



## Isolated Anterior Pneumomediastinum as a Complication of Oesophageal Foreign Body

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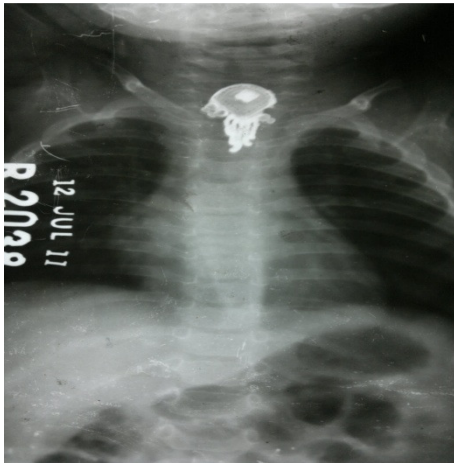
**Abstract:** Whether or not to put a thoracostomy tube in an 'asymptomatic pneumomediastinum' patient is still an un-answered question due to lack of proper definition of the condition and of guidelines for surgical intervention. We managed a 2 years old child with an unusual foreign body who presented with occult pneumomediastinum in postoperative period. The conservative strategy worked well and the child was sent home without any morbidity.

**Introduction:** Oesophageal foreign body, a common problem in paediatric population can sometimes have a devastating outcome especially when its margins are ragged and sharp. We attempted removal of an irregular shaped pendant from oesophagus of a 2 year child which led to anterior pneumo-mediastinum and pneumothorax.

**Case Report:** This toddler was brought to the emergency department with history of ingestion of a pendant of necklace. This pendant was grabbed by the child during breast feeding. His parents attempted to remove it from throat of child manually but it slipped deeper, into the oesophagus. So, the parents rushed to the hospital.

The patient, previously healthy male of 12.5 kg, looked slightly distressed and irritated but breathing was regular. There was no pallor, cyanosis or stridor. Pulse was 128/min and blood pressure 112/68 mmHg. Air entry was equal on both sides and on air SPO<sub>2</sub> was 100 %. Chest X-Ray of the child showed a partially diamond shaped object (roughly 1.5cm x 2.2 cm) with multiple threads at lower end, stuck in upper part of oesophagus at the level of C6 to T1 vertebrae. Lungs and cardiac silhouette appeared absolutely normal. (Fig 1)

The child was posted for emergency removal of the pendant. By the time we put an IV cannula, the child had already completed 5 hours of fasting. Monitoring with ECG, NIBP and pulse oxymeter was started. The child was premedicated with fentanyl 2mcg/ kg and Ondansetron 1.5 mg. Intravenous induction was done with 2.5 cc of 1% propofol and Succinyl choline 25 mg and the child was easily intubated with 4.5 size endotracheal tube. Placement was confirmed by capnography and bilaterally equal air entry. The Child was ventilated with O<sub>2</sub>+N<sub>2</sub>O and sevoflurane on Jackson- Rees circuit. Inj. atracurium 6mg was then injected.

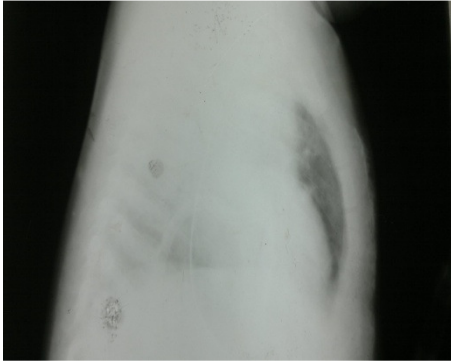


**Fig 1:** X-Ray showing the foreign body (pendant)

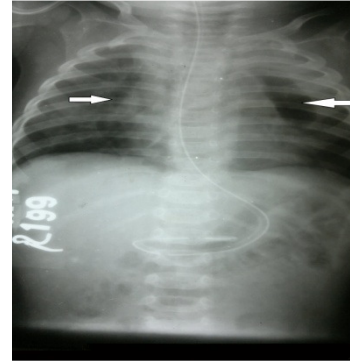
As margin of the pendant was not visible on laryngoscopy, the paediatric surgeon passed the rigid bronchoscope, grasped the pendant and tried to pull it out gently. But it was too tightly stuck in the oesophagus to come out easily due to its ragged edges. So the surgeons poured some lignocaine jelly around the pendant to lubricate its margin and attempted to pull it out. The pendant finally came out with a little force after multiple attempts but the endotracheal tube was also pulled out with the bronchoscope. We noted this and started mask ventilation. After a minute of mask ventilation we re-intubated the patient with a new 4.5 size endotracheal tube. A Ryle's tube (8.0 no.) was then passed into stomach and secured. On direct laryngoscopy nothing abnormal was visible except a minor trickle of blood which was cleared off. Patient was then extubated after reversal and confirming proper recovery from anaesthesia and was shifted to recovery room. Air entry was bilaterally equal but careful auscultation revealed mild mediastinal crackling which was missed in operation theatre. 2 hours stay of patient in recovery was uneventful. Vital parameters were normal except mild tachypnoea with respiratory rate of 25 to 30/min. However X-Ray chest (PA view) of patient, done while shifting him out of recovery room showed air shadow on both sides of hilum with normal lung plethora and costophrenic angle (Fig 2). With lateral view X-Ray, diagnosis of anterior mediastinum was made as it showed presence of air anterior to heart (Fig 3). We assumed that irregular and sharp margin of the pendant might have caused a small tear in upper part of oesophagus, through which the air would have entered during mask ventilation.

We shifted the patient to intensive care unit for continuous monitoring of vitals. We also supplemented analgesics, oxygen by mask and IV fluids. Patient never had any breathing difficulty, or drop in oxygen saturation or of blood pressure in next 72 hours during which we did serial chest radiographs of patient. In the next 24 hours, respiratory rate became normal (<25). There was

gradual reduction in amount of air seen on serial X-Rays, which was almost negligible after 72 hrs. Patient was kept nil by mouth for 48 hours. Gastrograffin swallow done after this did not show any problem. So patient was allowed to take liquids and soft diet. Patient was shifted to the ward after 72 hours and discharged from hospital after 2 days.



**Fig 2:** X-Ray (lateral view) showing anterior pneumomediastinum



**Fig 3:** X-Ray (AP view) showing air in mediastinum (arrows)

**Discussion:** Pneumomediastinum, presence of air in mediastinum can be spontaneous, traumatic or iatrogenic. Laennec defined spontaneous pneumomediastinum in 1819 as a rare benign syndrome, usually seen in young males with or without trigger factors like violent coughing, heavy exercise, valsalva and drug abuse. But it may also be secondary to diseases of airway and lung like asthma and cystic fibrosis. Macklin<sup>1</sup> in 1944 described its pathophysiology in three steps viz; alveolar rupture, spread of air along the bronchovascular sheaths and spread of this pulmonary interstitial emphysema to mediastinum down the pressure gradient. This mechanism, called Macklin effect, is still valid and applicable in cases of blunt chest trauma too<sup>2</sup>. Tracheobronchial or oesophageal ruptures can create an air leak into the mediastinum. Iatrogenic pneumomediastinum is reportedly known to occur as a complication of upper GI endoscopy<sup>3</sup>, dental and mandibular surgery<sup>4,5</sup> chest trauma and infections<sup>6</sup>, sclerotherapy for oesophageal varices or during passage of a Ryle's tube or Sangstaken tube<sup>7</sup>. It presents with a triad of chest pain, dyspnoea, and subcutaneous emphysema<sup>8</sup>. Hamman's sign (positive in this case) is infrequent. Oesophagus despite being a structure of posterior mediastinum, created a rarely seen "isolated, anterior pneumomediastinum" in this case, probably because the tear was high enough. Air might have entered the mediastinum through a small rent in anterior part of upper third of oesophagus due to positive pressure used during mask ventilation after the endotracheal tube had come out.

Plain X-Ray films, though not specific for oesophageal perforation, can show pleural effusion, pneumomediastinum, pneumothorax, subcutaneous emphysema and atelectasis but it may be normal if perforation is intramural or closes rapidly. CT scan is more sensitive for extraluminal air, but these findings are suggestive and not pathognomonic of oesophageal perforation<sup>9,10</sup>. It is very difficult to identify the site of perforation using CT scan. Most reliable method for this is contrast oesophagogram. Initially, water soluble dyes like diatrizoate meglumine, Gastrograffin are used. If they fail to demonstrate the puncture site due to their low radiographic density only then barium



sulphate is used as a contrast. However, Barium is known to cause mediastinitis and severe pulmonary inflammation<sup>11,12</sup>. The dye should be administered with caution in patient prone for aspiration. Helical CT oesophagography<sup>12</sup> is another good option but use of effervescent gas granules in it is controversial. Sometimes, combination of CT scan and endoscopy may demonstrate the site of leakage<sup>13</sup>. Rigid endoscopy itself carries risk of perforation and even flexible bronchoscopy can expand a small intramural tear as air insufflations is needed during the procedure. We avoided confirmation of oesophageal tear by endoscopy and oesophagogram to avoid further damage. Also, the child was not subjected to CT scan as diagnosis was evident on a simple posterior- anterior X-Ray film which is also enough to monitor the course of the disease in an otherwise stable patient<sup>8,14,15</sup>.

Tension pneumothorax requires an urgent placement of thoracic tube while mediastinal and pleural fluid collections can be drained with chest tubes and computed tomography guided drainage catheters<sup>16</sup>. Tension pneumomediastinum needs urgent surgical exploration or percutaneous placement of drainage catheter, which can be done under CT or fluoroscopic guidance. Conventional CT helps well to delineate relationship between mediastinal lesion and adjacent organs<sup>17</sup> but carries a risk of major vessel rupture since direction of needle and manipulations cannot be appreciated in real time CT alone. Unified CT and fluoroscopy systems reduce the risk of such complications<sup>18,19</sup>.

As patient was asymptomatic and vital parameters were absolutely stable, we decided to monitor the patient closely with preparation for intercostal tube and mediastinal exploration and aspiration at hand. Pneumomediastinum, if expanding can lead to compression of great vessels, bronchi, leakage of air in bronchovascular plane leading to pneumothorax and hence haemodynamic and respiratory instability. On the other hand, complication rate with chest tube is as high as 22% and they can be insertional, positional or infective<sup>20</sup>. It also prolongs hospital stay of patient. Therefore, many studies suggest the strategy of conservative management for a benign pneumomediastinum provided the aetiology is taken care of<sup>21,22,23</sup>. Analgesia was provided using NSAIDS to avoid respiratory depression and also because pain is not severe after removal of the object. Liquid diet was allowed only after confirmation of absence of tear in upper oesophagus. We were able to send the child home by sixth day because of this conservative regimen.

Despite of multiple studies, perfect guidelines for definition, quantification and indications of surgical interference are not available due to lack of suitable cohorts and this issue will need multicentric prospective trials<sup>20</sup>.

**Conclusion:** Occult pneumomediastinum can be managed without thoracostomy tube, with simple chest radiography provided that patient should be haemodynamically stable and facility for close observation and emergency surgery should be at hand. Conservative management of this kind thus reduces the morbidity and burden on the health care system.

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