL of saline. The contrast enhancement of the lesion was classified as enhancing, hypoenhancing, or no enhancement. Thereafter, the peritoneal deposits or thickened omentum or both were sampled using a 22-G needle.

EUS revealed a thickened omentum in seven patients, peritoneal nodules in six patients, and both thickened omentum and peritoneal nodules in two patients. The peritoneal nodules were larger and well-defined in malignant ascites as compared to

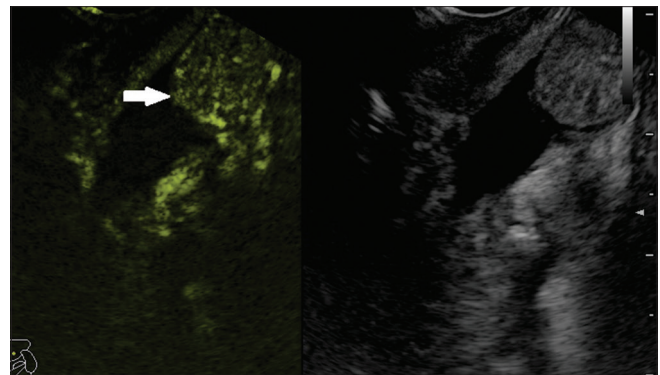


Figure 1. EUS in a patient with malignant ascites: Peritoneal nodule is seen as enhancing lesion on contrast-enhanced EUS (arrow)

tubercular ascites (5.2 ± 1.0 mm *vs.* 2.2 ± 0.3 mm, respectively; $P = 0.002$). On CEUS, the peritoneal deposits [Figure 1] as well as thickened omentum were enhancing in all the six patients with malignant ascites, whereas the thickened omentum as well as peritoneal nodules [Figure 2] were hypoenhancing in all patients with tubercular ascites. There were no complications of the procedure. Cytological examination of EUS-FNA samples from peritoneal deposits revealed metastatic adenocarcinoma in four patients, poorly differentiated carcinoma in one patient, granulomatous inflammation in two patients, and nonspecific inflammation in one patient. Cytological examination of EUS-FNA samples from thickened omentum revealed metastatic adenocarcinoma in two patients and granulomatous inflammation in five patients.

To the best of our literature search, CEUS features of these deposits have not been evaluated previously. Que *et al.* used contrast-enhanced transabdominal ultrasound to study the enhancement pattern of metastatic peritoneal nodules in 25 patients with confirmed peritoneal metastases after ultrasound-guided biopsies of peritoneum.^[5] Similar to our results, they also reported that metastatic peritoneal nodules showed fast radial enhancement.

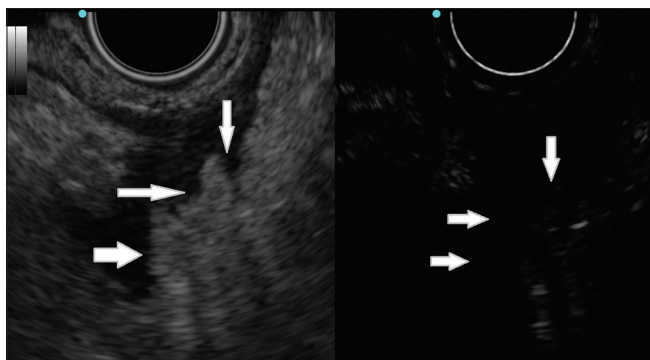


Figure 2. Hypoechoic ill-defined peritoneal nodule (arrows) in tubercular ascites (arrows)

We have for the first time demonstrated the CEUS findings in malignant as well as tubercular omental as well as peritoneal nodules. CEUS, by demonstrating the enhancement pattern of peritoneal nodules as well as thickened omentum, appears to be a good diagnostic modality for differentiating tubercular from malignant ascites. However, prospective studies with a large sample size are needed to confirm these interesting initial results.

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Conflicts of interest

There are no conflicts of interest.

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