

Case Report

Industrial compressed air injury resulting in caecal perforation and tension pneumoperitoneum - a rare non-iatrogenic barotrauma

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ABSTRACT

The widespread use of compressed air equipment in industrial settings has led to an increase in severe injuries resulting from misuse. Air compressor abuse is one of the non-iatrogenic causes of colonic barotrauma and typically occurs when coworkers engage in joking or horseplay. High-pressure compressed air is capable of penetrating clothing and can cause bowel injury. Injuries due to compressed air range from mucosal tear to perforation to abdominal compartment syndrome. Although the caecum is considered the most vulnerable segment, the sigmoid and rectosigmoid junction are the most common sites of perforation in industrial barotrauma cases. We report a case of extensive pneumoperitoneum caused by caecal perforation secondary to the forceful injection of compressed air through the perineum while playful joke in young male patient. The patient had one caecal perforation and multiple serosal tears throughout the colon, which were successfully managed with resection and creation of a double-barrel ileo-ascending stoma, along with primary repair of the serosal tears.

Keywords: Barotrauma, Caecal perforation, Compressed air, Ileos-ascending stoma, Industrial safety

INTRODUCTION

The risk of barotrauma (pneumatic injury) resulting from the accidental or playful misuse of compressed air equipment has been reported worldwide over time.¹ The most commonly used tool in industrial workplaces is the blow-gun dust cleaner, which can cause potentially fatal pneumatic injuries if directed at various parts of the body, particularly the rectum. Although such injuries in industrial settings are rare, they can be devastating.² Case studies have shown that non-iatrogenic barotrauma commonly involves young male industrial workers who misuse compressed air equipment, often during prank-related incidents. Importantly, these injuries can occur even when the victim is fully clothed, as high-pressure compressed air is capable of penetrating clothing and forcibly entering the anorectal canal without direct

insertion of the nozzle. The resting pressure of the anal sphincter is approximately 40-80 mm Hg. Seromuscular rupture may occur when intraluminal pressure rises to 100-120 mm Hg, while colonic perforation or bursting is seen at pressures between 140-200 mm Hg. In comparison, the airflow used during colonoscopy is approximately 1.46 l/min, which is considered within a safer range. However, compressed air jets can deliver airflow of nearly 141 l/min, almost 100 times higher than safe levels. Industrial medium-pressure air compressors (150-1000 psi) are commonly used in such settings. According to Laplace's law, wall tension increases with both pressure and radius; therefore, the widest part of the colon experiences the greatest stress. As the caecum is the widest segment, it is the most vulnerable to perforation. We report a case of compressed air-induced barotrauma to the large bowel presenting with acute abdomen and faecal peritonitis

secondary to caecal perforation, along with its management.

CASE REPORT

A young man in his 20s presented to the emergency department with severe abdominal pain and abdominal distention of 1-hour duration. On detailed questioning, the patient revealed that a high-pressure air compressor nozzle had been placed directly into his anus by his co-workers as part of a playful prank. On examination, the patient was conscious, coherent, and dehydrated.

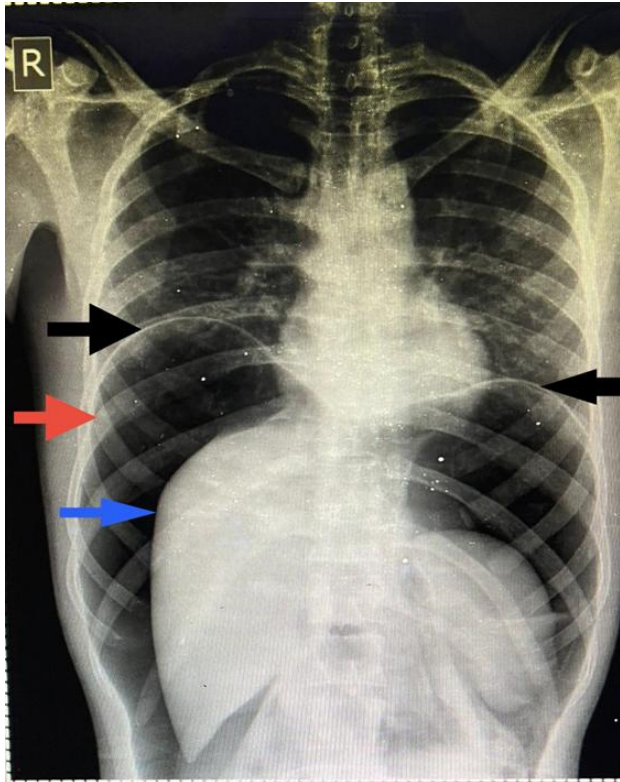


Figure 1: Erect X ray abdomen suggestive of air under diaphragm compressing the visceral organs. (black arrow- diaphragm, blue arrow- liver border, red arrow- air under diaphragm).

His pulse was 110/min, with a blood pressure of 110/70 mm Hg and was maintaining oxygen saturation of 98% on room air. On systemic examination, cardiovascular examination: no abnormality detected. Respiratory examination showed bilateral air entry. Per abdominal examination revealed gross distention, tympanic on percussion, diffuse tenderness with guarding all over the abdomen, absent bowel sounds. Per rectal examination showed no external injury, and digital rectal examination was within normal limits. Routine blood investigations showed normal red blood cell and platelet counts, and haemoglobin was 13.5 g/dl. Arterial blood gas analysis was within normal limits. An abdominal X-ray revealed tension pneumoperitoneum compressing the visceral organs (Figure 1). The patient was initially resuscitated with intravenous fluids, and a nasogastric tube was

inserted. An emergency laparotomy was performed. Upon opening the peritoneum, a large amount of air escaped, and the peritoneal cavity was found to be filled with faecal fluid. A single caecal perforation measuring 3×3 cm (Figure 2) was identified, along with multiple serosal tears throughout the whole colon (Figure 3 A-D). The remaining abdominal organs were normal. Resection of the perforated segment, with some part of distal ileum was performed, followed by creation of a double-barrel ileo-ascending stoma. The serosal tears were repaired using 2-0 silk round-body sutures.

The postoperative diagnosis was caecal perforation with tension pneumoperitoneum and faecal peritonitis. The patient was extubated on postoperative Day 1. Epidural catheterization was performed for pain management, and total parenteral nutrition (TPN) was initiated. Supportive measures, including antibiotics, incentive spirometry, and transfusion of one unit of packed red blood cells, were provided. A multidisciplinary team comprising a surgeon, critical care specialist, anaesthetist, nursing staff, physiotherapist, and nutritionist was involved in the patient's care.

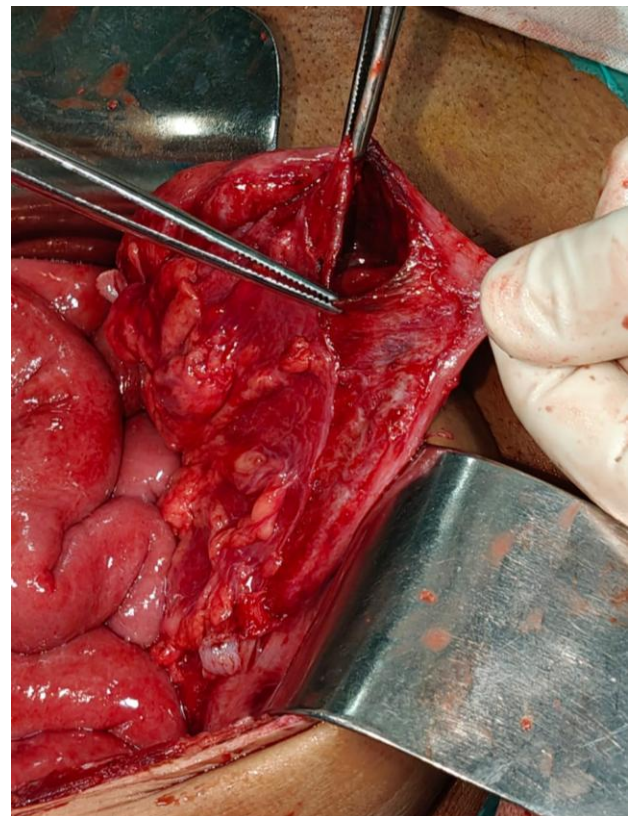


Figure 2: Picture showing the 3x3 cm perforation in caecum.

Outcome and follow-up

The patient's postoperative recovery was satisfactory. He was discharged in stable condition, and one month follow up post discharged was uneventful. He has recovered well and is currently asymptomatic.

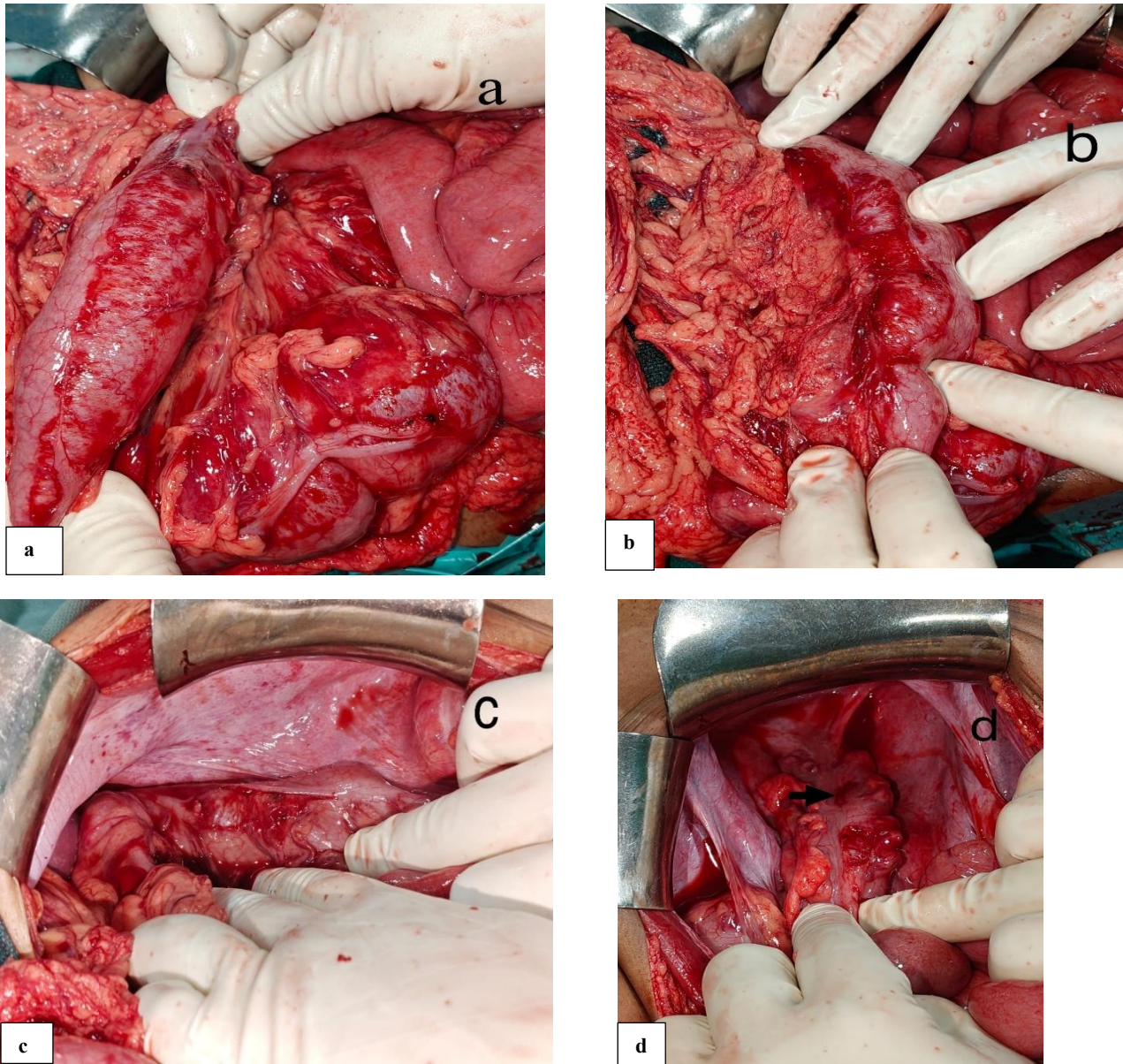


Figure 3: (a) serosal tear in ascending colon, (b) serosal tear in transverse colon, (c) serosal tear in descending colon and (d) serosal tear in rectum (black arrow).

DISCUSSION

Colorectal injuries resulting from barotrauma are uncommon and may vary widely in severity, ranging from minor mucosal tears to catastrophic intestinal perforations. There have been relatively few reports of colorectal barotrauma, most of which involve bowel perforations, and some progress to tension pneumoperitoneum.³ However, the rectosigmoid junction and sigmoid colon are the most common sites of injury due to their relative fixity and angulation.⁴ In contrast, our patient had a perforation in the caecum. These injuries typically present with abdominal pain and distension, and when colonic perforation occurs, signs of peritoneal irritation may rapidly develop. Additional complications can include respiratory distress resulting from reduced diaphragmatic movement due to pneumoperitoneum, as well as

respiratory alkalosis secondary to hyperventilation associated with abdominal compartment syndrome. Elevated intra-abdominal pressure may also facilitate the migration of air, leading to pneumomediastinum, pneumothorax, and extensive subcutaneous emphysema.⁵ Diagnosis often begins with an erect abdominal X-ray to identify pneumoperitoneum. Management of colonic barotrauma focuses on relieving tension pneumoperitoneum and addressing the underlying colonic injury. Hemodynamically stable patients without perforation may be managed conservatively with bowel rest, antibiotics, and close observation. However, confirmed perforations or signs of peritonitis require surgical intervention. The choice of procedure—whether primary repair, Graham's patch, bowel decompression, diversion colostomy or ileostomy with primary repair, or resection and anastomosis—depends largely on

intraoperative findings.⁶⁻⁸ In our case, multiple serosal tears and a large caecal perforation were identified intraoperatively; therefore, serosal tears were repaired, and bowel resection with creation of a double-barrel ileo-ascending stoma was performed.

CONCLUSION

Injuries resulting from barotrauma can range from a simple mucosal laceration to tension pneumoperitoneum leading to abdominal compartment syndrome. However, emergency laparotomy remains the definitive management for colonic perforation associated with faecal peritonitis, sepsis, and shock. Primary repair or resection with anastomosis, with or without diversion, should be performed as indicated based on intraoperative findings and the patient's condition. This case highlights the severe risks associated with the improper use of compressed air equipment. It underscores the need for increased awareness and preventive measures to educate individuals about the potential hazards of such equipment. Strengthening safety protocols and promoting targeted education and training are essential to preventing similar incidents and ensuring a safer overall environment.

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REFERENCES

1. Park YJ. Rectal perforation by compressed air. Ann Surg Treat Res. 2017;93(1):61-3.
2. Bains L, Gupta A, Kori R, Kumar V, Kaur D. Transanal high pressure barotrauma causing colorectal injuries: a case series. J Med Case Rep. 2019;13:133.
3. Sy ED, Chiu YI, Shan YS, Ong RL. Pneumatic colon injury following high pressure blow gun dust cleaner spray to the perineum. Int J Surg Case Rep. 2015;6C:218-21.
4. Clemens MS, Peace KM, Yi F. Rectal Trauma: Evidence-Based Practices. Clin Colon Rectal Surg. 2018;31(1):17-23.
5. Anderson ML, Pasha TM, Leighton JA. Endoscopic perforation of the colon: lessons from a 10-year study. Am J Gastroenterol. 2000;95:3418-22.
6. McDonnell WM, Loura F, Pointon MJ, Greenon JK. Cat scratch colon. Endoscopy. 2007;39:459-61.
7. Thatte M, Taralekar SV, Raghuvanshi K. Colonic barotrauma with tension pneumoperitoneum - review of literature and report of a successfully treated case. Int J Sci Res. 2014;3:339-41.
8. Weber M, Kolbus F, Dressler J, Lessig R. Survived ileocecal blowout from compressed air. Int J Legal Med. 2011;125:283-7.

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