

## **A rare case of pneumoperitoneum and grade IV intraabdominal hypertension; A case report and review of literature.**

### **PNÖMOPERİTONUN VE GRADE 4 İNTRAABDOMİNAL HİPERTANSİYONUN NADİR BİR SEBEBİ; OLGU SUNUMU VE LİTERATÜR SUNUMU.**

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#### **ABSTRACT**

Abdominal compartment syndrome is a serious abdominal condition with significant percentage of morbidity and mortality and can result from various reasons. Here we present a rare case of intra-abdominal hypertension where a 26 years male patient developed grade IV intra abdominal hypertension following deliberate entry of air due to opening of balloon inflator cylinder through his anus by his peer group while poking fun. However we also find that intervention at an appropriate time may prevent the complication of abdominal compartment syndrome in spite of substantial rise of intra abdominal pressure at the time of presentation.

**Key words:** Abdominal compartment syndrome, gas, insufflation.

#### **ÖZET**

Abdominal kompartman sendromu çeşitli sebeplerle ortaya çıkabilen, morbiditesi ve mortalitesi yüksek bir durumdur. Burada, şakalaşma sırasında arkadaşları tarafından anüsten hava kompresörü ile basınçlı gaz uygulanan ve karın içerisi gaz ile doldurulan ve geldiğinde karında yüksek basınçlı bir durum olan hasta yapılan girişim sonucunda kurtulan 26 yaşındaki bir erkek hasta sunulmuştur.

**Anahtar kelimeler:** Abdominal kompartmant sendromu, gaz, insuflasyon.

#### **INTRODUCTION**

Pneumoperitoneum is a condition characterized by the presence of free gas or air within the peritoneal cavity. Abdominal Compartment Syndrome (ACS) caused by a varieties of situation like abdominal trauma , liver transplantation , retroperitoneal hemorrhage , intestinal obstruction , pelvic fracture, ascites, burn, pancreatitis, ileus, large volume replacement, iatrogenic injury during laparoscopic surgery or it may be due to some other pathological condition, mainly perforation of hollow viscous. Abdominal Compartment Syndrome (ACS) due to pneumoperitoneum produces derangement of normal physiology resulting in failure of multiple organs. It reduces venous flow, increases pulmonary and cardiac complica-

tions and derangement of function of abdominal organ.

It is important to treat the pneumoperitoneum as early as possible to prevent serious complications of pneumoperitoneum and abdominal compartment syndrome to save precious life.

#### **Case**

A 26 years old male patient presented with sudden onset abdominal distension and pain following deliberate insertion and sudden opening of balloon inflator cylinder nozzle through his anus by his friends for fun. The patient came to the emergency ward after 5 hours of the incidence. There was no history of respiratory distress, vomiting, and altered sensorium.

Patient was occasional smoker. There was no history of any comorbid condition.

On examination patient was conscious, alert and cooperative, normal built, no sign of cyanosis or pallor. On examination-abdomen was hugely distended, tense, and tender (Figure 1). Intestinal peristaltic sound was absent, on examination of chest-breath sounds were normal vesicular breath sound. Pre-operative blood investigation-complete blood count and blood biochemistry report were normal except CRP was borderline raised.

Straight x-ray showed bilateral sub-diaphragmatic collection of huge air. Outline of liver and spleen were clearly delineated and medially shifted without bowel gas shadow (Figure 2,3). Intra abdominal pressure was measured by trans-vesicle

Foley's catheter (Figure 6) and it was found to be 40 cm of water equivalent to the 29.6 mm of Hg, grade IV intra abdominal hypertension ( $\geq 25$  mm of Hg). Cardiac and respiratory monitoring done. Exploratory laparotomy was done for suspected bowel perforation and relieve of Pneumoperitoneum. After exploration it was found that a large haematoma (Figure 4) and a perforation (Figure 5) occurred at the recto-sigmoid junction with contaminated abdomen. Gangrenous portion of the gut was resected, peritoneal toileting with normal saline and colostomy with mucous fistula done.

Postop period was uneventful and all the biochemical and physiological parameters were normal. The patient was discharged in favorable condition on 10 th post operative day.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

### DISCUSSION

There are various uses of compressed air as an energy source for cleaning of tools and machines. Iatrogenic colonic injury were reported during colonoscopic examination, foreign body introduction, and barium enema study.<sup>1</sup> Colorectal injury by compressed air is a rare entity. After the first reported case of colon rupture<sup>2</sup>, a number of case are there in literature (3,4). Andrews-1911 and Burt-1931 has shown that normal gastrointestinal tract will be ruptured by air

pressure 0.49 to 0.88 kg/cm<sup>2</sup> and 0.29 kg/cm<sup>2</sup> respectively (5,6). Increasing order of resistance to GI intraluminal gaseous pressure are rectum, sigmoid, ileum, oesophagus, jejunum, transverse colon, caecum and stomach. When compressed air is introduced into the gastrointestinal tract, it will distended the gut and first of all the outer serosa and muscularis mucosa will tear and mucosa-submucosa will bulge through the tear. After that if air pressure is increased there is loss of resistance to air pressure and full thickness bowel

perforation occur. Among the reported cases the most common site of perforation is rectosigmoid region. Our case is also an example of rectosigmoid junction perforation. It may rupture immediately or rupture may be delayed. There are 2 reported case of delayed rupture (7,8).

Mechanism of perforation: there are two factor for GI perforation;

1. Intraluminal air pressure
2. Air is introduced how much forcefully.

Funnel shaped configuration of buttock and perineum helps to concentrate the air. Air at 0.49 to 0.88 kg/cm<sup>2</sup> pressure make a column of air which is acts as a solid particle entering into the anal canal. The anal canal and distal rectum is supported outside by perineal muscle but the anterior wall of rectosigmoid region is free of support. So that this is the first site to encounter by the air leads to perforation (5). This explains that why rectosigmoid is the most common site for perforation.

In healthy persons, Intra Abdominal Pressure (IAP) is normally 0-5 mmHg and inversely changes with intrathoracic pressure during normal respiration (9).

Continued or repeated increase in IAP of 12 mm of Hg or more leads to Intra Abdominal Hypertension (IAH) (10). World Society of The Abdominal Compartment Syndrome (WSACS) has classified IAH into 4 grade (Table 1).

<b>Table 1: Grading system of IAH (10-11).</b>	
Grade	IAP [mm of Hg]
I	12-15
II	16-20
III	21-25
IV	>25

There are different methods for direct and indirect measurements of IAP (12). Among them gold standard method of indirect measurement is via a urinary bladder catheter (10,13,14). A transducer technique or a manometer technique is also available. We have used urinary bladder catheter technique and it was found to be 40 cm of water equivalent to 29.6 mm of Hg, grade IV intra abdominal hypertension ( $\geq 25$  mm of Hg). Emergency exploratory laparotomy done and diseased sigmoid colon was resected. Due to heavily contaminated abdomen instead of primary anastomoses end colostomy and mucous fistula were done. Postoperative day was uneventful and patient was discharged on 10th post operative day.

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