

### MASSIVE UPPER GASTROINTESTINAL BLEEDING ORIGINATING FROM A FOURTH-STAGE DUODENAL DIVERTICULUM: A CASE REPORT AND REVIEW OF THE LITERATURE

Louis Rioux, MD, FRCPC; Sylvain Des Groseilliers, MD, FRCSC; Michel Fortin, MD, CSPQ; David O. Mutch, MD, FRCSC\*

Duodenal diverticulum is well-known pathologic entity. Most such diverticula are asymptomatic and located on the second stage of the duodenum. The diagnosis is most often established by endoscopy or upper gastrointestinal radiography. Hemorrhage has been described but is an infrequent complication. We report on a patient who presented with massive upper gastrointestinal bleeding, originating from a fourth-stage duodenal diverticulum. The diagnosis was made with a combination of arteriography and scanning with technetium 99-labelled red cells. Diverticulectomy was performed with a successful outcome. This report underlines the diagnostic limits of fiberoptic endoscopy for hemorrhagic lesions located past the third stage of the duodenum.

Le diverticule du duodénum est une entité pathologique bien connue. La plupart de ces diverticules sont asymptomatiques et font leur apparition dans le deuxième duodénum. Le diagnostic est le plus souvent posé par endoscopie ou radiographie des voies gastrointestinales supérieures. L'hémorragie est une complication qui a déjà été décrite, mais qui est peu fréquente. Nous présenterons un rapport sur un patient qui, à son arrivée, saignait abondamment des voies gastrointestinales supérieures à cause d'un diverticule au quatrième duodénum. On a posé le diagnostic par artériographie et scintigraphie au moyen de globules rouges marqués au technétium 99. On a procédé à une diverticulectomie réussie. Ce rapport met en évidence les limites diagnostiques de l'endoscopie par fibre optique dans le cas des lésions hémorragiques du duodénum.

The incidence of duodenal diverticulum varies from 2% to 5% in the general population. Of these diverticula, 90% are asymptomatic and 67% are located in the second stage of the duodenum.<sup>1</sup> Complications are rare but result in significant morbidity. They include mechanical obstruction of the common bile duct, pancreatic duct and duodenum, diverticulitis with perforation, abscess, fistula formation and he-

morrhage.<sup>1,2</sup> We report on a patient who had massive upper gastrointestinal bleeding originating from a diverticulum located in the fourth stage of the duodenum.

#### CASE REPORT

A 45-year-old woman was seen in the emergency room, complaining of epigastric pain and weakness. She reported upper gastrointestinal bleeding

and the passage of black stools, evolving over the last 24 hours. It was the first such episode. She had no known history of upper digestive disease. Previously, she had undergone a cholecystectomy, appendectomy and hysterectomy. She had also had hyperthyroidism, treated with radioactive iodine 20 years previously. She had no history of drinking but admitted to the regular recent use of a non-steroidal anti-inflammatory drug.

*From the Department of General Surgery and Department of Gastroenterology, Centre Hospitalier Val d'Or, Que.*

*Accepted for publication May 23, 1996*

**Correspondence and reprint requests to:** Dr. Louis Rioux, Centre Hospitalier Val d'Or, 725, 6<sup>ème</sup> rue, Val d'Or (QC) J9P 3Y1

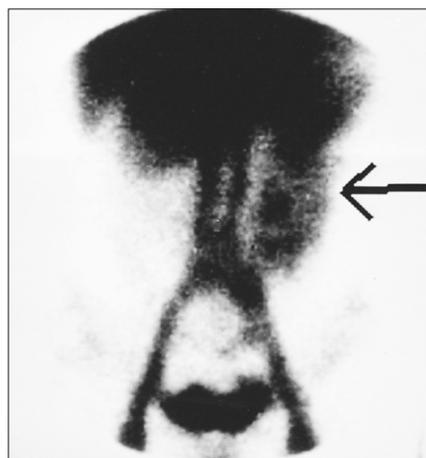
© 1996 Canadian Medical Association (text and abstract/résumé)

On admission, the patient was pale but well oriented. Her temperature was normal, the blood pressure was lowered at 80/50 mm Hg and the pulse rate was 75 beats/min. The cardiopulmonary examination gave normal results. Her abdomen was soft with slight epigastric tenderness; no evidence of rebound or guarding was found. On rectal examination, abundant black stools were noted. Her hemoglobin level was 89 g/L, with a normal leukocyte count. The liver function tests, urinalysis and measurement of electrolytes gave normal results. Gastric lavage gave a clear aspirate. The patient was admitted to the intensive care unit and was initially treated with H<sub>2</sub> blockers and resuscitated with Ringer's lactate solution and a total overnight transfusion of 4 units of blood. Twelve hours after admission her blood pressure was still only 80/40 mm Hg and her hemoglobin raised only slightly to 96 g/L. Active passage of black stools and bright blood through her rectum was still evident. Endoscopy of the upper gastrointestinal tract showed no abnormalities. Over the next 6 hours her condition deteriorated with hypotension at 85/60 mm Hg and a drop in the hemoglobin level to 63 g/L. She was transfused with 2 more units of blood and 2 units of fresh-frozen plasma. A second consultant was called and a second endoscopy was performed in the ICU, again showing no evidence of active bleeding or pathological lesions down to the third stage of the duodenum. Scanning with technetium 99-labelled red cells showed hypercaptation at 5 minutes in the left upper quadrant of the abdomen. This finding was confirmed at 15, 30 and 60 minutes (Fig. 1). Selective superior mesenteric artery angiography was done immediately. A collateral branch of the pancreaticoduodenal artery showed aneurysmal dilatation, and

contrast material opacified the fourth stage of the duodenum (Fig. 2).

In spite of continuous resuscitation attempts the patient's condition remained unstable. At the time of surgery, her hemoglobin level was 45 g/L, and she required transfusion of 6 more units of blood (for a total of 12 units since admission). Intraoperative findings included a dilated small bowel filled with blood clots. The second stage of the duodenum was kocherized and the angle of Treitz was mobilized. An anterior duodenotomy was performed at the junction of the third and fourth stages of the duodenum, and a rigid sterile rectoscope was used to inspect the duodenal lumen. An actively bleeding diverticulum was found in the posterior wall of the fourth stage of the duodenum. The diverticulum projected into the pancreatic body and was supplied by a large feeding vessel. The diverticulum was mobilized and resected; the duodenum was then reconstructed with a two-layer end-to-end anastomosis.

The postoperative course was uncomplicated. The patient remained hemodynamically stable. Oral intake was resumed on the 5th postoperative



**FIG. 1.** Scan obtained with technetium 99-labelled red cells shows activity in small bowel (arrow) at 30 minutes after injection, compatible with active upper gastrointestinal bleeding.

day and she was discharged 9 days after the procedure.

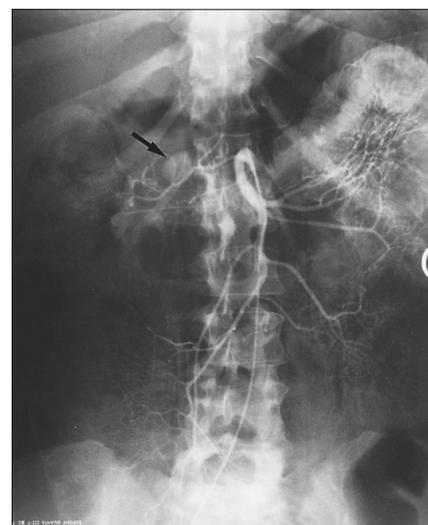
The pathological findings were compatible with a duodenal diverticulum showing ulcerated mucosa.

## DISCUSSION

The precise incidence of duodenal diverticula is unknown.<sup>3</sup> Based on autopsy data, it ranges between 3% and 22%; radiologic findings on upper gastrointestinal series estimate it at from 2% to 5%. In a large series of 624 patients who underwent endoscopic retrograde cholangiopancreatography, Osnes and colleagues<sup>4</sup> reported an incidence of 23%.

Duodenal diverticula rarely cause symptoms in people under 40 years of age. The incidence rises with age and is similar in both sexes. Most diverticula (67%) are located on the second stage of the duodenum;<sup>5</sup> of these, 90% are within 2.5 cm of the ampulla of Vater and 90% are asymptomatic.

Since the diverticular wall is most often composed of mucosa, submucosa and muscular fibres, most au-



**FIG. 2.** Selective catheterization of superior mesenteric artery demonstrates extravasation of contrast medium (arrow) in fourth portion of duodenum, confirming bleeding at that site. No underlying anatomic abnormality is seen.

thors believe that diverticula originate from parietal weakness. There are two types of duodenal diverticula: endoluminal and extraluminal. The latter type is the most frequent. Endoluminal diverticula are caused by congenital webs of the second duodenum, obstruction being the principal clinical manifestation. Extraluminal diverticula are known to be associated with bile duct disorders.

In their study, Osnes and colleagues<sup>4</sup> found lithiasis in 86% of patients with diverticula compared with only 38% in patients without them. Bile duct and duodenal obstruction and acute and chronic pancreatitis can result from diverticular compression. Diverticular perforation, though infrequent, is associated with a 48% death rate.<sup>6</sup> Other rare clinical manifestations include refractory anemia, cyclic vomiting and diverticular carcinoma.<sup>3</sup>

We have reported on a case of massive hemorrhage originating from a diverticulum. This complication is seldom found in the North American literature. Ryan, Hamilton and Morrissey<sup>2</sup> described massive hemorrhage from a third-stage diverticulum. The diagnosis was made by upper gastrointestinal endoscopy, and the patient successfully underwent diverticulectomy. Balkissoon and associates<sup>7</sup> reported the discovery by barium upper gastrointestinal series of a bleeding diverticulum located on the fourth stage of the duodenum. The patient was similarly treated by diverticulectomy. Schuurman, Brink and Sobotka<sup>8</sup> treated a case of hemorrhage originating from a third-stage diverticulum found and excised through an exploratory laparotomy. A patient presenting with massive bleeding and shock due to hemorrhage from a

second-stage diverticulum was reported by Callery, Auperti and Soper;<sup>9</sup> initial control was achieved through endoscopy before a surgical diverticulectomy was undertaken.

The precise cause of the bleeding is not well known. Some diverticula show evidence of ectopic gastric mucosa in the fashion of a Meckel diverticulum.<sup>10</sup> Others may contain bezoars, causing traumatic irritation and ulceration of the mucosa. Diverticula perforating in large vessels have been reported,<sup>11</sup> and Rowlands and King<sup>12</sup> described a case of diverticulum perforating the aorta. Finally, intradiverticular malignant neoplasia causing bleeding has also been reported,<sup>13</sup> whereas angiodysplasia involving the diverticular submucosa is also mentioned as a cause of hemorrhagic complications.<sup>7</sup>

## CONCLUSIONS

Complications of diverticular bleeding are rare. Even if fiberoptic endoscopy is considered the standard for diagnosing upper gastrointestinal hemorrhage and duodenal diverticula, our case underlines the limited range of this technique for lesions located beyond the third stage of the duodenum. A systematic diagnostic approach is essential, including scanning with technetium 99-labelled red cells and angiography, in order to avoid the morbidity of poorly planned surgical exploration.

## References

1. Afridi SA, Fichtenbaum CJ, Taubin H. Review of duodenal diverticula [review]. *Am J Gastroenterol* 1991;86(8):935-8.

2. Ryan ME, Hamilton JW, Morrissey JF. Gastrointestinal hemorrhage from a duodenal diverticulum. *Gastrointest Endosc* 1984;30(2):84-7.
3. Lotveit T, Osnes M. Duodenal diverticula [review]. *Scand J Gastroenterol* 1984;19(5):579-81.
4. Osnes M, Lotveit T, Larsen S, Aune S. Duodenal diverticula and their relationship to age, sex, and biliary calculi. *Scand J Gastroenterol* 1981;16(11):103-7.
5. Chitambar IA. Duodenal diverticula. *Surgery* 1953;33:768-91.
6. Zeifer E, Goeresh H. Diverticulitis with perforation. *Arch Surg (Chicago)* 1961;82:746-54.
7. Balkissoon J, Balkissoon B, Leffall LD Jr, Posey DA Jr. Massive upper gastrointestinal bleeding in a patient with a duodenal diverticulum: a case report and review of the literature [review]. *J Natl Med Assoc* 1992;84(4):365-7.
8. Schuurman PR, Brink AC, Sobotka MR. Profuse bleeding from a duodenal diverticulum [letter]. *Am J Gastroenterol* 1994;89(10):1920-1.
9. Callery MB, Aliperti G, Soper NJ. Laparoscopic duodenal diverticulectomy following hemorrhage. *Surg Laparosc Endosc* 1994;4(2): 134-8.
10. Cattell RB, Mudge TJ. The surgical significance of duodenal diverticula. *N Engl J Med* 1952;246(9):317-24.
11. Neil SA, Thompson NW. The complications of duodenal diverticula and their management. *Surg Gynecol Obstet* 1965;120:1251-8.
12. Rowlands GB, King PA. Duodenal diverticulum perforating into abdominal aorta causing fatal haemorrhage. *Br J Surg* 1954;41:415-7.
13. Bradham GB, Martin JB. Massive bleeding from a polyp in a duodenal diverticulum. *Ann Surg* 1962; 156:81-3.