
CASE REPORT

Haemoperitoneum Following Colonoscopy due to Tear of the Splenocolic Ligament: Revisit of the Splenic Ligaments

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ABSTRACT

Splenic injury or splenic ligament tear following colonoscopy is a rare but potentially life-threatening complication. It is often overlooked due to its bizarre clinical presentation and non-specific imaging features. It commonly presents as a delayed but serious complication that results in massive haemoperitoneum due to splenic injury. Urgent radiological or surgical intervention is required to control the bleeding and stabilise the patient's condition. The imaging features in relation to the relevant radiological anatomy have seldom been discussed in radiology literature. We report a case of massive haemoperitoneum following colonoscopy. The preliminary findings in preoperative computed tomography scan and digital subtraction angiography were confirmed during surgery which showed a tear in the splenocolic ligament with active bleeding. In addition, we review the anatomy of splenic ligaments and nearby vessels, and the role of computed tomography scan and digital subtraction angiography in identifying these structures. Knowledge about the relevant anatomy is crucial in understanding the pathogenesis and treatment options for this condition.

Key Words: Colonoscopy; Ligaments; Spleen

中文摘要

結腸鏡檢查後因脾結腸韌帶撕裂出現腹腔積血：再次探查脾韌帶

馮啟邦、周偉強、岑承輝、簡偉權

結腸鏡檢查後脾損傷或脾韌帶撕裂是一種罕見但可能危及生命的併發症。由於這情況奇異的臨床表現和非特異性影像學特徵，此症往往會被忽視。此症通常表現為一種遲發性嚴重併發症，患者因脾損傷而引致大量腹腔積血，須以緊急介入或外科手術控制出血及穩定病情。放射學文獻中很少討論涉及放射學解剖的影像學特徵。本文報告一宗結腸鏡檢查後出現大量腹腔積血的病例。術前CT掃描和術中數字減影血管造影的初步結果顯示脾結腸韌帶撕裂並有活動性出血。本文並會回顧脾韌帶和附近血管的解剖結構，以及CT掃描和數字減影血管造影識別這些結構中的作用。相關解剖結構知識對理解該症的發病機制和治療方案選擇至關重要。

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CASE REPORT

A 44-year-old woman with good past health was admitted to our hospital for work-up of chronic anaemia in May 2012. An uneventful oesophagogastroduodenoscopy (OGD) with antral biopsy was performed showing inactive and mild chronic gastritis. Colonoscopy was performed 5 minutes later by the same experienced surgical endoscopist. It was uneventful with no abnormality detected and no endoscopic biopsy obtained. However, she developed increasingly severe abdominal pain and hypovolemic shock. An urgent contrast computed tomography (CT) scan of the abdomen and pelvis was performed for suspected colonic perforation.

Precontrast scan showed massive haemoperitoneum and hyperdense blood clots, mostly centred in the

splenicocolic ligament region. Separation of spleen from the splenic flexure and inferomedial displacement of the splenic flexure were seen (Figure 1). Smaller hyperdense blood clots were noted around the phrenicocolic ligament region, with no extension to the left paracolic gutter (Figure 2). Postcontrast scan showed a tear in the splenicocolic ligament, with extension to the nearby left lateral end of the greater omentum. Tear in distal end of the right gastroepiploic vessels was found and severe active contrast extravasation (Figure 3) with pooling was found in one of its dilated omental branches (Figure 4). No intrasplenic tear or haematoma was identified. No splenomegaly was seen and the splenic hilum was intact.

Emergency surgery was performed, confirming the tear in the splenicocolic ligament. An active bleeding site

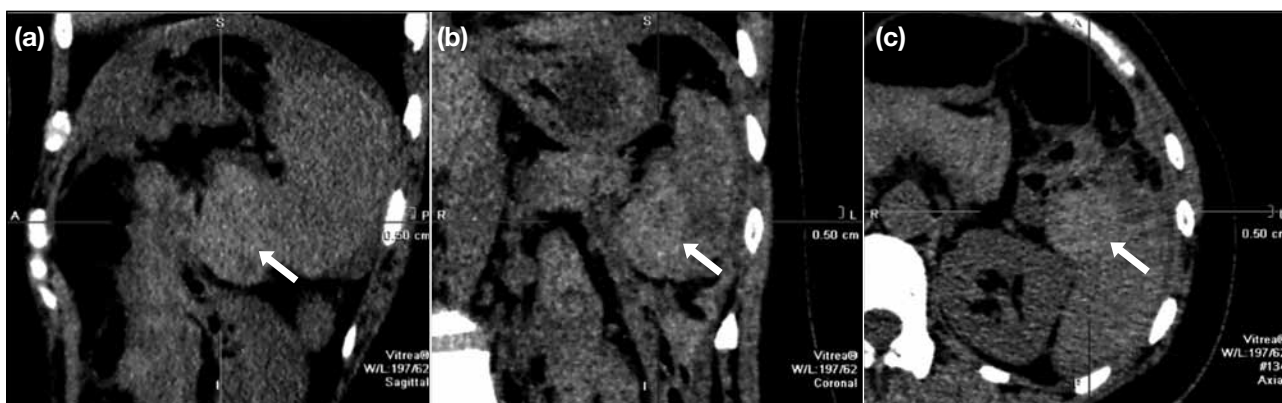


Figure 1. The (a) sagittal, (b) coronal, and (c) axial images show acute haematoma (arrows) at the splenicocolic ligament with splenic flexure displaced away from inferior spleen. The splenicocolic ligament is a non-vascular remnant of the extreme left end of the transverse mesocolon, which is not easily identified in the computed tomography scan of a normal individual.

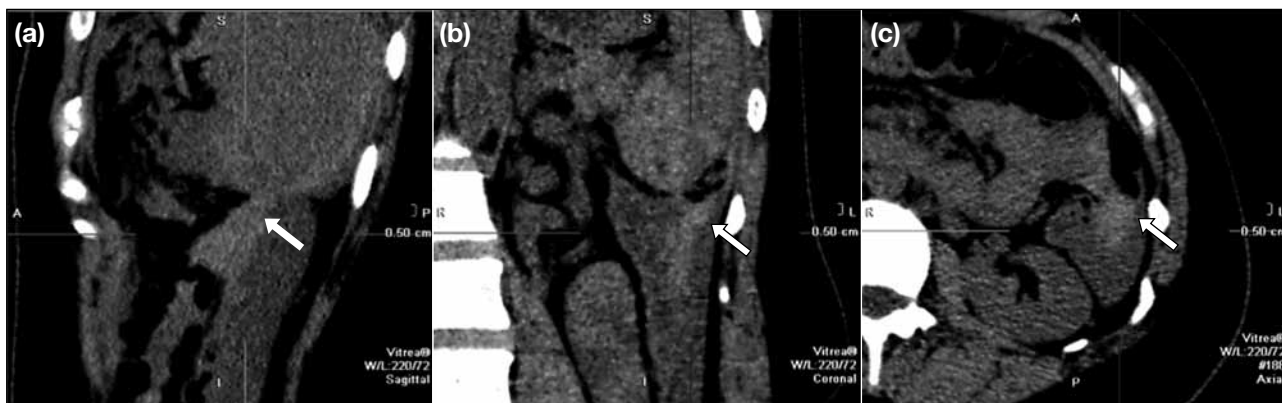


Figure 2. The (a) sagittal, (b) coronal, and (c) axial images show acute haematoma (arrows) overlying the phrenicocolic ligament and in the left subphrenic space. The phrenicocolic ligament separates the left subphrenic space from the left paracolic gutter and is outlined by the acute haematoma in this patient.

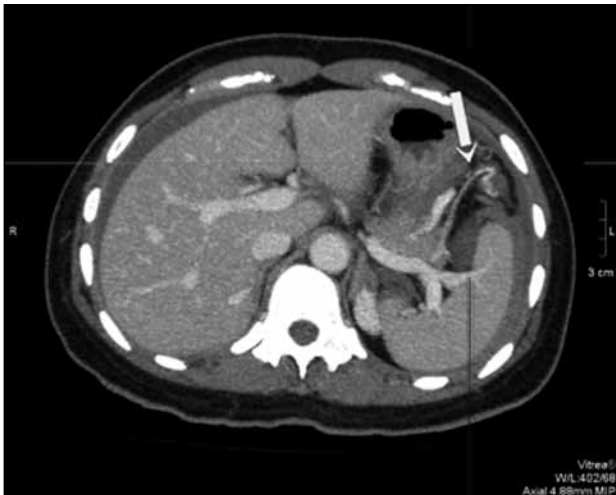


Figure 3. Active contrast extravasation (arrow) and pooling along the distal end of the left gastroepiploic vessel.



Figure 4. Tear at the distal end of the left gastroepiploic vessel (arrow) with pooling of contrast extravasation.

was found which was easily controlled with bipolar forceps, and beriplast spray was applied for further reinforcement. A total blood loss of 900 ml was found. No splenectomy was required. No pre-existing adhesion or congenital peritoneal band was found around the spleen during the surgery. The patient was discharged uneventfully 4 days after surgery.

DISCUSSION

Colonoscopy is a commonly performed procedure with low complication rates. Postcolonoscopy colonic haemorrhage and perforation are the two most common

complications associated with the procedure.¹ Splenic injury is a rare complication following colonoscopy, which was first reported by Wherry and Zehner in 1974.² The incidence of symptomatic splenic injury associated with colonoscopy is not well-established, with an estimated incidence of less than one per 100,000 cases.³

Similar to our case, colonoscopy-induced splenic injury characteristically presents as a delayed but often serious complication.^{4,5} The most common clinical manifestations are diffuse peritonitis and hypovolemic shock within 24 hours of the endoscopic procedure. Most cases require laparotomy and some even require splenectomy.⁴

There are a few postulated mechanisms of injury to spleen during colonoscopy. The most likely mechanism of injury in most cases is due to tension on the splenicocolic ligament or on pre-existing adhesions due to manipulations of the colon. Direct injury to the spleen during the passage of endoscope through the splenic flexure might also be a cause of injury.³ Therefore, any cause of increased splenicocolic adhesions, splenomegaly, or underlying splenic disease might be a predisposing factor for splenic injury during colonoscopy.

Most prior reports show splenic or perisplenic haematoma, or splenic rupture following colonoscopy.⁵ Direct demonstration of splenic ligament tear with avulsion of vessels, as in our case, is rare. We are not sure if performing OGD immediately before colonoscopy was a contributing factor for injury in our case.

The spleen is an intraperitoneal organ with a smooth serosal surface, located in the left upper abdomen. It is attached to the retroperitoneum by fatty ligaments that also contain its vascular supply.⁶ The main anchoring ligaments of the spleen are, namely, the gastrosplenic ligament that connects the spleen to the greater curvature of the stomach, the splenorenal ligament that connects the spleen to the pancreatic tail and posterior abdominal wall, the phrenicocolic ligament that forms a supportive sling for the inferior splenic pole, and lastly, the splenicocolic ligament that connects the spleen to the splenic flexure.^{6,7} Embryologically, all these ligaments are derived from the dorsal mesentery.^{6,8} These ligaments can be identified on CT scan by the associated vascular landmarks and their relationship with adjacent organs.⁷

Gastrosplenic Ligament

The gastrosplenic ligament is at the extreme left end of the gastrocolic ligament and it extends from the posterolateral wall of the fundus and the greater curvature of upper stomach to the splenic hilum.^{6,7,9} It is in direct contiguity with the splenorenal ligament at the medial and posterior aspect, and forms the lateral boundary of the lesser sac.

The gastrosplenic ligament contains the left gastroepiploic and short gastric vessels (Figure 5), which are the vascular landmarks for its identification. The left gastroepiploic vessels can be identified as they arise from the distal splenic artery and vein, and course from the splenic hilum in the gastrosplenic ligament, while the short gastric artery and vein are seen at the fundus of stomach.

Splenorenal Ligament

The splenorenal ligament, which is also known as the phrenicosplenic ligament or lienorenal ligament, is at the left extremity of the transverse mesocolon. The splenorenal ligament contains the pancreatic tail, distal splenic artery, and proximal splenic vein and together they insert in the splenic hilum.^{6,7,9} Therefore, the splenic artery and vein serve as the anatomical landmarks for identification of this ligament. The splenorenal ligament is continuous with the gastrocolic ligament medially and the phrenicocolic ligament inferolaterally. Functionally

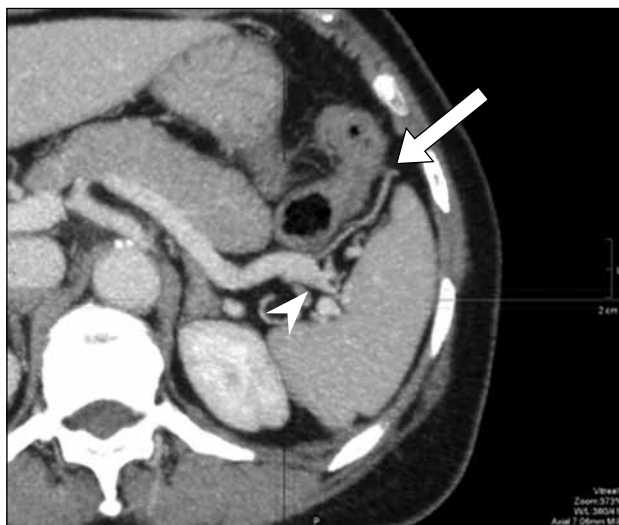


Figure 5. A computed tomography scan of a normal individual demonstrating left gastroepiploic artery (arrow) and proximal splenic artery (arrowhead). The gastrosplenic ligament contains the left gastroepiploic vessel while the splenorenal ligament contains proximal splenic vein. These serve as the anatomical landmarks for identification of these ligaments.

it attaches the spleen to the retroperitoneum and, along with the gastrosplenic ligament, it forms the left lateral border of the lesser sac.

Phrenicocolic Ligament

Phrenicocolic ligament is a major suspensory ligament of the spleen. It is a triangular fold of peritoneum attaching the splenic flexure of the colon and the left hemidiaphragm at the level of the 11th rib to the inferior splenic pole.^{6,7} It is in direct continuity with the splenorenal ligament and the lateral aspect of the transverse mesocolon. Anatomically, it separates the left subphrenic space from the left paracolic gutter. Therefore, it can be outlined by its characteristic position on CT peritoneogram or in cases with ascites. The phrenicocolic ligament does not contain any major vessel. Infiltration with the phrenicocolic ligament results in functional spasm and / or mechanical narrowing of the splenic flexure at the level where the colon returns to the retroperitoneum, accounting for the colon cut-off sign.

Splenocolic Ligament

The splenocolic ligament is a non-vascular remnant of the extreme left end of the transverse mesocolon and greater omentum. It attaches the base of the splenic hilum to the left transverse mesocolon and splenic flexure.^{10,11} Mobilisation of the splenic flexure during colonic surgery usually requires dissection of the splenocolic ligament and part of the phrenicocolic ligament.

CONCLUSION

Splenic injury following colonoscopy is a rare but potentially life-threatening complication that is often overlooked. The complex anatomy of the splenic ligaments and their relationships with the adjacent organs can be recognised on the basis of the vascular anatomy and the anatomical location. Understanding the anatomy and recognising these ligaments on CT images help in the setting of splenic injury which allows prompt localisation of bleeding source and aids the subsequent intervention.

DECLARATION

No conflicts of interests were declared by authors.

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