

# Rare presentation of colonic perforation due to severe barotrauma

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## Abstract

Colon barotrauma can be mostly caused by elevated intra-luminal pressure. Air insufflation during colonoscopy procedure is the most common cause of iatrogenic colon barotrauma. Few cases of multiple perforations of colon caused by non-iatrogenic barotrauma are noted in the literature. We present a case report of a 18 year young male, who had recently joined the garage to work as labourer. Every day after the work, his co-workers would clean the dust on their clothes by the hose of the air compressor. Patient took and inserted the gas hose into his anal canal and insufflated it with the pressure set at the maximum. Emergency laparotomy was done. Perforation of transverse colon, multiple linear serosal tears in the recto-sigmoid colon and over the caecum, faecal peritonitis and mesenteric tear were noted. Primary closure of the perforation was done. A loop ileostomy was then fashioned. Post operative period was uneventful and patient was discharged after 3 weeks. Follow up was done after 6 weeks, distal colon patency was confirmed by barium study, ileostomy was closed later, and the patient tolerated the procedure well.

**Key Words:** Barotrauma, colonoscopy, compressed air.

## Introduction

Colon barotrauma can be mostly caused by elevated intra-luminal pressure. Air insufflation during colonoscopy procedure is the most common cause of iatrogenic colon barotrauma. Few cases of multiple perforations of colon caused by non-iatrogenic barotrauma are noted in the literature<sup>[1-5]</sup>.

Colon barotrauma includes colon mucosal traumas and colon perforation with elevated intraluminal pressure, mainly caused by air<sup>[1,2,3]</sup>. It has been observed that "cat scratch" colon is a mild type of iatrogenic colon barotrauma and colon perforation is the severe one. In some cases, it was reported that colon perforation was caused by compressed air<sup>[4]</sup>. Colon barotrauma presented as colonic perforation and serosal injuries caused by compressed air.

## Case report

An young male patient 18 years old, who had recently joined the garage to work as labourer.

Every day after the work, his co-workers would clean the dust on their clothes by the hose of the air compressor. Patient took and inserted the gas hose into his anal canal and insufflated it with the pressure set at the maximum. Following this, he developed abdominal distension and difficulty in breathing. He was taken by his relatives to the local hospital, and later the patient was referred to our hospital casualty. Patient gave history of bleeding per rectum following the incident. On examination, abdomen was distended, no abdominal movements were seen with respiration, card board like rigidity was present, underlying structures could not be appreciated because of the rigidity, resonant note was heard over all the quadrants and bowel sounds were not heard.

## Investigations

X-ray erect abdomen showed pneumo-peritoneum [Figure 1]. Patient's relatives were not affordable for CT scan hence, emergency laparotomy was done.

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### **Intra operative findings**

Perforation of transverse colon, multiple linear serosal tears in the recto-sigmoid colon

### **Operative procedure**

Primary closure of transverse colon perforation was done. The serosal tears were sutured. A loop

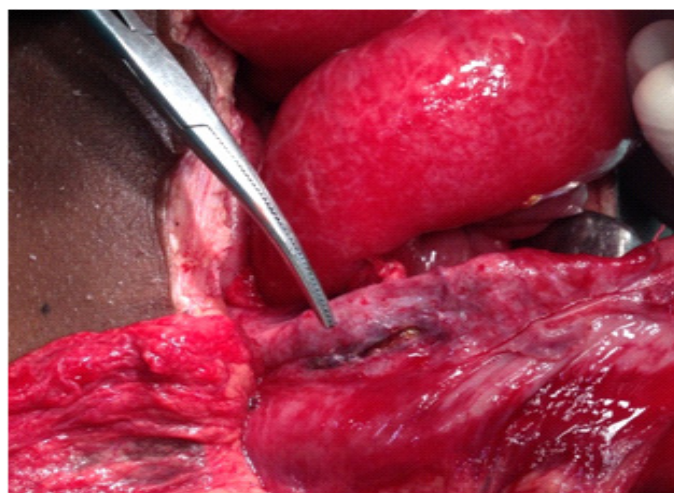
ileostomy [Figure 7] was then fashioned, brought out through the abdomen wall in the right iliac fossa. Post operative period was uneventful and patient was discharged after 3 weeks [Figure 8,9] Follow up was done after 6 weeks, distal colon patency was confirmed by barium study, ileostomy was closed later, and the patient tolerated the procedure well.



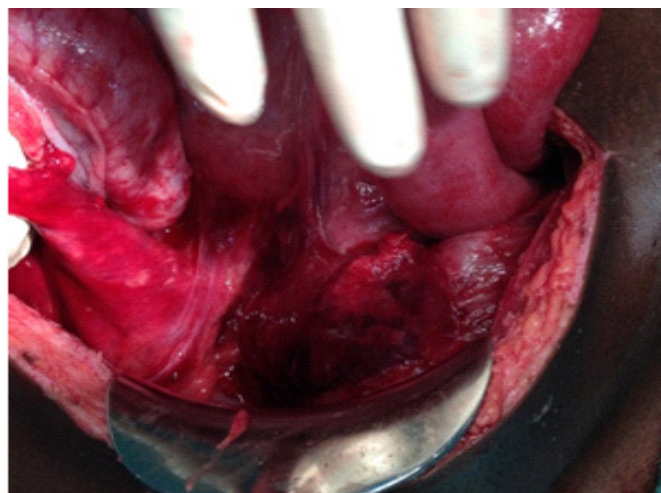
**Figure1. X-ray erect abdomen pneumo-peritoneum**



**Figure 2. Mesenteric tear**



**Figure 3. Transverse colon perforation**



**Figure 4. Recto-sigmoid junction serosal tears**





**Figure 6. Caecal haematoma with mesenteric tear**



**Figure7. Loop Ileostomy**



**Figure 8. Post operative barium enema after 6 weeks**



**Figure 9. Post operative ileostomy closure**

### Discussion

Most cases of iatrogenic colonic barotrauma occurred during a colonoscopy procedure. 5 Their incidence is reported as 0.1 to 0.5%. 6-9 According to the law of Laplace, the wall tension is directly proportional to the intramural pressure and the diameter of the colon<sup>[10]</sup>. The caecum has the largest one among all the diameters of colonic segments and is the most easily affected area to barotrauma during colonoscopy procedure<sup>[5-11]</sup> “Cat scratch” colon is usually seen in a mild type of iatrogenic colon barotrauma and colon perforation is the severe one. Hemorrhagic colitis is one of the histological findings in cat scratch colon<sup>[12]</sup> McDonnell<sup>[2]</sup> reported superficial breaks in the mucosa in the right colon during a colonoscopy procedure leading to secondary barotrauma and termed as “cat scratch” colon in 2007. Cat scratch colon was defined as bright erythematous linear marks resembling scratches<sup>[5]</sup>. The ascending colon and the caecum are mostly injured. Cruz-Correa<sup>[13]</sup> reported that the collagenous colitis was predisposed to catscratch colon. Woltjen<sup>10</sup> reported four caecal perforations during 3000 colonoscopy procedures. Misuse of compressed air is reported as one of the causes occurring in a non-iatrogenic colon barotraumas<sup>[5,10,12-15]</sup>. In various industrial fields, compressed air is broadly used for industrial

machines, including cleaning and in fabric machines. However, ignorant and improper use of compressed air equipment may lead to disastrous events in which colon wall rupture may occur. Fortunately, colorectal injury by compressed air is not frequent in spite of the increased and widespread use of compressed air in modern life. Colon baro-trauma cases caused by compressed air were reported in the literature. Coffey<sup>[4]</sup> in 2007 described the case of a young man who was victim to perineal blasting by compressed air hose. In Korea, colon barotrauma caused by compressed air was first reported in 1996, where Suh<sup>[11]</sup> described in two colorectal trauma patients. Their rectosigmoid region was ruptured due to a jet of compressed air directed to their anus, while they were playing practical jokes with their colleagues in their work place<sup>[11]</sup>. One patient was treated with primary two layer closure, and the other with primary two layer closure and sigmoid loop colostomy<sup>[11]</sup>. In our case, severe compressed air caused linear serosal tears at the recto-sigmoid colon with perforation of transverse colon. Unlike air insufflations during colonoscopy procedure, misuse of compressed air may lead mainly to transverse colon perforation<sup>[4,11,12]</sup>. In case of non-iatrogenic colon barotrauma, the recto-sigmoid junction in the colon is the vulnerable site due to easy increase of the intramural pressure.



Burt<sup>[15]</sup> showed that the average pressure necessary to rupture the full thickness of bowel considering different layers of human gastrointestinal tract was 0.29 kg/cm<sup>[2]</sup>. The order of resistance to intra luminal pressure were rectum, sigmoid colon, ileum, esophagus, jejunum, transverse colon, cecum and stomach in that order<sup>[15]</sup>. Not only actual intra luminal pressure, but the velocity of airflow is also important in the occurrence of bowel injury<sup>[11]</sup>. The sudden high velocity insufflation of air induces extreme shear force at the point of maximal fixation. The recto-sigmoid junction has bilateral fixation, which limits its mobility; thus, compressed air insufflation with high velocity can cause recto-sigmoid colon barotraumas<sup>[4]</sup>. The diagnosis is not difficult if the patient has a history of abdominal pain and distension after exposure to the compressed air. However, patients with acute abdominal pain of unknown origin should be checked for trauma history and occupational history, such as construction, industrial worker and cleaners using compressed air. Intraperitoneal free air on abdomen or abdominopelvic computed tomography confirms the colon perforation. In our case, lots of free air on simple x-ray confirmed the colonic barotrauma with perforation. Necessary management depends on the severity of barotrauma. In case of colon perforation, surgical procedure should be considered and conservative treatment can be given in colonic mucosal ulcers. The prognosis has generally been favourable in recent years<sup>[11]</sup>. Our patient was managed with surgical treatment and recovered without any further complications. In summary, occurrence of colon barotrauma can be caused by industrial compressed air and the recto-sigmoid colon is most likely injured, but can cause perforation of any part of the bowel. Patients with acute abdominal pain of unknown origin should be checked for trauma history and occupational history using compressed air. Most cases of colon barotrauma in compressed air reported rectosigmoid colon perforation, but in our case transverse colon perforation with mesenteric tear, multiple linear serosal tears at the site of rectosigmoid colon and caecum were noted.

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