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Case Report

Post-traumatic hollow viscus perforation with mesenteric and bowel ischemia

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ABSTRACT

Hollow viscus perforation and acute mesenteric ischemia are life-threatening conditions that must be recognized and managed appropriately. Computed tomography (CT) helps to visualize the bowel wall directly, as well as in the timely diagnosis of secondary signs of bowel ischemia. The radiologist should be familiar with the signs of pneumoperitoneum on supine radiographs for detection of hollow viscus perforation. These must be viewed with an index of high suspicion in symptomatic patients, post-trauma, and, further cross-sectional imaging may still be required.

Introduction

A young male presented with recent blunt trauma to the upper abdomen. A supine radiograph was suspicious of pneumoperitoneum and CT was performed to rule out perforation. The above finding was confirmed on CT, in addition, lack of enhancement of a segment of colon, and non–occlusive mesenteric ischemia was evident. He was managed with exploratory laparotomy and repair of the perforation with partial colectomy.

Case presentation

Thirty-one-year male presented to the emergency department with abdominal pain 2 days after a road traffic accident. He had sustained a blunt injury to the abdomen with the steering wheel. He did not have any abdominal distension, vomiting, hematemesis, or melena. There was no prior surgery. On clinical examination, he was afebrile, and mildly tachypneic. Blood pressure at the time of admission was 110/70 mm Hg.

A supine radiograph of the chest revealed a small, ill-defined radiolucency in the right subphrenic region (Fig. 1). This raised the suspicion of a pneumoperitoneum. There were no obvious rib fractures. Due to the worsening abdominal pain, a computed tomography (CT) of the abdomen, with oral, and intravenous contrast was performed. There was pneumoperitoneum with free air outlining the diaphragm. Pockets of air were seen adjacent to the pylorus of the stomach, transverse colon, and along the anterior abdominal wall (Figs. 2, 3).

A defect was seen in the anterior pyloric wall and the transverse colon with adjacent small air pockets. When compared to the rest of the bowel loops, descending colon showed hypo enhancement, suggestive of bowel ischemia (Fig. 4). Diffuse, circumferential wall thickening of the distal ileal loops was present along with adjacent mesenteric fat stranding (Fig. 5). Mild hemoperitoneum was also present. There were no vascular or organ injuries, no vascular thrombosis, pneumatosis, or portal venous gas. He was immediately taken up for surgery

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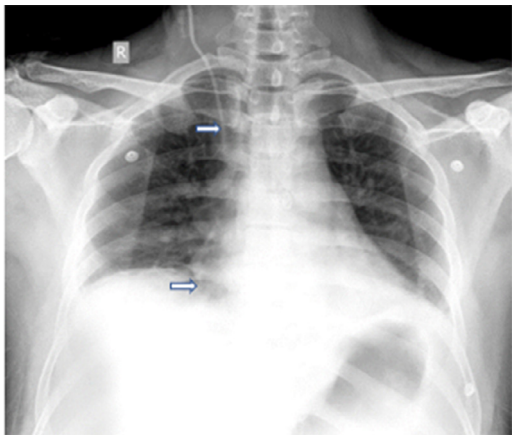

Fig. 1 – Supine radiograph of the chest shows a central venous line (arrow), which is appropriately positioned. There is a small, ill-defined radiolucency (arrow) below the right dome of the diaphragm. Lungs do not reveal any contusions or pneumothorax. No rib fractures were evident.

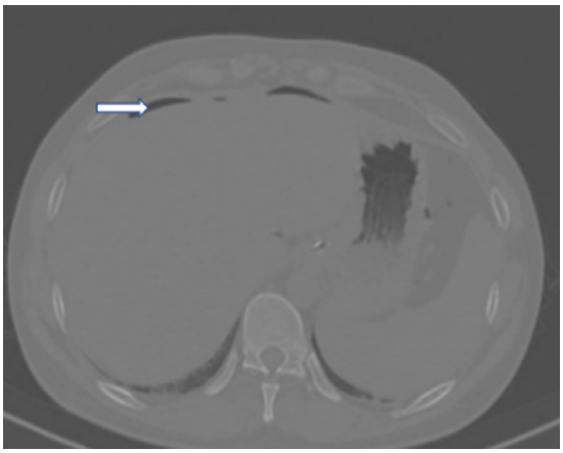

Fig. 2 – Axial CT of the abdomen, lung widow, shows the presence of pneumoperitoneum (arrow).

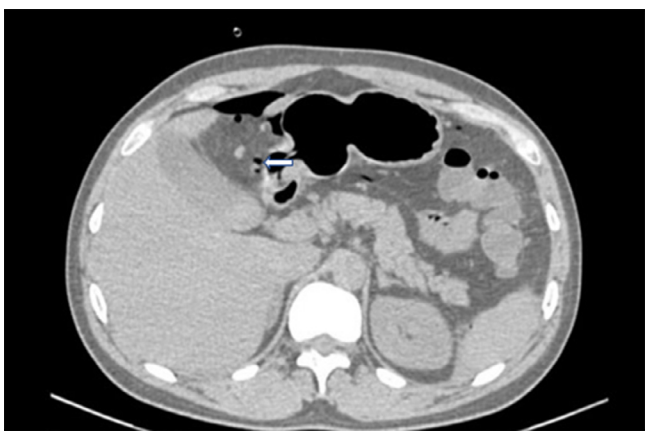

Fig. 3 – A small defect (arrow) is seen in the anterior wall of the pylorus with an adjacent air pocket.

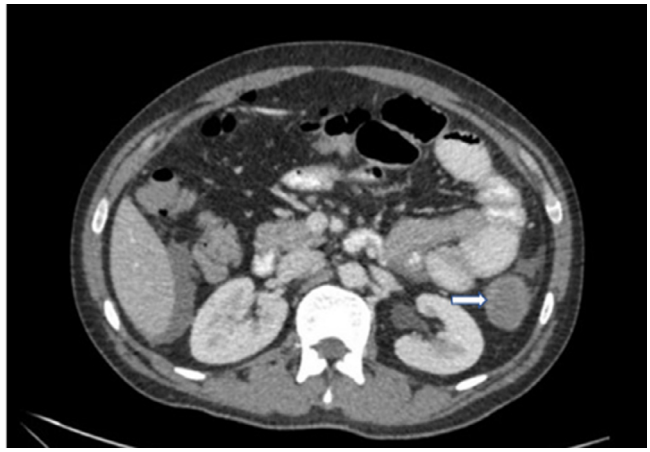

Fig. 4 – On axial CT with contrast, portal venous phase, hypo enhancing descending colon (arrow) is seen.

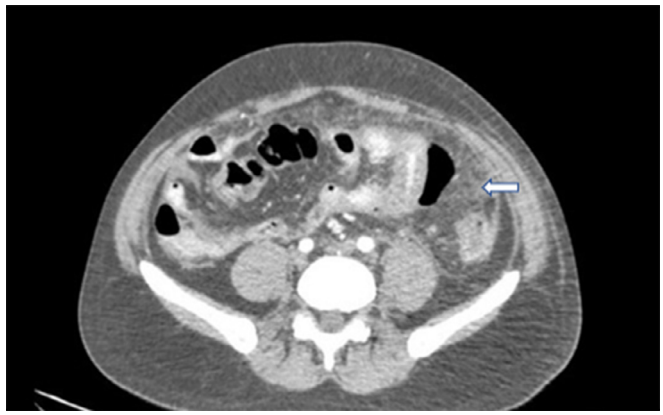

Fig. 5 – Axial contrast-enhanced CT reveals thickened ileal loops with diffuse mesenteric fat stranding (arrow) in the lower abdomen and pelvis. There was no extravasation of contrast.

and exploratory laparotomy (Fig. 6). Primary repair with omentopexy was performed for the pyloric perforation. A partial colectomy was done for the necrotic segment of the colon. He was discharged after a week with no subsequent complications.

Discussion

The detection of intraperitoneal free air in the setting of trauma can often be very challenging. However, such cases usually need urgent surgical intervention. Plain radiographs being an initial, cheap investigation, still play a vital role in guiding further investigations, and management. A study compared the sensitivity of supine radiographs with erect chest and decubitus abdominal radiographs in the detection of pneumoperitoneum. They found the positive predictive value to be 80.4% on supine KUB (Kidney, ureter, and bladder study), 78.7% on supine chest radiograph, 85.1% on the erect

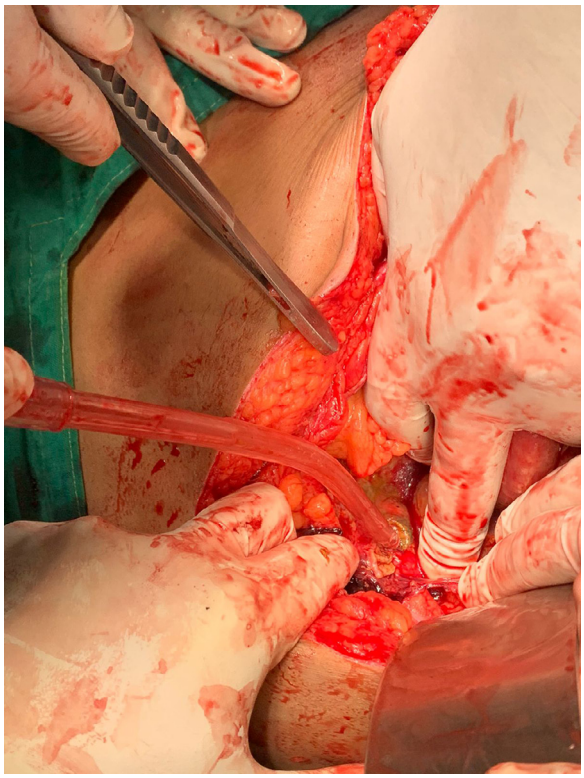

Fig. 6 – Intraoperative image shows a colonic perforation with adjacent necrotic bowel.

radiograph, and 98.0% on left decubitus abdominal radiograph [1].

It is often not possible or feasible to perform an erect chest radiograph in trauma patients. Radiologists should be familiar with the signs of pneumoperitoneum on supine radiographs such as Rigler sign (double-wall sign), falciform ligament sign, ligament teres sign, cupola sign (radiolucency seen below the heart), football sign (large oval radiolucency over the central abdomen), and the hepatic edge sign. The named signs in the pediatric radiographs include inverted V-sign (air outlining the lateral umbilical ligaments) and the urachus sign [1]. Sometimes only a subtle right subphrenic radiolucency may be visible, such as in the above case.

Air pockets localized adjacent to the bowel wall constitute a direct sign of perforation and can help predict the perforation site [2]. Acute mesenteric ischemia is a secondary sign of bowel perforation and has a poor prognosis if not treated early. The complications include bowel necrosis, gangrene, and perforation. Multidetector CT with contrast including arterial and portal venous phase is the recommended protocol. A split bolus technique allows a single-phase acquisition by dividing the contrast dose with a timed delay [3]. It has the advantage of lower radiation doses. Specific signs of bowel ischemia include lack of bowel wall enhancement, pneumatosis intestinalis, gas in the portal vein, and pneumoperitoneum [4].

Conclusion

Non–occlusive mesenteric ischemia can occur without any arterial or venous thrombosis. Hypovolemic shock, heart failure, abnormal hematocrit, drug-related vascular changes are the conditions that can lead to non–occlusive bowel infarction [5]. In summary, recognition of the signs of bowel ischemia can significantly impact patient prognosis, and survival.

Availability of data and materials

The data is taken solely from my institution.

Patient consent

Written informed consent for participation was obtained from the patient.

Declaration of Competing Interest

I have no competing interests to declare.

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