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## Abdominal apoplexy: A rare case of spontaneous middle colic artery rupture with transverse colectomy

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## ABSTRACT

**INTRODUCTION AND IMPORTANCE:** Idiopathic spontaneous intraperitoneal hemorrhage (ISIH) is a rare but potentially fatal entity. The majority of the reported cases of ISIH due to middle colic artery rupture are associated with pseudoaneurysm. Our case is unique in that no pathology could be identified. To our knowledge, this is the third case report in the literature of a spontaneous middle colic artery rupture with no underlying pathology.

**CASE PRESENTATION:** In our report, we present the case of a 27-years old male presenting with a hemoperitoneum due to ruptured middle colic artery with no evidence of pseudoaneurysm or any other pathology. The patient's hemodynamic status deteriorated abruptly requiring a damage control exploratory laparotomy for evacuation of the hemoperitoneum, ligation of the middle colic artery and transverse colectomy. The post-operative course was uneventful afterwards and the patient was discharged a week after presentation with full recovery.

**DISCUSSION:** Patients with ISIH might exhibit the "double rupture" phenomenon, compromising their hemodynamic stability and necessitating urgent surgical interventions. CTA can be of paramount importance to guide such interventions if the patient's clinical status permits. Angiographic embolization is an acceptable alternative approach in specific situations.

**CONCLUSION:** ISIH should be on the differential diagnosis of any young patient presenting to the ED with an acute abdomen, regardless of the identifiable risk factors.

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## 1. Introduction

Abdominal apoplexy is the historical term for what is now known as idiopathic spontaneous intraperitoneal hemorrhage (ISIH) [1]. ISIH refers to spontaneous, non-traumatic abdominal bleed due to the rupture of small mesenteric arteries or veins without any evidence of the well-documented etiologies such as pregnancy, malignancy, vasculitis or any other inflammatory processes e.g. pancreatitis [2]. Although very rare, this entity should be in the differential diagnosis when an otherwise healthy patient presents to the Emergency Department (ED) with an atypical abdominal pain and associated gastrointestinal symptoms, combined with signs of hemodynamic instability and shock [3]. Here, we report a case of a young male who presented to our academic medical center with syncope and a history of abdominal pain from ISIH, who was found to have a middle colic artery rupture with no well-identified pathology necessitating a transverse colectomy

with special surgical management. ISIH should be kept in mind in any healthy, young patient presenting with an acute abdomen.

## 2. Case presentation

We present a case report that is compliant with SCARE 2020 criteria [4]. A previously healthy 27-year-old Danish male was brought to the ED by the ambulance after experiencing syncope at home. The patient had a 2-day history of abdominal pain associated with nausea and two episodes of non-bilious, non-bloody vomiting on the morning of presentation. The review of systems was otherwise insignificant. There was no recent change of bowel habits. The clinical assessment on presentation revealed an ill-looking, pale and diaphoretic patient in clear distress. He was afebrile in triage but had tachycardia with stable blood pressure (BP) at 110/73. The patient was admitted to adult the adult ED, where he was attached to a monitor. Physical examination revealed diffuse abdominal tenderness with guarding; an IV line was secured, and the patient was flushed with an IV bolus. As part of his assessment, a bed-side abdominal ultrasound was done, which revealed free fluid in the peritoneum. The patient clinical status deteriorated rapidly thereafter with an increase in heart rate (HR) up to 130 beats per minute

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(a)



(b)

**Fig. 1.** CT Angiogram of the abdomen and pelvis with evidence of hemoperitoneum and active bleeding. White arrow shows loss of opacification keeping in interruption of blood flow. The black arrows in (a) and (b) show extravasation of contrast keeping with active bleeding.



Fig. 2. Barker's vacuum packing technique.

(BPM) and a significant, sudden drop of BP to 90/55 mmHg with change in mental status. The patient became confused and agitated. The decision was taken to intubate him to protect his airway. Vasopressors were initiated and a massive transfusion protocol was activated. He was scheduled for urgent exploratory laparotomy; however, the patient responded to initial management with vasopressors and fluids and his vital signs stabilized, so the decision was made to take advantage of his clinical stability and perform a Computed Tomography Angiography (CTA) of chest, abdomen and pelvis especially that the facility was in close proximity to the OR. Immediate arrangements were done with facility to avoid any potential delays. CTA of chest, abdomen and pelvis was performed and revealed a large hemoperitoneum with findings of an active bleed from the middle colic branch of the superior mesenteric artery (SMA) and the anastomosing marginal branch with the inferior mesenteric artery (IMA) with no evidence of aneurysmal changes (Fig. 1).

It is worth noting that the patient's medical, surgical, social as well as family history were unremarkable. He is athletic with a BMI of 24. Upon history taking, he specifically denied recent trauma or forceful retching. The patient did not have any history or evidence of malignant hypertension on or earlier to presentation. He also had no history of drug abuse, particularly cocaine, which may be associated with vasculopathy and possible spontaneous arterial rupture. In addition, the patient has never been a smoker, drinks alcohol only occasionally and has never experienced such episodes in the past.

Intra-operatively, a large transverse colon mesenteric hematoma was evacuated. A vascular surgeon was consulted. The bleeding middle colic artery was identified and ligated. The base of the mesentery was explored to ensure the patency of the SMA and IMA using the Doppler machine. Other culprits of bleeding were ruled out. At the time of the operation, the transverse colon looked unhealthy, so the decision was taken to undergo a damage-control surgery, resecting the dusky-colored transverse colon and leaving both colonic stumps in the abdomen. The abdominal incision was left open, with temporary abdominal closure (TAC), using the Barker's vacuum Packing technique (Fig. 2). The patient was sent to the surgical intensive care unit (SICU). The pathology report of the resected tissue revealed middle colic perforation and dissection, with evidence of colonic mucosa

necrosis and concomitant submucosal hematoma. No element of vasculitis was reported.

In SICU, the patient was extubated and medically optimized. 48 h later, the patient was taken to the OR for a second look. The bowels were healthy-looking and well-perfused; reconstruction of the bowels and primary fascial closure of the abdominal incision were achieved. The patient was discharged home at day 7 from the initial presentation after an uneventful hospital stay.

### 3. Discussion

Abdominal apoplexy was initially coined in 1931 to describe spontaneous intraperitoneal or retroperitoneal hemorrhage as a result of the rupture of an intra-abdominal vessel [3]. ISIH is now being used instead and the term has been refined to include peritoneal hemorrhage from visceral vessels when it is not a consequence of the well-known etiologies such as malignancy, trauma, iatrogenic injury, ectopic pregnancy and other gynecological lesions or vascular diseases such as aortic aneurysm, dissection and other entities [5,6]. ISIH is remarkable for its low incidence; Kennedy et al. reported 50 cases between 1909 and 1965 [7], whereas Camerci reported only 110 cases between 1909 and 1998 [1].

Visceral vessel rupture commonly occurs at the site of an aneurysm. The pathophysiology is believed to be weakness of the tunica media in small vessels with angiopathy, predisposing to rupture when there is an abrupt increase blood pressure; in addition, pathology reports often describe disruption to the elastic lamina [8]. The usual culprits are the splenic artery (60%) followed by the hepatic artery (20%), the superior mesenteric arteries (5%) and the gastric and gastroepiploic arteries (3%) [9,10]. Aneurysms of the colic arteries are particularly rare and account for less than 0.3% of all superior mesenteric aneurysms [11]. It is no surprise then that only 36 reports are available in the literature about abdominal apoplexy from middle colic artery rupture [5,11]. Only two of these are similar to ours in that aneurysmal pathology was not identified [2,12].

The clinical presentation of ISIH ranges from non-specific dull abdominal pain and anemia to an acute abdomen with hypovolemic shock [8]. Our patient presented with abdominal pain, tachycardia and diaphoresis showing early signs of hypovolemic shock. However, he dramatically decompensated and progressed into hypotension. Retrospectively, this can be explained by the so-called "double rupture" phenomenon, which manifests as a sudden circulatory collapse after a stable clinical status on presentation, and this is explained in the literature by contained bleeding into the lesser sac, which eventually floods into the peritoneal cavity [13].

ISIH It is a diagnosis of exclusion which requires meticulous scrutinization of abdominal organs and vessels, down to their distal branches. Hence, the use of multi-slice CT angiography (MS-CTA) has emerged as one of the most sensitive and specific tools to assess hemoperitoneum in hemodynamically stable patients whether with or without active extravasation in order to detect and subsequently manage the culprit vessels [8,14].

Treatment of ISIH revolves around hemodynamically stabilizing the patient and then controlling the source the bleed. After identifying the culprit vessels by CTA, embolization can be considered if there is no suspicion for bowel compromise and if the patient is stable enough to undergo the intervention [11]. This was no feasible in our patient. It is often the case that immediate surgical management is carried on with a lifesaving exploratory laparotomy that aims at identifying the involved artery and managing it according to the pathology. Fortunately for our patient, we had the CTA facility ready, and we could point the source of bleeding within

few minutes before starting the operation. During such surgical interventions, it is important to check the viability of the intra-abdominal organs which are supplied by the ruptured vessel. The patient had an inevitable transverse colectomy for dusky-looking bowel after controlling the source of bleed and ligating the ruptured middle colic artery. Such intra-abdominal vascular accidents necessitate a second-look surgery within 24–48 hours after stabilizing the patient. Our patient had a second look surgery during which his bowel continuity was reconstructed with primary closure of his abdominal surgical wound.

This surgical strategy is referred to as damage control surgery (DCS) [15], a treatment strategy which has been associated with significant increase in survival in critically injured patients. The presence of the so-called “lethal triad” which is a combination of hypothermia, acidosis and coagulopathy, precludes definitive treatment in one sitting and in this subset of patients, DCS offers a temporization treatment where physiological recovery is prioritized over anatomical repair.

**4. Conclusion**

ISIH should be kept in mind in any healthy, young patient presenting with a non-traumatic acute abdomen. Although rare, early diagnosis and prompt treatment can remarkably decrease the morbidity and the mortality from this entity. The intervention should be properly directed taking into consideration the hemodynamic stability of the patient and the possibility of organ ischemia.

Time	Findings and Progress
Arrival to hospital ED	Vague non-specific abdominal pain, Hemodynamically stable, but pale and diaphoretic. Blood work-up revealed unremarkable findings. Blood type and cross-matched obtained
One hour later	Surgical consultation by the ED team. General assessment, including bedside Ultra-sound: Significant amount of free fluid in the abdomen.
Within 15 min from surgical consultation	Rapid Deterioration: tachycardia up to 130 bpm and decreased blood pressure. Two large IV bore cannulas were placed.
Immediate Resuscitation	Massive blood transfusion protocol was initiated. Vasopressors were administered. The patient was intubated endotracheally. Simultaneously during resuscitation, patient was scheduled for life-saving emergent exploratory laparotomy and the OR desk was notified.
Few minutes later	Hemodynamic stability was achieved while preparing the patient for OR.
In/out within 10 min	Given that the patient was hemodynamically stable, and the abdominal source of his presentation was still obscure, the decision was to go for CTA aimed at revealing the cause and delineating the anatomy.
CTA on way to OR	CT facility was contacted and cleared for the patient. CTA was done within 10 min maximum
Damage control Surgery (DCS)	While preparing the patient on OR table, we managed to get radiological results revealing a middle colic artery rupture. Surgery took around 40 min to control the bleeding middle colic artery and perform the transverse colectomy for the dusky bowel. Exploration of all the vessels to make sure that there is no other indolent cause of bleeding

Timetable from arrival to ED until DCS was performed; ED: Emergency department, OR: operating room, DSC: damage control surgery

**Learning Points:**

- ISIH is on the differential diagnosis of a non-traumatic acute abdomen.

- Patient’s hemodynamic and clinical stability directs the intervention.
- CTA is a valuable roadmap to identify the culprit bleeding vessels if the patient’s hemodynamic and clinical status permits.
- Angiographic embolization is an alternative intervention in stable patients with no evidence of peritonitis.
- “Double-rupture” phenomenon can explain the clinical deterioration after initial hemodynamically stable presentation.
- Damage control surgery (DCS) should be considered in unstable patients where there is a possible need for temporary closure of the abdomen.
- In such patients, a second-look surgery is mandatory following Damage control surgery (DCS) after stabilizing the patient.

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The authors report no declarations of interest.

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**Ethical approval**

The study is exempt from ethical approval in our institution.

**Consent**

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

**Authors contribution**

All authors contributed equally to writing the paper.

**Registration of research studies**

Not applicable.

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