**Hepatosplenic Carcinoid diagnosed by EUS**

John C Deutsch, MD¹  
Daniel A Nikcevitch, MD²  
Thomas C Nelson, MD³  
Departments of Gastroenterology¹, Oncology² and Pathology³  
St Mary’s Duluth Clinic, Duluth MN

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Methods: EUS images were captured directly to DVD and processed using Adobe CS3 and Photoshop software.

**Introduction:**

A patient with evolving liver and spleen lesions was evaluated by EUS and found to have carcinoid tumor involving both tissue sites. This is the first report we are aware of in which EUS was used to diagnose carcinoid tumors in the spleen.

**Case:**

A 69-year-old female was in her usual state of excellent health when she developed abdominal pain. She was seen in a community hospital emergency department and was found to have a urinary tract infection. Treatment with antibiotics resolved her abdominal symptoms. A CT scan during her evaluation showed an abnormally enlarged lymph node in the mesentery and a questionable liver lesion, felt to be either a mass or a hemangioma. She also had several liver cysts. She presented to oncology four weeks later for evaluation of her CT findings. She stated she felt perfectly well at that time and, in fact, wondered why she was being evaluated.

Her family history was significant for a sister dying from breast cancer at a young age.

Her physical exam was unremarkable.

A repeat CT scan was performed which revealed adenopathy at the mesenteric root (Figure 1), a right medial breast mass (Figure 2), diverticulosis without evidence of diverticulitis and equivocal findings for caudate lobe hemangioma as well as numerous hepatic cysts. A definitive liver lesion was not identified with higher resolution CT.

With the familial history of breast cancer and the CT abnormality of the breast,
the patient underwent further evaluation and was found to have a ductal breast cancer.

She underwent a simple mastectomy with sentinel node biopsy and was eventual staged as having T2N0M0 Stage I disease. The patient was placed on tamoxifen which she tolerated without side effects other than some flushing.

At her subsequent oncologic follow ups, she was doing very well. She had no evidence of recurrence of breast cancer and continued adjuvant hormonal therapy with Tamoxifen. A CT scan of the abdomen (now 11 month after her initial emergency room visit) showed the nodule in the mesenteric root remains unchanged (Figure 3) and no solid lesions were identified in the liver (Figures 4,5). The nodule did not appear to be amendable to percutaneous biopsy and it was elected to follow the patient with serial imaging.

One year later she returned for oncologic follow up. She remained on adjuvant hormonal therapy with Tamoxifen. But in the month prior to this visit she began having intermittent left lower quadrant abdominal cramping and frequent loose stools. The tamoxifen related flushing may have increased.

The mass in the root of the mesentery that has been present for at least 2 years was essentially unchanged in size (Figure 6). Likewise, the cystic lesions in the liver appear unchanged. However, there were new findings in the liver and spleen (Figures 7,8). EUS evaluation was recommended as well as colonoscopy for possible microscopic colitis.

Her colonoscopy was unremarkable and biopsies were normal.

EUS was done using Pentax 3630 UR radial array equipment. A periduodenal mass was identified just past the uncinate process of the pancreas involving the superior mesenteric artery (Video 1). Pentax 3630 U linear array equipment revealed several small liver lesions and a large liver mass which was biopsied using a 25g Wilson Cook needle (Video 2). Preliminary cytology using Papanicoloau stain

Figure 3: CT showing stability of mesenteric mass (green arrow) on the follow up 10 months after Figure 1.

Figure 4: CT of liver at 10 month follow up after Figure 1.

Figure 5: CT of spleen at 10 month follow up after Figure 1.

Figure 6: CT showing stability of mesenteric mass (green arrow) on the follow up 22 months after Figure 1, and 12 months after Figure 3.

Figure 7: CT of liver mass (red arrow) 12 months after Figures 3-5.

Figure 8: CT of splenic lesions (blue arrow) and liver mass (red arrow) 12 months after Figures 3-5.

Figure 9: Papanicolaou stain of liver FNA revealed neuroendocrine features.

Figure 10: Hematoxylin and Eosin stain of the cell block confirmed these features.
suggested a neuroendocrine tumor *(Figure 9)*. Due to the rarity of neuroendocrine involvement of the spleen, aspiration of a splenic lesion with a 25g needle was also performed to see if there was a second primary tumor. *(Video 3).*

Final liver cytology of smears and cell block show epithelial cells having neuroendocrine features *(Figures 9,10).* These stained positive for low molecular weight cytokeratin, synaptophysin, chromogranin *(Figures 11)*, as well as estrogen. The cells of interest were negative for progesterone and BRST-2.

The previous breast cancer stained positive for both estrogen and progesterone and appeared morphologically different than the current tumor. The morphologic and immunohistochemical findings were consistent with metastatic carcinoid tumor rather than breast cancer. The splenic aspirate showed morphologic findings consistent with metastatic carcinoid tumor *(Figures 12,13).*

**Discussion:**

Carcinoid tumors are uncommon endoneurocrine neoplasms that can arise in a variety of organs, but most commonly in the ileum, appendix, colon, stomach, duodenum and bronchus\(^1,2\). They can grow slowly and remain asymptomatic for years.

Liver metastases are common with advanced disease, but splenic involvement is exceedingly rare, and to our knowledge, has not been reported to have been diagnosed except during surgery.\(^3,4\)

Our particular patient is of interest in that her initial presentation was probably for an incidental urinary tract infection. An emergency room CT scan revealed an abdominal abnormality probably representing asymptomatic metastatic small intestinal carcinoid. Further evaluation identified early stage breast cancer, and over time the patient showed no evidence of progressive carcinoid disease of the bowel and index lymph node, but came to attention for abnormal liver and spleen findings of surveillance CT scans. It is likely that she is developing carcinoid syndrome with diarrhea and flushing, although her hormonal therapy complicates this interpretation.

This report is the first we are aware of in which splenic aspiration by EUS has confirmed metastasis of carcinoid disease and adds to the literature in which EUS is able to safely identify significant findings in the spleen.\(^5,7\)
References:


