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False-Positive Somatostatin Receptor Scintigraphy Due to an Accessory Spleen

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A patient with previous left caudal pancreatectomy and splenectomy presented with Zollinger-Ellison syndrome. Abdominal CT and endoscopic ultrasonography revealed a mass in the splenic area. Somatostatin receptor scintigraphy showed a nodular increase of the uptake corresponding to the lesion detected with conventional imaging. A second laparotomy was performed and the mass was resected. Histological analysis showed that the nodular lesion was an accessory spleen. Since physiologic uptake of ^{111}In-pentetreotide is seen in the spleen, an accessory spleen mimicking a tumor, specially after previous splenectomy, may result in false-positive somatostatin receptor scintigraphy.

Key Words: somatostatin receptor scintigraphy; gastroenteropancreatic tumors; accessory spleen

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Somatostatin receptor scintigraphy (SRS) detects neuroendocrine gastroenteropancreatic (GEP) tumors with a high sensitivity (70% to 95%) (*1–9*). It may detect primary and metastatic endocrine tumors not visualized by other imaging techniques and, therefore, is considered to have an effect on patient's management (*7,8*). Specificity, reported by autoradiographic and clinical studies, seems high but is difficult to evaluate because all scintigraphic positive sites cannot be histologically studied. In our experience of more than 200 patients with neuroendocrine GEP tumors, we report here a case of demonstrated false-positive result due to an accessory spleen.

CASE REPORT

A 63-yr-old man was admitted in July 1988, with epigastric pain, vomiting and diarrhea of a few months duration. The esophagogastroduodenoscopy showed ulcerative esophagitis and ulcerative duodenitis. A diagnosis of Zollinger-Ellison syndrome (ZES) was biologically confirmed on secretin test results: basal acid output 11.7 mmol/hr acid output, after secretin infusion (3 U/kg/hr), 27.7 mmol/hr above our 100% specificity threshold for the diagnosis of ZES; basal gastrin levels 77 microU/ml (normal value < 115); and gastrin under secretin infusion 222 microU/ml (*8*). Abdominal CT scan and ultrasonography were negative, as well as the search for multiple endocrine neoplasia Type 1. In November 1988, an explorative laparotomy was performed. A complete surgical exploration of the abdomen performed without preoperative endoscopy was negative. Intraoperative ultrasonography of the caudal pancreas gave doubtful results. A left caudal pancreatectomy with splenectomy was performed. Histological examination of the resected pancreas was normal. No pathological lymph node was found. No neuroendocrine tumor was found on the resected tissue. The patient was discharged on Omeprazole therapy (60 mg/d).

In May 1994, the secretin test remained positive: basil acid output at 2.3 mmol/hr, acid output under secretin infusion (3U/kg/hr) at 18.6 mmol/hr, basal gastrin levels at 143pg/ml (N < 108), gastrin under secretin infusion at 227pg/ml, confirming the diagnosis of ZES.

Abdominal CT and endoscopic ultrasonography revealed a mass in the splenic area (2.4 cm) near the left kidney, suggesting a tumoral lymph node.

Somatostatin receptor scintigraphy was performed with injection of 135 MBq ^{111}In-pentetreotide. Scintigraphic images were acquired using a dual-head camera (DST Sopha Medical Vision, Brie, France) with a medium-resolution, parallel-hole collimator, and a 256 × 256 word matrix with a preset time of 10 min. Acquisition was adjusted to both ^{111}In photopeaks (171 and 245 keV). Abdominal images were obtained at 4 hr in the anterior and posterior views. At 24 hr, the acquisition included anterior and posterior views for the head, chest and pelvis, and anterior, posterior, lateral and oblique views for the abdomen. Abdominal single emission CT (SPECT) was performed at 24 hr postinjection, using a double indium peak acquisition, 64 projections over 360° rotation, 60 sec per step, 64 × 64 matrix. Slices were reconstructed after backprojection using a Hann filter. Delayed images were performed on the abdomen in the anterior, posterior and lateral views 30 hr postinjection. SRS showed physiological uptake in liver and kidneys; the spleen had been removed previously. A focal increase of tracer uptake was clearly visualized in the left lateral and left posterior oblique views in the splenic area (Fig. 1), corresponding to the lesion detected with CT scan and endoscopic ultrasonography. No other abnormal tumoral uptake was found. A second laparotomy was performed in June 1996, 48 hr after injection of ^{111}In-pentetreotide.

After careful surgical examination of the abdomen, the surgeon found the nodular lesion corresponding to the lesion identified on preoperative imaging (CT, endoscopic ultrasonography and SRS). Intraoperative ultrasonography of the liver, duodenum and pancreas were negative. Intraoperative endoscopy with duodenal transillumination were also negative. Intraoperative scintillation detection performed was negative in the liver, pancreas and

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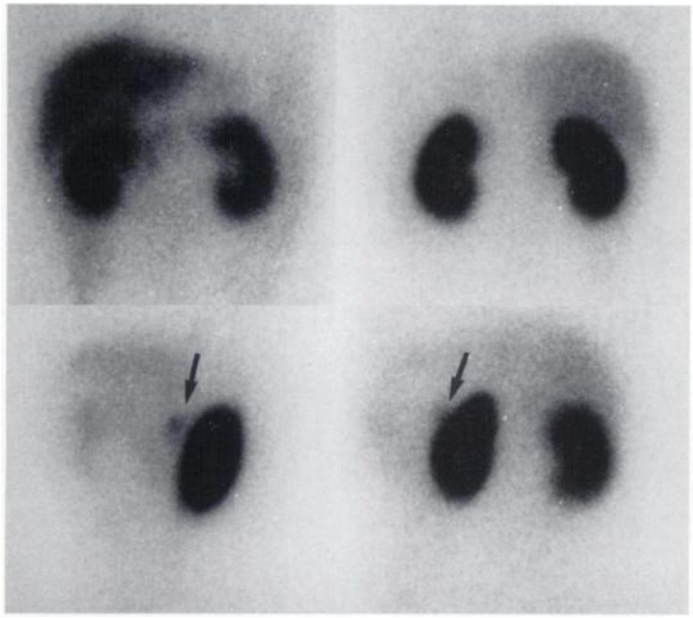

FIGURE 1. SRS performed before surgery shows a nodular increase of the tracer uptake in the splenic area (arrow). Planar images: anterior, posterior, lateral and oblique posterior views of the abdomen 24 hr after injection of ^{111}In-pentetreotide.

duodenum but showed a high uptake in the nodular lesion located in the epiploon. Counting was performed on both the nodular lesion and the surrounding reference tissue giving a tumoral-to-normal count ratio of 2.5 in vivo and 5 ex vivo. Histology showed that the nodular lesion (20mm, 27mm and 15 mm) corresponded to an accessory spleen; no endocrine tumor was found (Fig. 2).

Six months after surgery, another SRS did not show any abnormal uptake in the splenic area despite persistant biological ZES (Fig. 3).

DISCUSSION

The diagnosis of ZES is based on clinical signs (including diarrhea and multiple peptic lesions of upper digestive tract) and a specific biological syndrome: gastric acid hypersecretion and high serum gastrin levels both in the basal state and after secretin stimulation (secretin test). One hundred percent specificity thresholds of each of these parameters have been established by our group (*10*). This patient had typical clinical and biological signs of ZES, with increased acid output and serum gastrin levels under secretin infusion reading 100% specificity thresholds for this diagnosis.

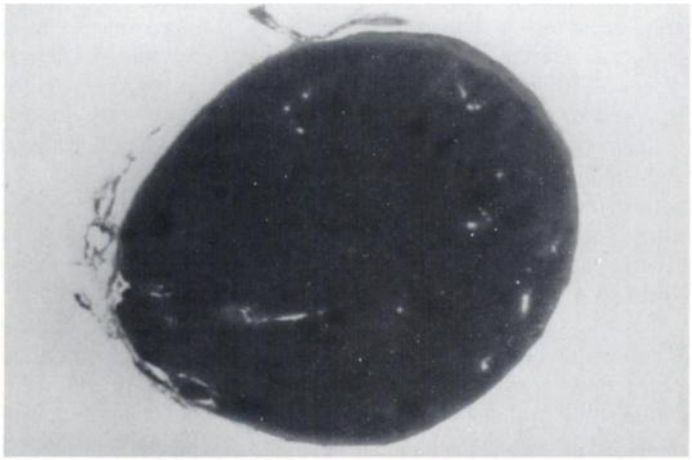

FIGURE 2. Histology of the removed tissue confirmed an accessory spleen (coloration hematein eosin safran).

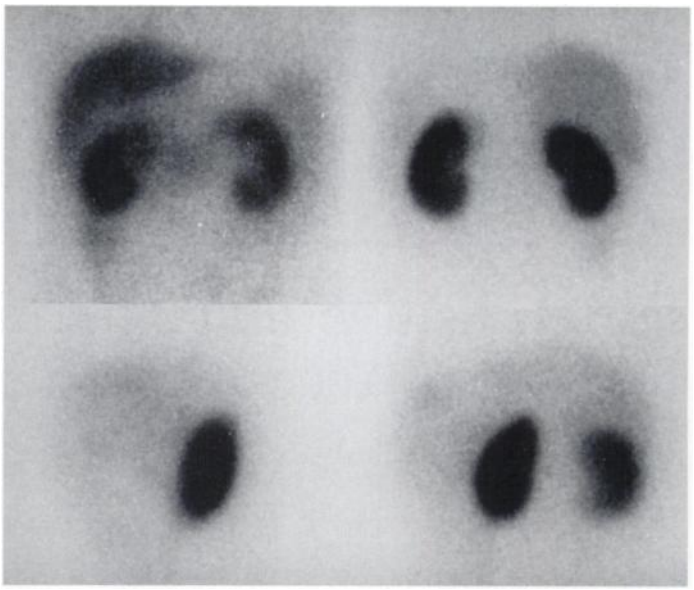

FIGURE 3. SRS performed 6 mo after surgery: no abnormal uptake was found in the splenic area. Anterior, posterior, lateral and oblique posterior views of the abdomen 24 hr after ^{111}In-pentetreotide injection.

The clinical management of patients with ZES usually involves the localization and surgical removal of the tumor. Curative surgery is difficult because primary tumors are often located in the duodenal wall and/or the lymphatics and are frequently smaller than 1 cm. They are often undetectable with conventional imaging as well as with endoscopic ultrasonography or SRS. Surgical exploration, including duodenal endoscopic transillumination and duodenotomy, remains negative in 8% to 15% of patients with specific biological ZES (*11,12*). The sensitivity of SRS for detecting primary gastrinomas and tumoral lymph nodes has been estimated at 51% (*7,8*). It has been demonstrated, however, that SRS largely improved the preoperative detection of these tumor; specificity is considered high (*1–9*).

This is a case of positive uptake of ^{111}In-pentetreotide in an accessory spleen mimicking an endocrine tumor. Accessory spleens have been demonstrated in different sites within the abdomen, including the retroperitoneal space, head of the pancreas and ovary (*13–15*). The detection of the accessory spleen in this patient might be explained by an enlargement of the accessory spleen after splenectomy, mimicking a neuroendocrine tumor.

Physiological uptake of ^{111}In-pentetreotide by the spleen is usually observed. The mechanism of the uptake in the spleen is not clearly elucidated and seems to be related to the lymphocyte presence of somatostatin receptors (*16–19*). Spleen uptake is reduced by Octreotide therapy. Tracer uptake in an accessory spleen is probably on the same basis. In this patient, SRS did not differentiate the physiologic uptake in the accessory spleen from tumoral uptake.

If an accessory spleen is suspected, ^{99m}Tc colloid scintigraphy or heat attenuated ^{99m}Tc erythrocyte have specific uptake for the liver and spleen, and may help differentiate an accessory spleen from a tumoral lesion (*20*).

CONCLUSION

Somatostatin receptor scintigraphy is a sensitive method for detecting neuroendocrine tumors. A physiologic uptake of ^{111}In-pentetreotide in the accessory spleen may mimick a tumor, especially after previous splenectomy, and result in a

false-positive result. The basis for the ZES remains unidentified.

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FIRST IMPRESSIONS
Midline Gallium-67 Activity at 72 Hr

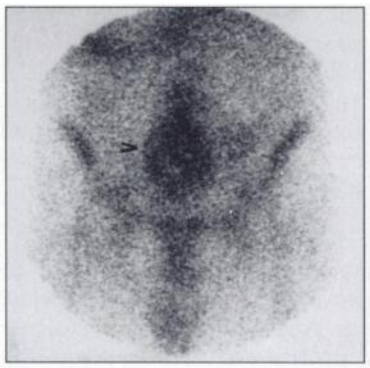

Figure 1.

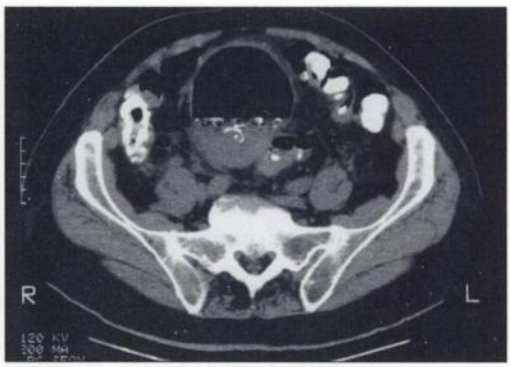

Figure 2.

PURPOSE
A 77-yr-old man had fever, abdominal pain, nausea and diarrhea. He was known to have diverticulosis for 25 yr. Gallium-67 scintigraphy demonstrated a large circular area of increased activity in the anterior pelvis at 72 hr (Fig. 1). A CT scan of the pelvis showed 8 × 8 cm giant sigmoid diverticulum (Fig. 2), which was subsequently resected at surgery.

TRACER
Gallium-67 citrate

ROUTE OF ADMINISTRATION
Intravenous

TIME AFTER INJECTION
48 hr (whole body) and 72 hr (pelvis)

INSTRUMENTATION
Gamma camera

CONTRIBUTORS
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