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Post-Traumatic Pneumoperitoneum Due to High Compression Trauma - A Case Report

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Abstract:-
Pneumoperitoneum and perforation are the most commonly seen complications in cases of rectal air entry at a high velocity in a short duration of time. We present a case of 20 year old male who was brought to emergency department with severe abdominal pain and distension for 2 hours. On asking history he told a friend of him pumped high-pressure air from an air compressor into his anus while he was working in a factory. The examination and investigations of patients were suggestive of free gas in peritoneal cavity (pneumoperitoneum) and the patient was taken for emergency exploratory laparotomy. On exploration, gaseous distention of whole colon was observed with multiple serosal tear along the colon . A defect of 2x2 cm seen in middle of transverse colon at anti mesenteric border. The defect was closed primarily.

Keywords*:- perforation , colonic barotrauma ,Acute abdomen, Emergency exploratory laparotomy, Transverse colon perforation*

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I. Introduction :-

In 1904 first case with barotrauma was reported which was the first fatal case of rupture of the bowel caused by compressed air introduced per rectum from a machine as stated by Stone.(1) In 1912, another case was reported by Cotton having perforation of the ascending colon-he made a temporary colostomy at the site of the perforation and repaired multiple tears in the serous and muscular coats of other portions of the colon and post operatively the patient recovered.(2) In 1914, another case was reported by Bendixen et al reported -a case of pneumatic rupture of the transverse colon, and gave brief notes on seven collected cases which were fatal.(3)

Colonic perforation and mucosal injury are common barotrauma which are caused by increased pressure in the lumen.(4) The most fatal complications of air entry into rectum which occurs at a high volume and velocity in a short time frame are (A) sigmoid colon rupture and (B) pneumoperitoneum which is evident in our case too.(5)

In this case, we discuss a rare case of transverse colon perforation caused by barotrauma. Nowadays, compressed gases are used in daily industrial work, laboratories, and in gas stations, which make it handy with increasing incidence.In industry the jets used have a pressure of 50 to 100 lbs. or more. Such jet enters the anus more easily than the examining finger or a proctoscope, and enters the bowel even when not inserted properly inside the anus and lead to barotrauma.(6) Intestinal rupture depends more on the suddenness of the pressure than on its amount, for the bowel.

II. Case Report:-

A 20-year male was brought to the emergency department with complain of acute abdominal pain with distension for 2 hours. On further investigating, he gave history that a friend of him pumped high-pressure air from an air compressor into his anus while he was working in a factory. On examination patient had tachycardia with a pulse of 122/minute, normal Blood pressure of 124/86 mmHg and respiratory rate of 20/min. Abdominal examination revealed distension and guarding of abdomen with tenderness all over the abdomen with absent bowel sounds. Per rectal examination revealed a ballooned rectum with fecal matter in it. ABG was done in emergency , X-ray chest and X-ray flat plate abdomen ,USG W/A was done. Routine investigations sent and a CT abdomen was advised. Initial stabilization of patient done in emergency and based on the investigations and findings patient was planned for Exploratory Laparotomy.

ABG REPORT:-

- pH :7.319
- pCo2 :50.6
- po2 :43.4
- Na+ :141
- K+ : 2.9
- Cl- :105
- ctHb :11.9
- so2 :68.4
- cGlu :140
- cLac. :7.2
- cCreat. :0.80

ROUTINE INVESTIGATIONS:

CBC

- TLC : 9.09
- HB: 13.1
- PLT: 524

ELECTROLYTES

- Na+/k+/cl- : 135.8/4.4/95.5

LFT

- BILIRUBIN (T/D/ID) : 0.3/0.1/0.2
- SGOT/SGPT: 34.9/13.5
- ALK PO4: 78.2

RFT

- UREA: 24.8
- CREAT: 0.7

USG W/A :- S/O-

1. Thin streak of free fluid is seen in morrisons pouch and perisplenic space

2.Fatty liver

3. minimal ascites

-suboptimal scan due to highly gaseous abdomen

CECT W/A:-

- Pneumoperitoneum with moderate fluid collection and active extra vasation of rectal contrast from proximal descending colon near splenic flexure suggestive of colonic perforation

FIG: pneumoperitoneum (gas under diaphragm)

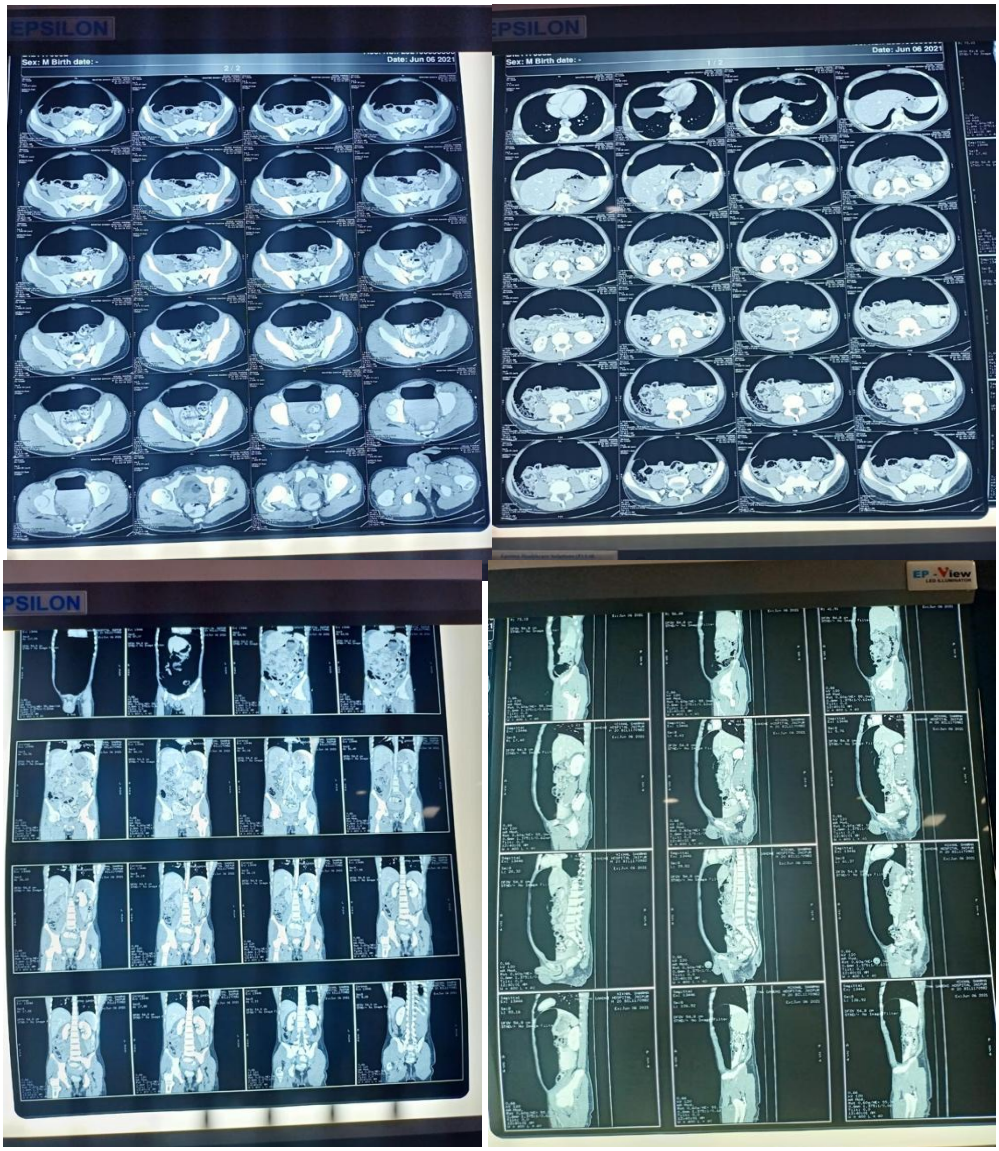

FIG:-CT Film showing gaseous abdomen (pneumoperitoneum)

MANAGEMENT:-

STEPS:-

- Under GA, Painting and Draping done in supine position and an midline incision was given.
- On inspection then whole of abdomen visualised from DJ junction to IC junction, bowel appeared healthy normal.
- Inspection from caecum a small defect of 2x2 cm at middle of transverse colon, no faecal content, rest of descending sigmoid and rectal examination normal .
- The margins of perforation were closed by primary closure(lamberts suture), and omental patch repair done (Mod. Grahm's repair), peritoneal toilet given and 2 ADK drain no.32 was placed in left iliac fossa and sub-hepatic space & fixed.
- Abdomen was closed in layers. Post-op period was uneventful and discharged after 10 days taking normal diet.

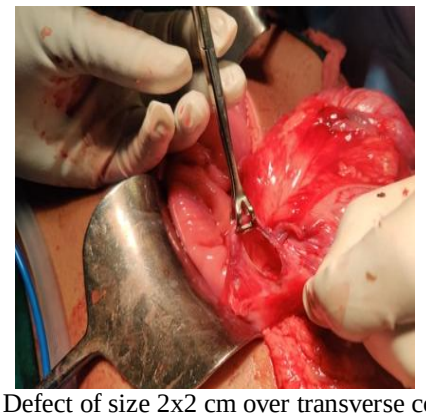

FIG: Defect of size 2x2 cm over transverse colon

FIG: Primary repair done over the defect

FIG: Post-op patient with 2 ADK drains

III. Discussion

Colonic barotrauma can be iatrogenic or abuse. Iatrogenic injury usually follows a colonoscopy procedure.(7) The part of colon which sustains the injury commonly is the caecum since it is the widest part of the colon.(8-10)

Recto-sigmoid colon is the most affected part in air compressor abuseand it is due to its fixation and restricted mobility and the angulation.(7) Woltjen reported 4 patient of colonic injury in his case series of 3000 colonoscopy.(7) "Cat scratch" colon is the mild type of iatrogenic barotraumas while perforation is the severe type. Cat scratch colon has hemorrhagic colitis as histological finding .(11)

The improper use of air compressor usually occur when working mates are joking with each other without realizing the serious consequences like colonic perforation which can be fatal. Average pressure

required to rupture the full thickness of bowel in human gastrointestinal tract is 0.29 kg/cm^{2}as stated by Burt in his research.(12) The injury to bowel depends not only on the pressure of intra-lumen but it also depends on the velocity of airflow because the bowel can dilate enormously if pressure is developed slowly as in cases of intestinal obstruction. Rapid dilatation, serosal tear and perforation are due to extreme shear force which is due to sudden insufflation of high velocity .(13)

Small perforations can be managed by primary closure with or without a diversion colostomy or ileostomy depending on the site and defect. In our report the patient had a mid-transverse colonic perforation with numerous serosal tear & with minimal contamination. So, we did a primary closure with omental patch (mod. Grahms repair). The diagnosis of such condition is not difficult ,if a proper history is asked, when it is not possible such as in an unconscious patient or when associated with other injuries an study about the profession or site of injury should be noted. Intraperitoneal free gas on chest X-ray or abdominal X- ray will confirm the diagnosis.

Our case was managed by primary closure and abdominal drainage . Primary repair or segmentary resection is the recommended in the treatment of colonic perforations (14).

In conclusion, the rare causes of colonic barotrauma is the exposure to an air compressor. Patients presenting with such complain are reluctant to give an accurate history due to social, religious, or psychological reasons. Exposure to air compressor should be always be ecluded/asked as a possible cause of acute abdomen.

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