

Pneumoperitoneum Secondary To Pneumothorax following Blunt Trauma: A Case Report

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Abstract-*Pneumoperitoneum is usually seen secondary to hollow viscus injury following any blunt abdominal trauma but in rare cases, it may be seen without any injury to the hollow viscera. In such cases, pneumoperitoneum can be due to some other causes like thoracic, gynecologic and other intraabdominal pathologies. Here we report the case of 52 year male who presented to accidental and emergency department with alleged history of roadside accident. Patient was in respiratory distress and was managed with immediate tube thoracostomy. His CECT-Abdomen revealed pneumo-hemoperitoneum for which patient underwent laparotomy. Intra-operatively, pneumoperitoneum was confirmed but no hollow viscus injury was seen. We suspect the patient developed pneumoperitoneum as a result of traumatic pneumothorax. Patient was kept in surgical ward for post-operative management and made a satisfactory recovery and was discharged without any complications.*

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I. Introduction

In approximately 90% cases of perforation of intraabdominal organ there is free air in peritoneal cavity outside the viscera.¹ Pneumoperitoneum can also be due to some other causes like thoracic, gynecologic and other intraabdominal pathologies.²

The intraabdominal pressure exceeds intrathoracic pressure by an average of 20–30 cm H₂O during both inspiration and expiration, therefore simple pneumothorax should not necessarily lead to pneumoperitoneum. On the other hand, patients with tension pneumothorax may develop pneumoperitoneum due to the rapidity of build-up of intrathoracic pressure and therefore, high intrathoracic pressure is required to cause dissection of air through the retroperitoneal space.³

Intrathoracic pressures of 60 cm H₂O or greater will result in subcutaneous emphysema and pneumoperitoneum from progression of air flow.^{4,5} It is thought that air leaking from ruptured alveoli collects in the interstitial space. As intrathoracic pressure increases, the air dissects along the sheath of adjacent vessels into the mediastinum. The air can then dissect into various spaces, including the pleural space and along the thoracic great vessels and esophagus into the retroperitoneum, where it may rupture into the peritoneal cavity and cause pneumoperitoneum.⁵

The diagnosis of Spontaneous pneumoperitoneum is usually made after negative laparotomy results. Spontaneous Pneumoperitoneum with signs of peritonitis makes a therapeutic dilemma between conservative or non-conservative treatment.

II. Case Report

A 52 year male presented to accidental and emergency department of Pt. B.D.Sharma medical college Rohtak with alleged history of roadside accident when patient was on bike and collided with truck on 6th June 2017. The time elapsed between the accident and presentation to hospital was 6 hours.

His Glasgow coma scale was 15/15. Patient was in respiratory distress and physical examination revealed decreased breath sounds on right side and crepitus over right chest wall and an immediate tube thoracostomy was done. On abdominal examination there were abrasions over right hypochondrium and right flank. Tenderness was present over right hypochondrium.

Chest x-ray after tube placement demonstrated subcutaneous emphysema.

CECT thorax showed subcutaneous emphysema over right side of chest wall. B/L hydropneumothorax with underlying basal atelectasis noted. ICD noted in situ on right side of chest. Fracture of 8th 9th 10th and 11th rib on right side of chest.

CECT abdomen revealed 2+ free fluid, pneumo-hemoperitoneum with liver laceration and contusion. Free air in peritoneal cavity is shown in fig 1 & 2.

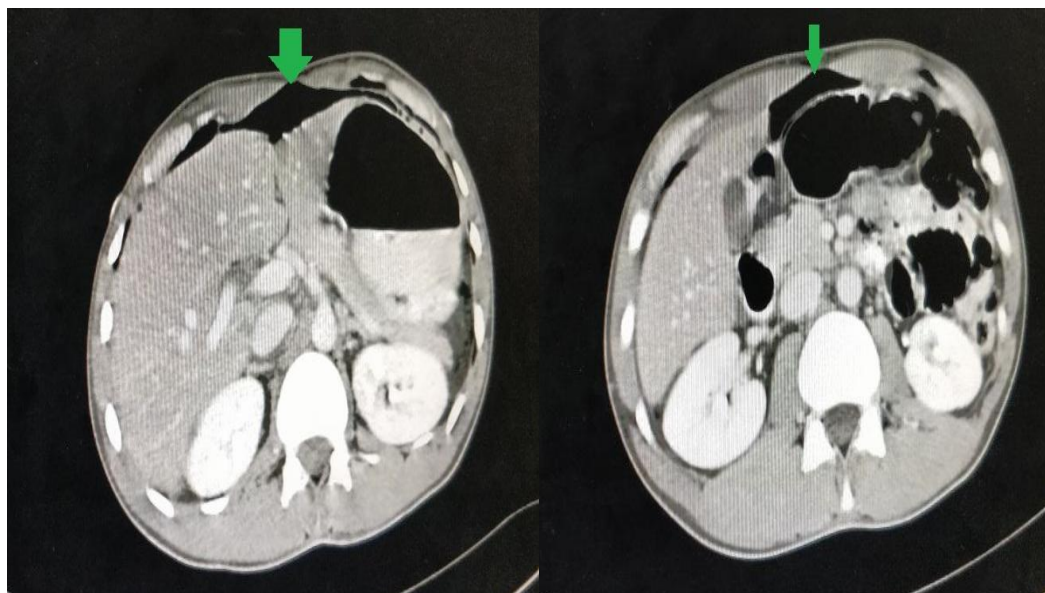


Fig. 1 CECT showing free air in peritoneal cavity **Fig.2** CECT showing pneumoperitoneum

Renal contusion and laceration is seen at midpole of right kidney. Fracture of left transverse process of L1 vertebra.

Then decision was made to perform an emergency laparotomy to rule out hollow viscus injury. On laparotomy pneumoperitoneum was confirmed and no hollow viscus injury was there. Retroperitoneal hematoma was present. Liver laceration was present. Rest of solid organs was normal. No diaphragmatic injury was present. A drain was put in pelvis and abdomen was closed. Patient was kept in surgical ward for post-operative management. ICD and abdominal drain were taken out on 3rd post-operative day and patient was allowed orally. Patient was accepting orally, passing flatus and stool so discharged on 5th post-operative day under satisfactory conditions.

III. Discussion

Pneumoperitoneum in most cases is pathognomonic of a ruptured viscus and usually requires immediate exploratory laparotomy. Diagnosis of pneumoperitoneum is often only possible radiographically.⁶ Experimental studies showed that interstitial emphysema develops, when intratracheal pressures exceed 40 cm H₂O, pneumomediastinum develops at pressures of 50 cm H₂O, and combined subcutaneous emphysema and pneumoperitoneum can appear at pressures of 60 cm H₂O and greater.⁵ Rupture of the diaphragm following blunt abdominal trauma, is another possible cause of pneumoperitoneum.⁷

Pneumoperitoneum in the absence of hollow viscus perforation is uncommon. It is a surgical dilemma resulting in negative laparotomy.

In our case, the patient presented with road side accident. Patient had pneumothorax which progressed to pneumoperitoneum. Due to immediate placement of ICD in emergency department on arrival, the accumulated pressure should have been released prior to development of pneumoperitoneum because other reported cases have theorized that delayed placement of the chest tube was responsible for the pneumoperitoneum. This may have resulted from higher-impact trauma that allowed for the accumulation of greater intrathoracic pressures. We believe that laparotomy was the best approach in this situation based on the fact that complication of missed bowel injury may warrant exploration laparotomy even with equivocal signs.

IV. Conclusion

Spontaneous pneumoperitoneum after Blunt trauma to lower chest and abdomen can occur in presence of pneumothorax without any bowel perforation. One cause can be diaphragmatic injury. Even without diaphragmatic injury, pneumoperitoneum may develop as a sequelae of pneumothorax raising the intrathoracic pressure more than intraabdominal pressure causing transdiaphragmatic migration of free air into the peritoneal cavity. It is a surgical dilemma resulting in negative laparotomy.

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