

CASE REPORT

PNEUMOMEDIASTINUM FOLLOWING SPIROMETRY: A CASE REPORT WITH REVIEW OF LITERATURE

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ABSTRACT: Pneumomediastinum is a well recognized clinical entity, it was first described as a complication of trauma by Laennac in 1819, spontaneous Pneumomediastinum as an entity was initially introduced into medical literature in 1939 by Hamman, from whom Hamman's sign is derived. We present here a case of Pneumomediastinum developing spontaneously after spirometry in 18 years old boy who was a known asthmatic and had marfanoid habitus.

KEYWORDS: Pneumomediastinum, Spirometry, Marfanoid habitus, Bronchial asthma.

INTRODUCTION: Pneumomediastinum is a well recognized clinical entity, it was first described as a complication of trauma by Laennac in 1819,¹ spontaneous Pneumomediastinum as an entity was initially introduced into medical literature in 1939 by Hamman,² from whom Hamman's sign is derived. We present here a case of Pneumomediastinum developing spontaneously after spirometry in 18years old boy who was a known asthmatic and had marfanoid habitus.

In the limited search for earlier reports, we found, that our case report is unique in the sense that spirometry has precipitated both spontaneous Pneumomediastinum and subcutaneous emphysema in an individual having both bronchial asthma and marfanoid habitus.

CASE HISTORY: An 18years old male patient presented to us with history of worsening breathlessness, wheeze and non-productive cough since two weeks, there was no history of orthopnoea or chest pain. He had similar on and off complaints in the past since childhood. He was not a smoker or suffered from other significant illness in the past. He was on oral bronchodilators for asthma.

On examination he was afebrile, pulse rate was 86 per minute, and blood pressure was 114/70 mm of Hg and respiratory rate of 14cycles/min. He had marfanoid habitus with high arched palate, positive wrist sign and Thumb sign. He weighed 44 kilo grams, height was 166cms and arm span of 174cms (Arm span to height difference of 8cms and BMI of 16.29 kg/m²) there were no obvious eye changes.

Respiratory system examination revealed occasional polyphonic rhonchi bilaterally. Cardiovascular system examinations, per abdomen and CNS examinations were normal.

A tentative diagnosis of Bronchial Asthma was made and asked for few blood investigations and pulmonary function test.

On routine workup his complete haemogram was normal, serum electrolytes, calcium, Chest X-Ray and ECG were within normal limits. Patient was subjected for spirometry, his pre bronchodilator values include FVC -1.82/3.56 (34%), FEV1 -1.20/3.13 (35%) PEFr-4.55/9.3 (26%) FEF 25-75-1.30/4.85 (24%) andFEF0.2 to1.2 was 0.8/8.1(10%). PFT is suggestive of

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mixed airflow pattern. Post bronchodilator spirometry was planned and then patient complained of chest pain, it was retrosternal and non radiating type, so post bronchodilator test was deferred and he was asked to wait. Pain was presumed to be due to anxiety, as there were no other clinical signs correlating to his chest pain. Half an hour later patient started complaining of dyspnoea and a sensation of crawling of insects over chest and neck region, examination revealed crepitus i.e., subcutaneous emphysema in the region of neck, anterior chest and upper part of both arms. Breath sounds were normal except for occasional polyphonic rhonchi. CVS examination was normal.

Immediately diagnosis of subcutaneous emphysema and Pneumomediastinum was made and chest X-ray was taken which showed air shadows in the region of neck and both axilla, ring of air around aortic knuckle (highlighting of aortic knuckle) and thin vertical translucent lines along both cardiac borders, suggestive of Pneumomediastinum with subcutaneous emphysema.

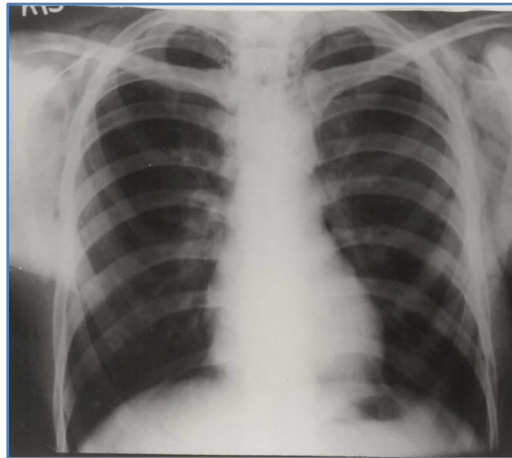


Figure 1

Patient was admitted to the hospital and was started on oxygen therapy at 3 Liters/min. He was kept under observation for 2 days, all signs and symptoms regressed, he was discharged on 3rd day after prescribing combination of inhaled corticosteroids and long acting beta agonist (ICS+LABA) with supportive medication.

DISCUSSION: Pneumomediastinum is a benign self limiting condition.

Various causes include:

- Secondary to raised intra thoracic pressure (Valsalva maneuver, weight lifting, vomiting, strenuous exercises),
- Blunt trauma to chest,
- Peak expiratory flow maneuver,
- GI instrumentation like (Endoscopy, colonoscopy).
- Rare causes include arthroscopy of shoulder, Dental extraction and SCUBA diving etc.

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Most cases of Pneumomediastinum probably are the result of alveolar rupture into bronchovascular sheath, from momentary shearing force due to sudden pressure discrepancy between them, mainly in the presence of alveolar over distention. From the bronchovascular sheath the extra alveolar air moves centripetally to the mediastinum and externally may reach the pleural cavities and soft tissue compartments of neck.

Pneumomediastinum sometimes can be induced by sudden changes in the breathing pattern, so that the lung volume is increased or sudden changes in pressure occurs like deliberate manipulation of breathing pattern producing a valsalva like maneuver which can result in mediastinal and subcutaneous emphysema. In healthy subjects the common symptoms include chest pain or retrosternal pressure sensation of dyspnoea, dysphagia, crackles in the neck, and puffiness of neck or face. Auscultation might reveal Hamman's sign, a crunch like sound synchronous with heart beat.

On review of literature few similar case reports were found, Jose c et al³ reported a similar incident in healthy 25yrs old non-smoker following measurement of maximum expiratory pressure, subject develops discomfort in the neck and physical examination revealed crepitus in the neck, CXR neck confirmed subcutaneous emphysema and small mediastinal emphysema, which was very much similar to our case. In a similar incidence reported by Basil Varkey et al,⁴ a 23yrs old healthy individual who was tall asthenic built, went on to perform various lung function tests, though he developed slight pain across the upper anterior chest following initial FVC testing.

The Heimlich maneuver is widely accepted relatively safe technique advocated as a means of clearing an obstructed airway. Agia GA, Hurst DJ⁵ reported a case of pneumomediastinum that occurred following the generation of increased pulmonary pressures during performance of the Heimlich maneuver. Ramakrishnan, S et al⁶ described a case of subcutaneous and mediastinal emphysema developing as a complication of lung function test in an immune compromised patient with presumed pneumocystis carinii pneumonia. A case of spontaneous pneumomediastinum and subcutaneous emphysema (Hamman's syndrome) are rare but potentially dangerous complication of labour.

Authors Dr. Sami Kouki and Abd Allah fares⁷ reported a case of a 23years old primigravida, admitted to the hospital for delivery after 40 weeks of pregnancy. Delivered a 4.27 kgs baby after 9hours of labour, soon after which patient developed dyspnoea and chest tightness, a chest X-ray and CT scan revealed pneumomediastinum and subcutaneous emphysema, she improved clinically after 3 days with just observation.

CONCLUSION: In our case patient had developed both Pneumomediastinum and subcutaneous emphysema during FVC maneuver while attempting to blow maximum possible air. This might have resulted in a maximal inspiratory effort followed by a few seconds of breath holding before exhalation, this will create a pressure gradient between alveoli and interstitium resulting in rupture of alveolus. Bronchial asthma and marfanoid habitus could well have been a predisposing factor in our patient, taking into account the useful information provided by the spirometry, its worthwhile to emphasize the above small risk associated with the procedure, it puts a word of

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caution and awareness of above particular rare complication while performing spirometry in individuals with predisposing factors.

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