

Case Report

Pneumoperitoneum: Is it always present in Perforation of a Hollow Viscus?

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ABSTRACT:

Presence of air under diaphragm is considered to be the standard for diagnosis of perforation. We present a case of post traumatic ileal perforation in a 12 year old male child who did not show any classical signs of pneumoperitoneum on repeated X-rays. Relevant literature is briefly reviewed.

INTRODUCTION:

Post traumatic small bowel injuries in children are rare with a reported incidence of 5% of total trauma cases reported (1). Signs sometimes might be subtle, if there is no evidence of pneumoperitoneum on X-ray, there is a high chance of missing these injuries unless there is a high degree of suspicion. We present one such case which did not show any air under diaphragm on 3 serial X-rays.

CASE HISTORY:

A 12 year old child presented to the casualty unit of Jawaharlal Nehru Medical College & Hospital, Ajmer with a history of blunt abdominal trauma. Patient was



Fig 1: Erect abdomen X-ray after pushing air. Distension of stomach evident due to pushing of air. No evidence of pneumoperitoneum.

kicked by his younger brother in the abdomen. USG and abdominal X-ray erect were found to be normal. Patient was hemodynamically stable and taking orally. After observation for a few hours, patient was discharged. This patient presented again in the casualty after 2 days with complaints of pain abdomen. There was mild tenderness on palpation, no guarding or rigidity. Patient was otherwise stable. USG and abdomen X-ray were repeated. X-ray abdomen was normal. USG was suggestive of SAIO with some free fluid in pelvis.

Due to high clinical suspicion of perforation, repeat X-ray was done after insufflations of approximately 50 ml of air via Ryle's tube. This X-ray was also inconclusive (Fig 1). An MRI was thus ordered, which reported features of SAIO with moderate collection in perihepatic, perisplenic, bilateral paracolic gutters and pelvic cavity with thin septations and debris with significant stranding in mesentery, with thickened and enhancing peritoneum, a perforation was thus suspected on MRI (Fig 2).

By this time patient's pulse rate had gone up and he had developed episodes of fever. This along with suspicion raised by MRI helped us in convincing the parents for surgery. Per operatively, a large ileal perforation approximately 10-12 cm from ileocecal junction was found. There were adhesions which required lysis, perforation was approximately 5-6 cm in size with



Fig 2: MRI suggestive of mesenteric stranding, peritonitis and collection in abdomen.

devitalized edges, and it needed a resection and anastomosis. A drain was placed. Patient was on ionotropic support for three days and required monitoring in Paediatric Surgical ICU for the initial 4 days. He was discharged with minor wound infection and on full oral feeds on day 12. Patient is in regular follow-up and is doing well.

DISCUSSION:

Pneumoperitoneum is defined as presence of air in the abdomen. It's most common cause is a perforated viscus. In standard practice, a good quality erect abdominal or chest X-ray is considered to be diagnostic of a perforated viscus (2). Presence of air under right or left dome of diaphragm, and sometimes below the central tendon indicates perforation. There are other signs which are found useful in diagnosis, like the

Rigler's sign(3) ;presence of air on both sides of the intestine, and the Football sign(4); where the abdomen shows a large radiolucent shadow resembling a football (seen on a supine film). None of these signs were found in X-ray of our patient.

Literature says radiographic technique is important with a suspected abdominal perforation. At least 2 radiographs should be obtained, including a supine abdominal radiograph and either an erect chest image or a left lateral decubitus image. The patient should remain in position for 5-10 minutes before a horizontal-beam radiograph is acquired. A lateral chest x-ray has been found to be even more sensitive for the diagnosis of pneumoperitoneum than an erect chest x-ray.

Projectional radiography can miss small amount of air in abdomen and therefore often the diagnosis may be missed. CT scan is regarded as standard in assessment of pneumoperitoneum by many, as it can visualize quantities as small as 5cm³(5). In our patient we had repeated X-ray, after pushing around 50 ml of air in the GIT to overcome this drawback, but no pneumoperitoneum could be demonstrated. Besides being able to detect small quantities of free air, CT scan can detect the inflammatory fluid which pours out of a perforation readily. The cause of the perforation can sometimes be diagnosed also (4).

Many regard ultrasonography as being more sensitive in diagnosing perforation than a plain x-ray film (6). In fact some prefer ultrasound as it is non invasive and is free from radiation side effects. Both low- and high-frequency transducers may be used to detect intraperitoneal free air. With the patient in a supine position, the perihepatic space should be evaluated. Pneumoperitoneum can be detected on ultrasound by the enhanced peritoneal stripe sign in conjunction with reverberation artefacts. Comet tail artefact may also be seen. Ultrasonography has been shown to have a sensitivity of 85% and a specificity of 100% for pneumoperitoneum (7). Ultrasound findings in our case were not indicative of perforation.

MRI can also detect extra luminal air; pneumoperitoneum can be seen as an area of low signal intensity on images obtained with all sequences. It can

pick up free fluid and features of peritonitis. However it is not considered as an ideal imaging modality for perforation. In our case we did a MRI because it was easily available, and also avoided exposure to radiation.

One important reason for absence of pneumoperitoneum, in spite of a perforation is spontaneous sealing of the perforation. According to one study approximately 50% of perforations may seal spontaneously. These patients will have subclinical signs of perforation with no air under diaphragm but usually these patients will settle with conservative management (8). However, in practice such high number of sealed perforations is not encountered (9). Perforation in our patient was not found to be sealed. It was a large perforation which could not be repaired primarily and required resection. Adhesions were present. However, in retrospective, it is possible that adhesions had caused kinking and abnormal positioning of ileal loops, which might have covered the perforation.

CONCLUSION:

In conclusion, only plain X-ray cannot be relied upon to make a diagnosis of perforation. A high degree of suspicion is necessary to not miss a case of perforation peritonitis, which presents with no air under diaphragm. If there is clinical suspicion, higher diagnostic modalities should be freely used.

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