PNEUMOPERITONEUM SECONDARY TO PNEUMOTHORAX IN A VENTILATED CHILD


Abstract
Bronchoscopic removal of airway foreign body in children is a common emergency. With advancements in bronchoscopes and optics, removal of airway foreign body has become a safe procedure. Occasionally, due to poor visibility, lack of experience and faulty techniques complications like pneumothorax and pneumomediastinum can occur. Here we report a case of pneumoperitoneum following rigid bronchoscopy, which was managed non-operatively.

Key Words: Bronchoscopy, pneumothorax, pneumomediastinum, pneumoperitoneum, Conservative management.

INTRODUCTION

Presentation of case
A 10 month old male boy was admitted to paediatric ward with history of fever and cough - 2 days, breathlessness since 1 day. With suspicion of foreign body aspiration, emergency rigid bronchoscopy, was done and cooked noodles from carina and both main bronchi was extracted. Baby was shifted to ICU with Endotracheal tube in-situ and ambu assisted ventilation and connected to ventilator, once in ICU.

Immediately, baby desaturated and developed Surgicalemphysema with abdominal distension. X-ray of chest and abdomen revealed, bilateral pneumothorax, pneumomediastinum with surgical emphysema of chest and neck and gross pneumoperitoneum. Bilateral tube thoracostomy was done for bilateral pneumothorax. Child was managed conservatively and discharged in good condition, after 2 weeks.

Pre-operative X-rays of thorax and abdomen (Fig-1 & 2)

X-ray of chest and abdomen (post bronchoscopy), showing pneumothorax, pneumomediastinum, subcutaneous emphysema and pneumoperitoneum with typical ‘Foot Ball sign and Rigler’s sign (Fig-3)
X-ray chest, prior to discharge (Fig-5)

DISCUSSION

Pneumoperitoneum in children is a relatively uncommon emergency and is usually due to perforation of a hollow intra-abdominal viscus, necessitating surgical exploration. However pneumoperitoneum in children has also been reported as a complication of bronchoscopy and positive pressure ventilation. It has been demonstrated, that air can escape from a ruptured alveolus into the interstitial tissues of the lung and enter the mediastinum via the perivascular and peribronchial connective tissue sheaths. Dissection into the pleural space then produces a pneumothorax while downward extension of the air reaches retroperitoneum via esophageal, aortic and caval hiatuses, from where it ruptures into the peritoneal cavity causing pneumoperitoneum.

The mediastinum also communicates with several anatomic structures including the submandibular space, retropharyngeal space, and vascular sheaths in the neck. A tissue plane extends anteriorly from the mediastinum to the retroperitoneal space through the sternocostal attachment of the diaphragm. This space in continuous with the flank and extends to the pelvis. The mediastinum also communicates directly with the retroperitoneum by way of the periaortic and periesophageal fascial planes.

Pneumoperitoneum, in the children secondary to a respiratory cause has been increasingly recognized in recent years especially with the widespread use of positive-pressure ventilation in the management of critically ill infants. It is important to differentiate medical from surgical pneumoperitoneum in order to avoid an unnecessary exploratory laparotomy in infants, who are frequently too ill to withstand major surgery.

Although differentiation of medical from surgical pneumoperitoneum is sometimes possible on clinical grounds alone, several other features may aid this differentiation:

1. Absence of an intra-abdominal airfluid level favors the diagnosis of medical pneumoperitoneum, as an abdominal air-fluid level is found in more than 90% of neonates with gastric perforation. However the absence of an air-fluid level does not necessarily exclude a gastrointestinal perforation.

2. Presence of extra-alveolar air on chest roentgenogram in the form of a retrocardiac pneumomediastinum or a pneumothorax strongly favors anemical cause for the pneumoperitoneum.

3. In ventilated infants, an average peak inspiratory pressure of more than 35 cm water has been
correlated with increased risk of producing medical pneumoperitoneum. A large pneumoperitoneum, favors a medical cause while a small pneumoperitoneum is more likely due to a surgical cause. The presence of bacteria and debris on peritoneal lavage strongly favors a surgical cause for the pneumoperitoneum.

CONCLUSION
This case is particularly notable because of unusual presentation of pneumoperitoneum, following rigid bronchoscopy, which was recognized in time and treated conservatively, with good result.

Conflict of interest
None.

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Author's contribution
All authors contributed to the paper.

References