



PERFORATION OF BOWEL FOLLOWING ENDOSCOPY LEADING TO TENSION PNEUMOPERITONEUM

Dinesh N*	Fellow- Pediatric Anesthesia, Department of Anesthesia, GKNM Hospital, Coimbatore, India. *Corresponding Author
Mithul V S	Fellow- Pediatric Anesthesia, Department of Anesthesia, GKNM Hospital, Coimbatore, India.
Rajani Sundar	Chairperson, Department of Anesthesia, GKNM Hospital, Coimbatore, India.
Dinesh kumar Gunasekaran	Consultant, Department of Anesthesia, GKNM Hospital, Coimbatore, India.

ABSTRACT This was a case of tension pneumoperitoneum, very rare and potentially lethal complication, following colonoscopy under general anesthesia in 14 months old child with Inflammatory bowel disease. An acute, tense abdomen was noticed during colonoscopy, with progressive difficulty in ventilation and hemodynamic instability. The procedure was discontinued immediately. All attempts to improve ventilation failed. Hemodynamic supports were started. Decompression of the insufflated air did not improve the condition. Perforation was suspected. Urgent imaging of the abdomen showed pneumoperitoneum. Immediate percutaneous needle decompression of the abdomen was done after which ventilation and hemodynamics dramatically improved. After stabilization, surgical exploration was done.

Summary

Tension pneumoperitoneum during pediatric endoscopic procedures is a rare complication posing significant challenges to an anesthesiologist in recognition and management. It should be suspected in a tense abdomen with cardiopulmonary compromise following an endoscopic procedure. Percutaneous needle decompression is life-saving and need not be delayed until surgical exploration. Radiological confirmation should not delay intervention in strong clinical suspicion.

KEYWORDS : Endoscopy, Perforation, Tension Pneumoperitoneum, Percutaneous Needle Decompression.

INTRODUCTION

Tension pneumoperitoneum refers to the accumulation of intra-abdominal free air under pressure leading to hemodynamic and respiratory compromise. It is a very rare and potentially lethal complication due to the perforation of bowel after colonoscopy warranting immediate decompression of the abdomen.

Case Presentation

We report a case of tension pneumoperitoneum due to iatrogenic bowel perforation in a 14 months old boy, who was suspected to have inflammatory bowel disease. The child underwent diagnostic upper GI endoscopy and colonoscopy with biopsy, under general anesthesia. Anesthesia was provided with ASA standard monitoring and controlled ventilation with an endotracheal tube. Upper GI endoscopy was uneventful.

An acute, tense abdomen was noticed during colonoscopy, which led to progressive difficulty in ventilation and hemodynamic instability finally leading to circulatory collapse. The procedure was discontinued immediately and endoscopist was advised to decompress the insufflated air and come out. The position of the endotracheal tube was confirmed by laryngoscopy. All attempts to improve ventilation failed. Placing a nasogastric tube did not help to improve the condition. Hemodynamics were supported with Adrenaline and intravenous isotonic fluid bolus. Dopamine infusion was started to maintain hemodynamics.

Since the abdomen remained tense and interfered with ventilation, perforation was suspected. The child was noticed to have subcutaneous emphysema in the neck and upper chest with rectal prolapse. Urgent imaging of the abdomen showed pneumoperitoneum as shown below.



Figure 1: X-ray Abdomen Showing Pneumoperitoneum

Immediate percutaneous needle decompression was done on the right side of the abdomen (few centimeters medial and superior to anterior superior iliac spine) with 20G cannula, leading to a gush of air, after which ventilation and hemodynamics dramatically improved. Arterial blood gas revealed respiratory acidosis. The child was stabilized by continuing intravenous fluids, titration of Dopamine infusion, and mechanical ventilation with deepening the plane of anesthesia. Appropriate antibiotic prophylaxis was given. The child was then shifted for emergency surgical exploration and closure of perforation. The child was transferred to the Pediatric Intensive Care Unit (PICU) in the immediate postoperative period. The post-operative period was uneventful. The child was followed up for 5 days and discharged in stable condition.

DISCUSSIONS

Colonoscopy is generally a safe and widely used tool for both diagnostic and therapeutic procedures in various colonic pathologies. But, rarely, it can also produce serious complications like perforation and bleeding¹. Perforation as a complication of colonoscopy is estimated to occur between 0.03-0.9% of procedures. The risk is slightly higher with therapeutic procedures ranging between 0.15-2%^{2,3}. Common therapeutic procedures with increased risk are polypectomy for polyps larger than 20mm⁴, pneumatic dilatation for Crohn's stricture⁵, and endoscopic mucosal resection^{6,7}. The risk factors associated with higher incidences are age greater than 75 years^{8,9,10}, female gender¹¹, and history of diverticular disease¹⁰. Patients with active inflammatory bowel disease and on steroids carry higher risk¹². The data available on incidences of perforation in the pediatric population is limited. The most common clinical feature of perforation is the visualization of an extra-intestinal structure during endoscopy¹³.

Tension pneumoperitoneum is a very rare and potentially lethal complication of perforation following endoscopy. The presence of abdominal distension with rigidity, difficulty in ventilation, and hypotension are considered as signs of tension pneumoperitoneum. The increased intra-abdominal pressure causes elevation of the diaphragm which restricts lung volumes, decreases venous return (by compression on inferior vena cava), and cardiac output finally resulting in cardiopulmonary arrest^{14,15}. These effects are profound in the pediatric population due to poor lung reserve and compliance. Abdominal compartment syndrome occurs when raised intra-abdominal pressures (IAP >20mmHg) reduce blood flow to abdominal organs resulting in multi-organ dysfunction and death¹⁴.

Radiological signs of tension pneumoperitoneum in a supine abdominal x-ray are Football sign (large pneumoperitoneum outlining entire abdominal cavity), Double wall sign (visualization of the outer wall of bowel loops caused by the presence of intraluminal and extraluminal gas) and Cupola sign (due to gas trapped below central tendon of the diaphragm)16.

Tension pneumoperitoneum requires immediate decompression of the abdomen with percutaneous needle placement. It is life-saving, as it allows hemodynamic stability by relieving intra-abdominal pressure. Thereby it also acts as bridging therapy until definitive surgical exploration16,17.

The recommended areas of abdominal wall entry are

1. Below umbilicus, in the midline (through Linea alba)
2. Superior and medial aspect of the anterior superior iliac spine on either side16.

To minimize complications areas of prominent veins, infected skin, or scar tissue should be avoided. Possible complications are hemorrhage and bowel injury, which is unlikely in the presence of large pneumoperitoneum with patients in supine position16.

Most of the data available are from the adult population but our patient belongs to the pediatric age group.

CONCLUSIONS

- Tension pneumoperitoneum during pediatric endoscopic procedures is a rare complication posing significant challenges to an anesthesiologist in recognition and management.
- Tension pneumoperitoneum should be suspected in any patient who develops a tense abdomen with cardiopulmonary compromise following an endoscopic procedure.
- Percutaneous needle decompression is life-saving and need not be delayed until surgical exploration.

Take home message

- Vigilant monitoring and awareness of complications will reduce morbidity associated with endoscopic biopsy and improve the outcome.
- The use of smaller caliber endoscopes had been recommended to improve safety.
- Ultrasound being readily available in the armamentarium of an anesthesiologist, can be considered for the diagnosis of pneumoperitoneum and safe needle puncture.
- Radiological confirmation should not delay intervention in strong clinical suspicion.

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