Uncommon clinical presentation: Spontaneous pneumomediastinum with tracheal rupture

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Abstract
Spontaneous pneumomediastinum is a rare finding in a young adult without any co-morbidities or underlying lung pathology. A 22 year old male smoker, of average built presented with complaints of acute cough, throat pain and chest pain of 2 days duration. After admission he had an episode of hemoptysis & developed swelling over the neck and upper chest. Radiological assessment showed subcutaneous emphysema with tracheal tear. There was no pnemothorax. Likely cause of tracheal tear in this case could be either aspiration of a chicken bone leading to a direct injury to trachea or vigorous cough leading to raised intratracheal pressure causing rupture. As there was no pre existing lung diseases and the patient was not in respiratory distress, he was managed conservatively. The patient was discharged after complete recovery. It shows that spontaneous pneumomediastinum can present without pneumothorax, caused by tracheal rupture due to vigorous cough from food aspiration.

Keywords: Spontaneous pneumomediastinum, Tracheal rupture, Subcutaneous emphysema, Tracheal tear, Vigorous cough, Food aspiration, Ganja.

Case Report
A 22 year old male, smoker with no prior co-morbidities presented to emergency room with vigorous cough, throat pain and sub-sternal non radiating chest pain for 2 days. The symptoms were acute in onset, severe and developed after having food. There was no history of respiratory distress or swallowing difficulty. There was no history of trauma or excessive weight lifting in the week preceding onset of symptoms. The patient had no history of pulmonary tuberculosis or any other co-morbidities. He was a shopkeeper by occupation, smoker and used to smoke 2-3 cigarettes per day. He also smoke ganja and consumed alcohol occasionally. The patient was comfortable at rest with heart rate of 84 per minute, blood pressure 130/70mmHg, respiratory rate 20 breaths per minute and saturation was 98% on room air. Systemic and respiratory system examinations were within normal limits. Bilateral air entry was present with no adventitious sounds.

Within hours after admission, patient had an episode of hemoptysis and gradually developed swelling over entire neck and upper chest. On palpation crepitus was present, extending from lower mandibular region to the nipple area on both sides. On auscultation bilateral air entry was present.

On plain roentgenogram, in [Fig. 1] subcutaneous emphysema of neck was noted. For further characterization and etiological clues, a computed tomography chest was done, the CT neck suggested air was trapped subcutaneously from masticatory space above to the level of nipples. It also showed extensive, amount of subcutaneous emphysema in anterior, lateral and posterior chest wall and the pneumomediastinum [Fig. 2a, 2b] was also seen. CT chest also revealed small breach measuring 0.3 cm in posterior wall of trachea just above the carina [Fig. 3]. Both the plain roentgenogram and CT revealed the absence of pneumothorax.

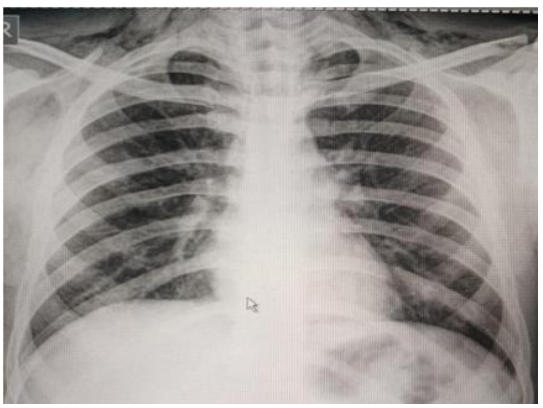

Fig. 1: Chest X-ray PA showing subcutaneous emphysema over the base of neck

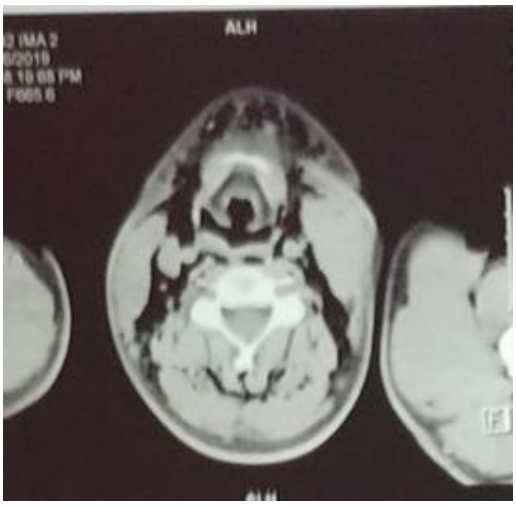

Fig. 2a: CT neck showing subcutaneous emphysema

Fig. 2b: CT chest showing Pneumomediastinum with Subcutaneous emphysema

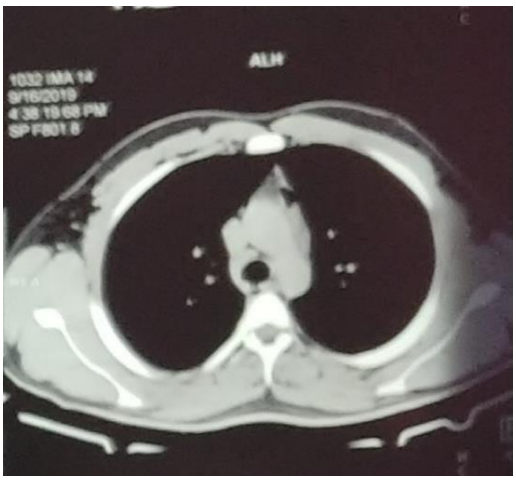

Fig. 3: CT chest showing probable small breach measuring 0.3cm noted in posterior wall of trachea just above carina

The patient was observed with serial monitoring of subcutaneous emphysema by measuring the neck and chest circumference. As the patient's condition was stable and tracheal tear was small, patient was managed conservatively. The treatment included bed rest, high flow oxygen by mask, antibiotics, anti reflux and antitussive medication. The subcutaneous emphysema started resolving within 24 hours of conservative management. The patient was discharged after 3 days. At one week follow up patient was asymptomatic with normal systemic and respiratory system examination.

Discussion

Pneumomediastinum is a benign condition but it can be severe and life threatening.[1,3] It is defined as the presence of free air in the mediastinum and is classified as spontaneous or secondary type. Pneumomediastinum was first reported by René Laennec in 1819 and spontaneous mediastinal emphysema was described by Louis Hamman in 1939.[18] A secondary pneumomediastinum has several causes: for example, recent interventions, history of aero digestive organ injury, cervico-thoracic infections, pneumothorax, or mechanical ventilator related injury. On the contrary, spontaneous pneumomediastinum is diagnosed without any definite cause. Bout of a violent cough can rarely lead to spontaneous pneumomediastinum and cervical subcutaneous emphysema.[1] The pathophysiologic mechanism of spontaneous pneumomediastinum is uncertain; but Macklin *et al.* in 1944 suggested that increased intrathoracic pressure induces alveolar rupture with passage of air into the interstitium or bronchovascular tissues of the tracheobronchial tree, followed by air penetration towards the hila and into the mediastinum.[2]

Subcutaneous emphysema can result from number of processes including blunt or penetrating trauma, pneumothorax, infection, malignancy or it can be iatrogenic due to surgical procedures and even spontaneous. Subcutaneous emphysema and pneumomediastinum can even occur due to vigorous cough. It can also occurs due to vigorous sneezing, vomiting, strenuous exercises, forced Valsalva manoeuver or substance abuse.[1,4-6,8] The subcutaneous emphysema pneumomediastinum complex commonly affects young adults in their second and third decades and has a male preponderance.[1,4,10,11,14] The age and sex predilection is due to relatively high workload and muscular activity.[1]

The spontaneous pneumomediastinum include acute onset of neck swelling, neck pain, chest pain, dyspnea, difficulty in swallowing, wheezing and distension.[1,9,13] Generally the patient's heart rate, blood pressure, oxygen saturation will be maintained, unless the subcutaneous emphysema and pneumomediastinum involves deeper tissues of thoracic outlet, chest and abdominal wall.[1,13] Then it can lead to severe and life threatening condition. On palpation of the overlying skin, crepitus can be appreciated. Haman's crunch, i.e., crepitus felt due to trapped air in mediastinum, is a diagnostic sign of pneumomediastinum, but not commonly appreciated. Both pneumomediastinum and subcutaneous emphysema are usually diagnosed by plain roentgenogram and is the only investigation necessary to make this diagnosis.[1,7,10] But CT is needed in some cases to assess extent of air leak in thorax and neck, and to localize the site of air leak.[1,7] CT in the index show the probable site of air leak at posterior surface of cervical trachea, just above the carina. Authors analyze that the cervical trachea might have torn at the posterior side due to violent cough and sudden increase in intra-thoracic and intra tracheal pressures after aspiration of food.

The secondary pneumomediastinum can occur due to pre existing conditions like post tubercular obstructive airway disease, asthma and bronchial foreign body, in any age group. Most commonly secondary pneumomediastinum occurs due to rupture of emphysematous bulla or pleura and is associated with pneumothorax.[5] Spontaneous pneumomediastinum without pneumothorax is mostly due to air leak from breach of trachea or esophagus. The major causes of tracheal injury include iatrogenic, blunt trauma, penetrating trauma, inhalation and aspiration of liquids or objects.[17] These cases present as sudden onset of subcutaneous emphysema just after the insult to trachea. Tracheal rupture can occur spontaneously also, especially when intra-tracheal pressure increases against closed glottis, seen in activities like sudden bouts of cough as in index case or due to weight lifting exercises.

In this index case there is no history of any invasive procedures and CT scan excludes oesophageal tear. Patient also gave history of episode of vigorous cough after aspiration of a chicken bone. Vigorous cough may have caused tracheal tear leading to pneumomediastinum & subcutaneous emphysema. Fragility of tracheal membrane due to habit of 'Ganja' smoking may have contributed to easy rupture.

Earlier surgical repair was mainstay of treatment in cases of tracheal tear. However, recently conservative treatment is more preferred in patients with small ruptures, less than 2 cm, and in patients with minimal, non-progressive symptoms and with no air leakage on spontaneous breathing.[16] Index case was managed conservatively with high flow oxygen, injectable antibiotics, antacids and cough suppressants. Oxygen supplementation is of great importance for treatment, regardless of any underlying pulmonary pathology. Since it increases the pressure of nitrogen diffusion in the interstitium and promotes absorption of free air which accelerates resolution. Pre existing pulmonary pathology and presence of pneumothorax are the factors which might complicate the scenario and mandate active surgical intervention.[7,9,13] As there were no complications and patient improved, hence discharged.

Conclusion

Primary spontaneous pneumomediastinum and subcutaneous emphysema after vigorous cough is a very rare condition. In this index case clinical symptoms and plain chest X-ray were the only investigation entailed to conclude a diagnosis but CT may aid in precise confirmation and gives an accurate detail about the extent, and in this case it gives a possible site of air leak. Patient was managed conservatively, as there were no other complications.

Source of Funding

None.

Conflict of Interest

None.

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