Spontaneous Pneumomediastinum and Pneumorachis after cyclical vomiting

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Abstract

We describe a 17 year old male who presented with a one week history of cyclical vomiting and burning sensation in his chest. Blood tests revealed acute renal failure. He was found to have surgical emphysema, pneumomediastinum and a small right apical pneumothorax. CT thorax revealed pneumorachis (air in spinal canal).

Though pneumorachis is well known following trauma or following surgical interventions[14], it is rather unusual to see a spontaneous pneumorachis.

It is important to be aware of the association between spontaneous pneumomediastinum and spontaneous pneumorachis and of its benign nature.

Key points

- Spontaneous pneumomediastinum can occur following vomiting or any manoeuvre which increases intrathoracic pressure.
- Chest x-ray and CT thorax should be performed.
- Spontaneous pneumorachis (air in spinal canal/epidural emphysema) is rare following vomiting.

Keywords

spontaneous pneumomediastinum, pneumorachis(epidural emphysema/air in spinal canal)

Case Report

A 17 year old male was admitted with a one week history of cyclical vomiting, diffuse abdominal pain and a burning sensation in the chest. He was noted to have surgical emphysema over his neck and right axilla. He was tender over the epigastrium with mild guarding. The rest of his physical examination was normal. Hamman's sign (a crunching, rasping sound, synchronous with the heartbeat, heard over the precordium in spontaneous pneumomediastinum) was absent. Blood tests repeated in hospital showed acute renal failure with metabolic alkalosis. He had a history of iron deficiency anaemia for which he was on iron supplements. He also had a history of long-standing abdominal pain which was treated as abdominal migraine. He had a high-arched palate and hyper mobile joints. Marfan syndrome was however excluded as he did not meet other criteria. Chest x-ray (fig 1) revealed a pneumomediastinum with a small right apical pneumothorax and subcutaneous emphysema.

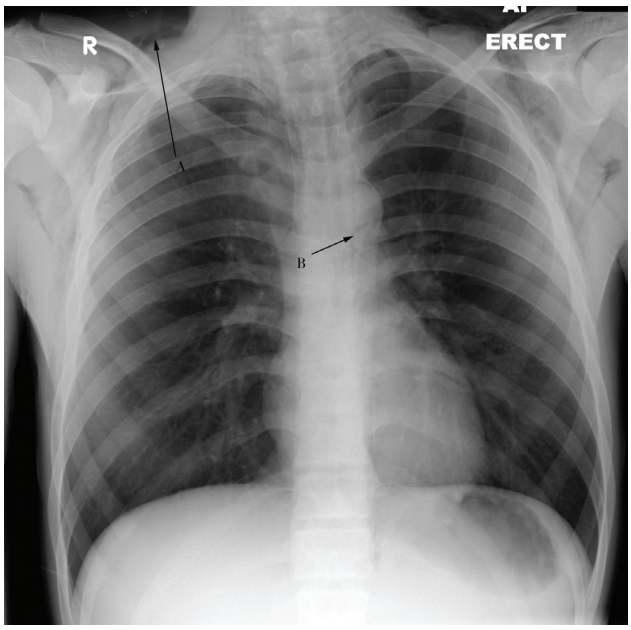

Figure 1. *Chest Xray showing subcutaneous emphysema (arrow A) and pneumomediastinum. (arrow B)*

CT thorax revealed a possible lower tracheal tear after a water soluble contrast swallow excluded oesophageal rupture. The CT (fig 2) confirmed right-sided pneumothorax, subcutaneous

emphysema, mediastinal air and also revealed air in the spinal canal - pneumorachis.

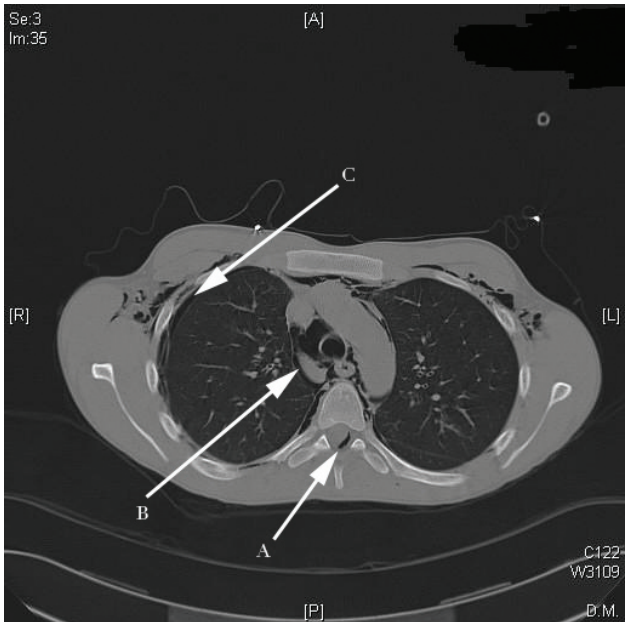

Figure 2. *CT Thorax showing pneumorachis (arrow A), pneumomediastinum (arrow B), pneumothorax (arrow C).*

Further blood tests including toxicology screen, antibody screen and rheumatoid factor were all normal. Endoscopy was attempted but failed due to severe inflammation of the upper one third of oesophagus. The initial diagnosis was Boerhaave's syndrome – spontaneous rupture of the oesophagus. Cardiothoracic surgeons advised conservative treatment as there was no need for any intervention at that time. He was started on intravenous antibiotics (Tazocin), fluids, potassium supplements and proton pump inhibitors (Omeprazole) and was kept nil by mouth.

Repeat chest x-ray done three days later showed complete resolution of pneumomediastinum and subcutaneous emphysema. Repeat endoscopy which was done three days later showed severe oesophagitis and a prepyloric ulcer. There was severe inflammation around the pyloric canal and an endoscope could not pass through the canal. The patient improved clinically and was started on oral feed with a soft diet. Bloods were within normal range when repeated after eight days. The patient was discharged home with omeprazole and follow up arranged for four weeks time with a repeat endoscopy.

Causes of primary spontaneous pneumothorax

Smoking, physical height- tall and thin habitus, valsalva resulting in increased intrathoracic pressure, changes in atmospheric pressure, proximity to loud music and low frequency noises, familial association –FLCN gene(10%)

Causes of secondary spontaneous pneumothorax

COPD or Emphysema, asthma, cystic fibrosis, interstitial lung disease, tuberculosis, pneumonia, bronchogenic or metastatic carcinoma, collagen vascular disorders including Marfan syndrome, catamenial pneumothorax.

Causes of pneumomediastinum

Acute production of high intrathoracic pressure,asthma, smoking marijuana, inhalation of cocaine, athletes, respiratory tract infection, emesis, severe cough, mechanical ventilation, trauma or surgical disruption.

Discussion

There are multiple causes of pneumomediastinum and pneumorachis but spontaneous pneumomediastinum and spontaneous pneumorachis occurring together is very rare indeed.

Pneumorachis occurs as air tracks from the mediastinum to the spinal canal through the intervertebral foramina, possibly due to the lack of a fascial barrier between the posterior mediastinum and the spinal canal[12,14].

Spontaneous pneumomediastinum and pneumorachis will gradually resolve without sequel.

A few cases of pneumorachis have been reported in the literature following drug abuse such as MDM, Ecstasy or marijuana[2,4,6,8,9]. The causal mechanism for pneumomediastinum may be vomiting against a closed glottis raising the intrathoracic pressure which may be the explanation in our case[1].

Another proposed explanation is a reduction in pulmonary interstitial pressure due to extreme physical activity[7,16]. The resultant increased bronchovascular pressure gradient leads to rupture of marginal alveoli adjacent to a blood vessel with leakage of air into the perivascular spaces. This tracks alongside the pulmonary arteries into the mediastinum causing pneumomediastinum. Further tracking of the air via the deep cervical fascia into the neck cause surgical emphysema[12,14]. This might explain the possible tracheal tear which was shown on CT .

Causes such as oesophageal rupture or tracheal tear should be actively excluded, although a study done suggested conservative treatment resolved these patients without any reported sequel[2].

Pneumorachis is a benign complication[6,14].

Conclusion

Our patient was diagnosed with Boerhaave's syndrome causing spontaneous pneumomediastinum, pneumorachis and surgical emphysema accentuated by a prepyloric ulcer.

Acute renal failure which responded to treatment was thought to be prerenal secondary to vomiting and dehydration.

In patients with spontaneous pneumomediastinum, pneumorachis[3,5,12,13] may be more common than previously realised. We should be aware of this and CT thorax should be done if there is any suspicion. Pneumorachis may be diagnosed more often now because of the increased availability of CT than before.

Both pneumomediastinum and pneumorachis usually follow a benign course and only need to be treated symptomatically, although tension pneumomediastinum may require intervention.

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