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Disseminated Islands of Gastric Mucosa in Jejunum and Ileum Detected by Technetium-99m-Pertechnetate Scintigraphy

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Disseminated islands of gastric mucosa are very rare in the small intestine. The secretion of hydrochloric acid can lead to ulceration which results in gastrointestinal bleeding. It is often difficult to localize the focus in case of gastrointestinal blood loss especially in the small bowel. Technetium-99m-pertechnetate scintigraphy may be a helpful tool in detecting ectopic gastric mucosa. We report a case of a 21-mo-old boy with recurrent gastrointestinal bleeding. By using pertechnetate scintigraphy, extensive tracer accumulation in the jejunum and proximal ileum was detected. Histologically, multiple islands of ectopic gastric mucosa were found in about 50 excited mucosal and transmural biopsies. The unusual finding of disseminated accumulation of ^{99m}Tc-pertechnetate in the small intestine was the diagnostic clue for such a rare disease.

Key Words: ectopic gastric mucosa; technetium-99m-pertechnetate; gastrointestinal bleeding

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Endoscopy and radiograph studies are able to locate most of the bleeding sources in patients with gastrointestinal blood loss. These methods, however, are unsuccessful in about 10% of patients with acute or chronic bleeding (*1,2*). In most of these cases, there are lesions in the small bowel which are difficult to localize. Mostly hemorrhage in childhood is caused by ectopic gastric mucosa in Meckel's diverticulum which results in peptic ulceration (*3*). Technetium-99m-pertechnetate scinitigraphy can be extremely helpful in detecting ectopic gastric mucosa as possible source of hemorrhage.

In this case report, we present a 21-mo-old boy with recurrent gastrointestinal bleeding. The pertechnetate scintigraphy performed to rule out Meckel's diverticulum showed extensive tracer accumulation throughout the jejunum and proximal ileum, which histologically disclosed as disseminated islands of gastric mucosa in the small bowel.

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CASE REPORT

A 21-mo-old boy with known chronic renal failure, caused by dysplastic solitary kidney, was admitted to our hospital with a history of rectal bleeding. During the past 3 mo there was a continuous moderate decrease in serum hemoglobin, which was interpreted as developing renal anemia. Before admittance, the child's mother reported on occurrence of bloody stools and melaena. The result of the physical examination was inconspicuous except for a moderate pallor. Hemoglobin on admittance was 5,1 g/dl, hematocrit 16%, WBC 17,3/nl and CRP $<$ 10 mg/l.

Endoscopy of the stomach and colon did not reveal a bleeding site. To rule out a bleeding Meckel's diverticulum a ^{99m}Tc-pertechnetate scan was performed several days later using a gamma camera equipped with a LEHR collimator. After injection of 50 MBq ^{99m}Tc-pertechnetate, we first acquired a dynamic study over 5 min. Then static images of each 600,000 counts were taken every 10 min up to 4.4 hr p.i. There was a hyperperfusion in the upper abdomen followed by a tracer accumulation throughout the entire jejunum and proximal ileum beginning at the flexure of Treitz, which increased with time and paralleled the activity of the gastric mucosa (Fig. 1). Maximum intensity was reached 10 min p.i. and then constantly persisted. There was no transport within the small bowel during the investigation. Meanwhile, there was an increase of CRP to 84 mg/l so we first suggested unspecific tracer uptake in inflammatory small bowel disease.

Under antibiotic treatment with ampicillin and sulbactam (Unacid®), rectal bleeding ceased for 1 wk in accordance with stable hemoglobin and hematocrit. A control scintigraphy performed 3 wk later showed an unchanged state, thus, inflammation was excluded.

We finally suggested that disseminated gastric mucosa in the small bowel must have been responsible for the extensive tracer accumulation. After the scintigraphy, the patient developed abdominal pain. Since sonographically an intussusception was suspected, the patient underwent emergency laparotomy. Intraoperative inspection of the small intestine revealed multiple ill-defined tissue islands on the serosa site of the jejunum and proximal ileum. One

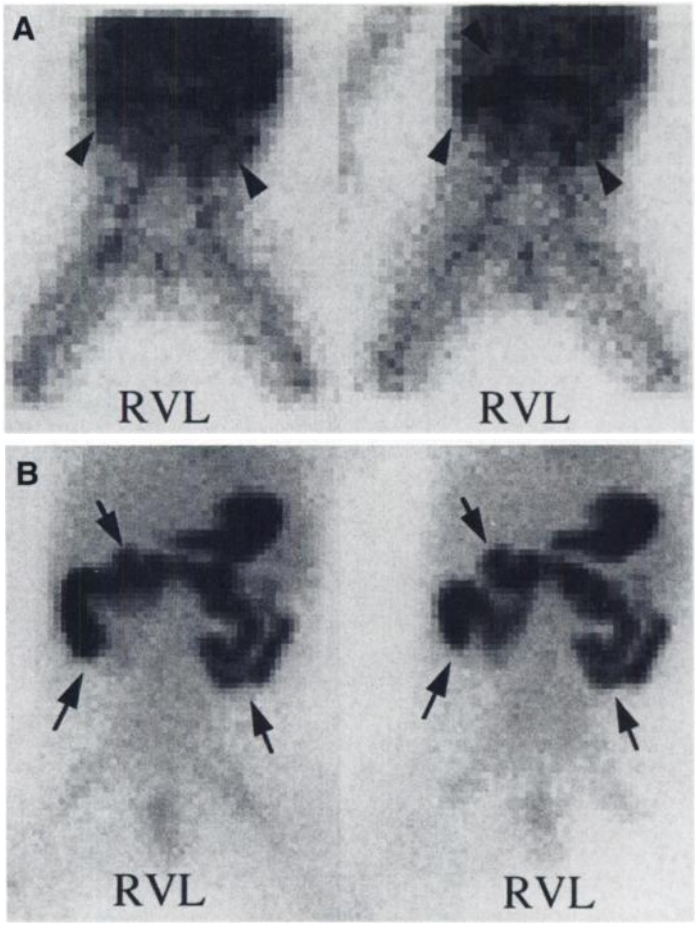

FIGURE 1. In the blood-pool phase (A) a tracer accumulation throughout the upper abdomen could already be seen (arrowheads). There was a distinct increase with time. A maximum was reached about 10 min p.i. The images obtained 20 and 60 min postinjection (B) revealed tracer accumulation in the jejunum and proximal ileum (arrows).

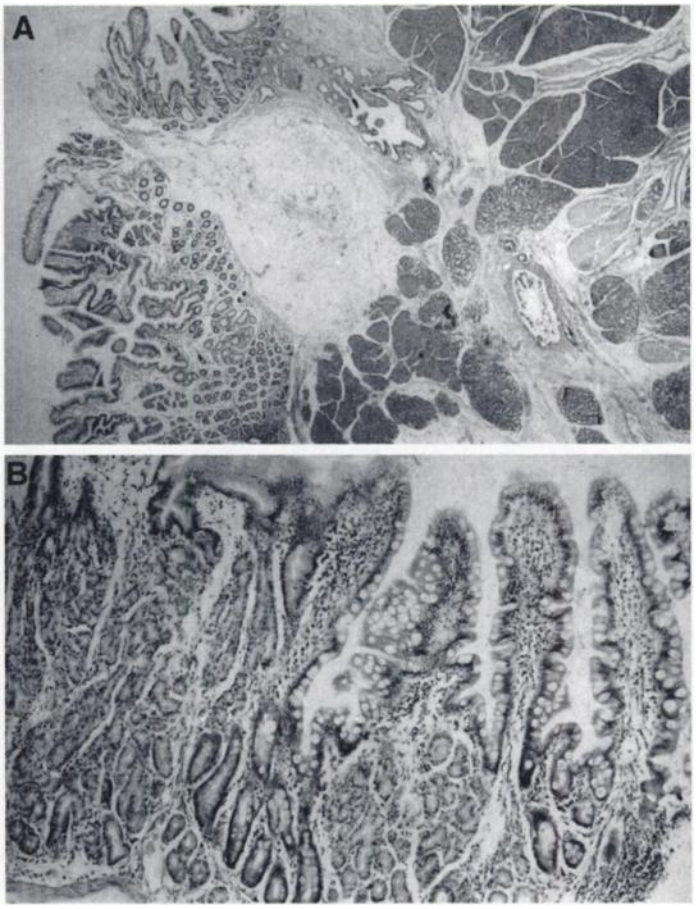

FIGURE 2. Histological preparations of the resected tissue (H&E staining). (A) In the left half of the image, there is normal jejunal mucosa while in the right half an island of pancreatic tissue can be seen on the serosa side of the small bowel wall (magnification 6,25 x). (B) In the right half, there is normal jejunal mucosa, while an island of gastric mucosa can be seen in the left (magnification 25 x).

53-cm long segment and another 2.2-cm long segment of the small intestine were resected and an end-to-end anastomosis was performed. Furthermore there were six wedge resections of the small intestine. Histology of the resected specimen mostly disclosed ectopic gastric mucosa and to a lesser extent islands of pancreatic tissue (Fig. 2). The surrounding small bowel mucosa showed inflammatory alterations and superficial ulcerations.

Postoperatively hemoglobin and hematocrit increased slightly. Rectal bleedings ceased, but the patient still showed melaena. A control scintigraphy only showed faint tracer on both sides of the middle abdomen in projection to the proximal and distal jejunum slightly increasing with time (Fig. 3). Given the localization of the foci and the clinical setting, we concluded that these may be due to uptake by small foci missed at surgery.

During relaparotomy, a total enteroscopy was performed. By this technique serial intraluminal polypoid lesions were found and the segment of the small bowel was resected. The histological examination again showed gastric mucosal islands.

DISCUSSION

Pertechnetate scinitigraphy has been established as an important method for detecting ectopic gastric mucosa in Meckel's diverticulum and other abnormalities.

McAfee et al. (*4*) described the concentration of ^{99m}Tc-pertechnetate in gastric mucosa in 1964. The tracer is secreted by the mucoid surface cells of the gastric glands (*4–7*). Harden et al. (*8*) suggested the use of ^{99m}Tc-pertechnetate for noninvasive detection of Meckel's diverticulum containing gastric mucosa in 1967. Since Meckel's diverticulum is the most common cause of gastrointestinal blood loss in children, pertechnetate scintigraphy was first used to detect this outpouching in the distal 100 cm of the ileum, therefore, often called Meckel's scintigraphy.

Depending on the patient's preparation, false-negative and false-positive results may be obtained. Application of perchlorate suppresses the pertechnetate uptake and barium from a

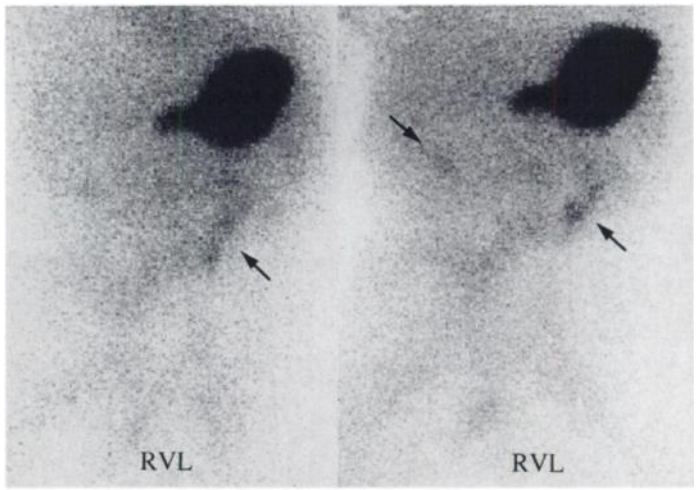

FIGURE 3. Control scintigraphy after emergency laparotomy showed only faint tracer accumulation in the left and right upper abdomen that slightly increased with time 20 (left side) and 50 min (right side) postinjection (arrows).

preceding rectal enema can absorb the ^{99m}Tc-pertechnetate gamma-rays (*6,9–11,12*). An underlying lesion can be obscured by a filled bladder; the patient should be instructed to clear their bladder before scanning (*6*). Since the tracer is secreted into the gastric lumen, transport of activity to the small bowel may simulate a lesion containing gastric mucosa. Priebe et al. (*13*), therefore, suggested to inverstigate the patients in the fasting state. False-positive results were also described after application of medications irritating the gastrointestinal tract as anticonvulsive drugs or laxatives (*14*).

There may be unspecific uptake of pertechnetate in peptic ulcer (*11,15,16*), inflammation (*16–18*), intussusception (*19*), hemangiomas and arteriovenous malformations (*20–21*), obstructed bowel loops (*14*), tumors (*22–23*) and abnormalities of the upper urinary tract as hydronephrosis (*6,20,24*), which can lead to false-positive scans. Furthermore, false-positive results have also been described due to lesions containing gastric mucosa other than Meckel's diverticulum, e.g., duplication cysts (*25–28*), Barrett's esophagus (*29*) or ectopic gastric mucosa in the gastrointestinal tract (*6,30*). The latter abnormality can be found throughout the whole intestine from esophagus to rectum (*31*). It appears either by dysontogenetic dystopia or as an acquired phenomenon. Common localization occurs in the esophagus and the duodenum (*32,33*). Ectopic gastric mucosa is less common than Meckel's diverticulum but shows similar complications: hemorrhage, perforation and bowel obstruction caused by hydrochloric acid induced ulceration. The occurrence in the small bowel is very rare (*34*) but in this part of the intestine it often acts as the leading part of intussusception.

The accumulation of pertechnetate in islands of gastric mucosa allows their detection by pertechnetate scintigraphy provided they are of sufficient extension. In experimental studies Priebe et al. (*13*) found that at least 1.8 cm^2 of gastric mucosa are necessary for imaging by gamma camera techniques.

Published cases of ectopic gastric mucosa detected by pertechnetate scintigraphy mostly show circumscribed tracer accumulation (*26*), which intraoperatively corresponds to a limited number of abnormal areas. An extensive heterotopy, which results in a tracer uptake outlining nearly the entire small bowel has not been described to this extent.

CONCLUSION

This case report emphasizes the importance of the ^{99m}Tc-pertechnetate scintigraphy in the differential diagnosis of unexplained gastrointestinal blood loss in children. Although a positive scan is not very specific, it can be important in taking the attention to the area of abnormality and in helping to support the decision for laparotomy. If inflammatory changes can be excluded an extensive tracer uptake in projection of the intestine in pertechnetate scintigraphy is highly suspicious for disseminated ectopic gastric mucosa in the small bowel.

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