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CASE REPORT

Vertebral column kyphoscoliosis and unexpected death

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Abstract A case of spontaneous gastric perforation is reported in a 75-year-old woman due to massive hemorrhaging from a benign gastric ulcer. Blood was prevented from leaving the stomach due to posterior displacement and rotation of the stomach associated with marked underlying vertebral column kyphoscoliosis. Significant deformity of the spine had caused malpositioning of the stomach as a result of the abnormal shape of the peritoneal and chest cavities. This in turn had led to mechanical obstruction and prevented egress of blood arising from a bleeding arteriole in the base of a chronic gastric ulcer. Rapid distension had resulted from the inability to spontaneously decompress the stomach, which in turn had led to rupture.

Keywords Acute gastric dilatation · Rupture · Hemorrhage · Peptic ulcer · Kyphoscoliosis

Introduction

Death due to peptic ulceration results from either acute hemorrhage or perforation of the duodenum or stomach, causing peritonitis, shock, and sepsis. Gastric perforation very rarely occurs from distension of the stomach with air or blood, as spontaneous decompression usually occurs through the pylorus or the cardioesophageal junction. Trauma may be involved. A case is reported where gastric rupture occurred after acute ulcer hemorrhaging in the absence of significant trauma. Possible predisposing factors are discussed.

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Case report

A 75-year-old woman with a past history of non-steroidal anti-inflammatory drug use for severe kyphoscoliosis suffered hematemesis and collapsed in her bathroom. Her other past history was of two previous cerebrovascular accidents. She was transferred to a hospital where an emergency gastroscopy revealed diffuse hemorrhaging from the gastric mucosa attributed to erosive gastritis. She was treated medically and had a second gastroscopy 6 days after admission, showing no acute bleeding and evidence of mucosal healing. She was found deceased in her hospital bed soon after this. No resuscitation was attempted, and there was no history of trauma. The etiology of her kyphoscoliosis was uncertain.

At autopsy, there was marked kyphoscoliosis with deformation of the thoracic and peritoneal cavities and posterior displacement of the stomach. Other major findings were limited to the peritoneal cavity with a 600-ml fluid hematoperitoneum. This was associated with distension of the stomach that contained an additional 1 l of fluid blood, with fresh blood within the small intestine. A 25× 25 mm chronic ulcer was present in the cardia of the stomach with an eroded vessel in its base (Fig. 1). Also, present along the greater curvature were a series of full-thickness ruptures ranging in size from 2 to 7 cm (Fig. 2). The ruptures were characterized histologically by splitting of the mucosa, submucosa, and muscularis propria (Fig. 3)

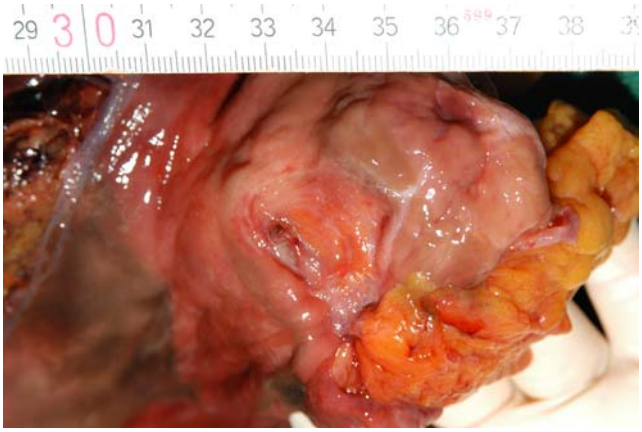

Fig. 1 A chronic gastric ulcer in the cardia of the stomach measuring 25×25 mm with a bleeding vessel in its base

and did not have the appearance of post-mortem gastromalacia. Histologic assessment confirmed the presence of a benign gastric ulcer with a vessel in its base (Fig. 4), in addition to chronic gastritis. The muscularis propria showed focal myocyte eosinophilia in keeping with ischemia. The heart was unremarkable and weighed 390 g (body weight 74 kg, length 165 cm) with no significant coronary artery atherosclerosis. Cerebrovascular atherosclerosis was present but no obvious areas of ischemic damage were noted. There were no other underlying organic diseases that could have caused or contributed to death. There was no evidence of significant trauma; specifically, there were no fractures or anterior chest wall markings to suggest that resuscitation had been attempted. Death was due to exsanguination from a bleeding gastric ulcer associated with rupture of the stomach.

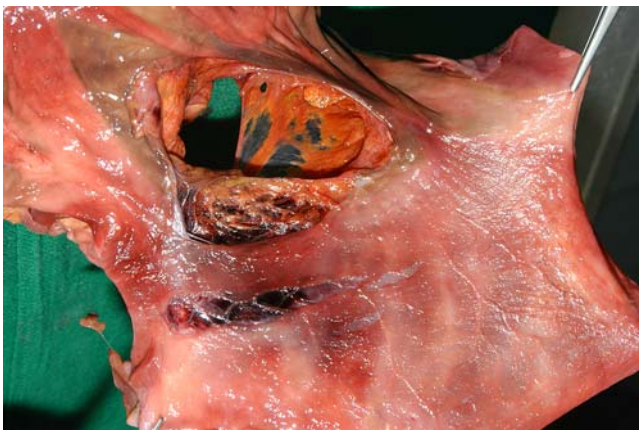

Fig. 2 The serosal surface of the opened stomach showing a series of full-thickness ruptures on the greater curvature ranging in size from 2 to 7 cm. The lacerations were characterized by splitting of the mucosa, submucosa, and muscularis propria

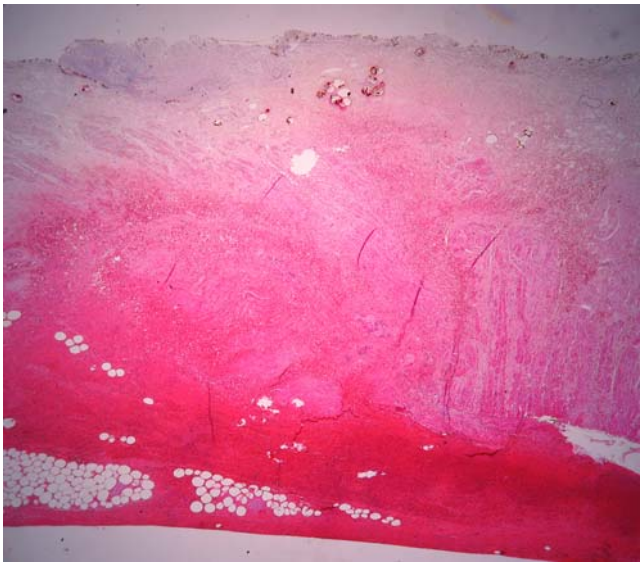

Fig. 3 Histological appearance of ruptures of the stomach wall with splitting and fresh hemorrhages in submucosa and muscularis (H & E, original magnification ×10)

Discussion

The reasons for acute gastric dilatation are sometimes ill-understood; however, mechanical and/or neurogenic factors may be involved [1]. In individuals with marked physical and mental impairment, this may result from a combination of factors including air swallowing and neuromuscular incoordination, with an inability to articulate clearly if there are symptoms. Dilatation of the stomach may also occur in individuals with diabetes mellitus due to autonomic neuropathy and has also been associated with eating disorders [2, 3].

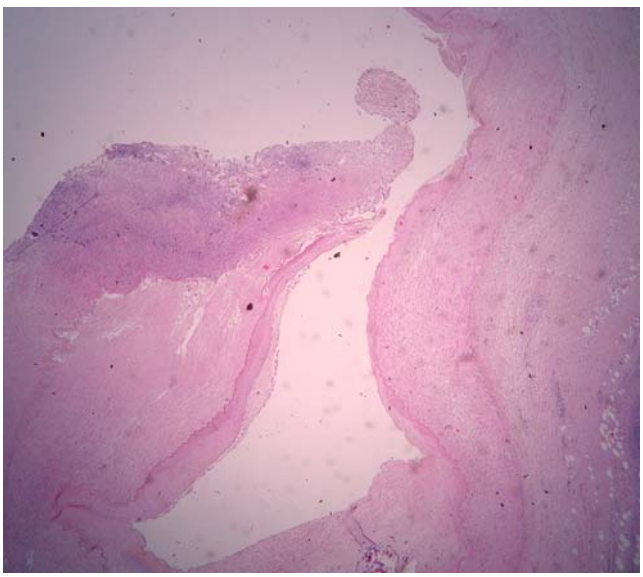

Fig. 4 Histological appearance of the gastric ulcer with a vessel in its base (H & E, original magnification ×10)

In the current case, massive hemorrhaging had occurred due to erosion of a large blood vessel by peptic ulceration. Normally, blood within the stomach would be expected to egress either through the pylorus, producing melena, and/or the esophagus causing hematemesis. In fact, both events had occurred in the reported case, with the initial presentation of hematemesis causing collapse and with fresh blood being found at autopsy within the small intestine. Both of these features indicated that there was patency of the pylorus and the cardioesophageal junction at certain times. However, for some reason, blood became trapped within the stomach under pressure resulting in distension and rupture.

We consider that the most likely explanation for this event relates to the marked spinal deformity of the deceased with severe kyphoscoliosis. Severely kyphoscoliotic vertebral columns may cause rotation and posterior displacement of the stomach due to deformation of the peritoneal and thoracic cavities. Such malpositioning of the stomach, as a result of the abnormal shape of the peritoneal cavity, then rarely results in mechanical obstruction and prevents spontaneous decompression [3]. A similar problem occurs in Irish setter pups that are predisposed to gas bloat because of a high thoracic depth/width ratio leading to gastric volvulus and dilatation [4]. It has also been reported as a cause of death in individuals with severe cerebral palsy and kyphoscoliosis associated with air entrapment [3]. Distension of the stomach occurs with myocyte ischemia, resulting in rupture unrelated to mechanical trauma. As noted, there was no history of trauma or attempted resuscitation in the current report.

Sudden unexpected death from natural or unnatural causes may be due to a wide range of sometimes extraordinary disorders (e.g., [5–8]). This case demonstrates a series of inter-related disorders that, in combination, were to prove lethal. Chronic pain from severe kyphoscoliosis had necessitated treatment with non-steroidal anti-inflammatory drugs, causing gastric ulceration. Hemorrhaging from the ulcer had resulted in blood loss, with a history of hematemesis, and with blood being found within the intestine. However, subsequent twisting of the stomach as it was filling with blood, due to the abnormal shape of the upper peritoneal cavity related to the underlying kyphoscoliosis, had prevented further escape of fluid. This had in turn led to stretching of the gastric wall, mural ischemia, and rupture. The summation of these events had resulted in a lethal outcome. The possibility of gastric torsion with distension and rupture should, therefore, be considered as a potential cause of death in individuals with severe kyphoscoliosis who present to autopsy with a history of unexpected collapse. This is particularly so if there has been a history of upper gastrointestinal problems.

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