

Pneumosrotal Emphysema

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ABSTRACT

Introduction: Pneumosrotum is a rare condition manifested by the accumulation of gas in the scrotum. Two conditions are included under the term of pneumosrotum, palpable scrotal emphysema, and pneumoatocele. Pneumosrotal emphysema has many etiologies, one of them is due to thoracic cage trauma, after a chest tube insertion or any other cardiothoracic procedures, causing pneumothorax and pneumoperitoneum.

Case report: We report the case of a 2-year old boy who was admitted to the hospital for productive cough with signs of respiratory insufficiency on physical examination. An X-ray followed by a CT scan were obtained, and bilateral pleural effusion along with consolidation were disclosed. A chest tube was inserted to improve the vital signs of the patient; however, a subcutaneous emphysema of the scrotum developed caused by pneumothorax.

Conclusion: Pneumosrotal emphysema is a self limited condition, defined as accumulation of air within the scrotum. The etiological factor must be understood in order to start the proper management and treatment.

Keywords: pneumosrotal emphysema, pneumothorax, drain, scrotum

CASE PRESENTATION

A case of a 2-year-old boy, previously healthy, presented for five days history of fever non-responding to antipyretics at home, associated with productive cough and decreased PO intake. Upon presentation to the ER, patient appeared in distress, crying, and afebrile with normal vital signs. Physical exam was significant for decreased air entry on the left lobe upon lung auscultation.

Laboratory workup was positive for a white blood cells count of 22,000 (neutrophils 93% and lymphocytes 6%) and an elevated CRP higher than 200mg/L.

Chest X-ray showed consolidation in the left upper lobe. Patient was admitted to the hospital with the diagnosis of pneumonia and started on IV ceftriaxone and IV vancomycin.

After 48 hours with no significant improvement on antibiotic therapy, chest X-ray done showed left pleural effusion with pulmonary condensation associated with deviation of the trachea to the left. Chest X-ray was followed by CT chest that showed a left sided dense suprahilar mass with associated abundant left pleural effusion and pulmonary collapse/consolidation (to be controlled by pleural tap) and a minimal right sided pleural effusion. Rapid antigen and PCR for COVID-19 were negative as well as IDR.

Following these results, patient underwent double left chest drain insertion for the effusion followed by a control chest X-ray that showed left sided pneumothorax with parenchymatous condensation in the left apex.

Pleural tap results were significant for WBC count of 210/mm³ (neutrophils 85% and lymphocytes 3%), RBC of 110/mm³, proteins 4.1g/dl, LDH 17,220, and glucose 10mg/dl.

6 hours post op, patient developed acute scrotal swelling with no erythema that was found to be a subcutaneous emphysema extending through the anterior wall of the abdomen to the scrotum.

Diffuse emphysema of the cervical and thoraco-abdominal membrane radiating to the right arm was apparent on the x-ray that followed this clinical finding and therefore our patient was found to have pneumothorax, pneumoperitoneum, and pneumosrotum with subcutaneous emphysema due to rupture of alveoli following chest drain insertion. **Figure 1** depicts postoperative pneumosrotum.



Figure 1. Postoperative pneumosrotum

PNEUMOSCROTUM FOLLOWING CHEST DRAIN INSERTION

Pneumoscrotum is defined as the collection of air in the scrotum. It is known to be of traumatic etiology and not a medical illness [1]. The first case of pneumoscrotum was published in 1912 by Keyes, and only 59 cases were reported between 1972 and 2013 [2]. Pneumoscrotum can either be scrotal emphysema or scromatocele. The difference between the two conditions is that scrotal emphysema is palpable, whereas scromatocele is not, due to the accumulation of the air in the tunica vaginalis [3].

Etiology

Scrotal emphysema can either be primary or secondary. Primary scrotal emphysema occurs via two mechanisms, either by a direct trauma to the scrotum, i.e., scrotal laceration or gas forming organisms that spread via blood or lymphatics such as in Fournier's gangrene [4]. Whereas, secondary scrotal emphysema occurs due to gas or air production elsewhere in the human organism, mainly in the thoracic or abdominal cavity, commonly involving iatrogenic causes, proceeding to accumulation of gas in the scrotum [5].

Pathophysiology

There are three main pathological mechanisms for scrotal emphysema.

The first one derives from the scrotum itself. This mechanism includes either self mutilation/injury of the scrotum where the air entry is direct [6] or infectious processes such as in perinephric abscess or Fournier's gangrene that often presents with scrotal emphysema and leads to disruption of the scrotal skin allowing the entrance of microorganisms and air production within the scrotum [7].

The second mechanism is of thoracic origin and this includes air accumulation in lungs or mediastinum (pneumothorax or pneumomediastinum). In case of pneumothorax, the air usually travels along the superficial fascia of camper and the deep layer of scarpa's fascia. These two fascias fuse together to form the colles fascia at the base of the penis and dartos fascia at the base of the scrotum leading to air collection in it [8].

Pneumothorax can cause pneumomediastinum. The air from ruptured alveoli penetrates into the perivascular and peribronchial sheaths at the base of lung's roots causing by this mechanism pneumomediastinum. In the other hand, in case of pneumomediastinum, the air from the mediastinum spreads into the peritoneum via the diaphragmatic hiatus through the periosephageal and periaortic fascias causing pneumoperitoneum [3]. The air dissects from the retroperitoneum through the abdominal cavity, inguinal canal, and expands to the scrotal sac along the spermatic fascia causing scrotal emphysema [9, 10].

The third mechanism is of abdominal origin, in case of any visceral perforation, due to bowel ischaemia or defects, or abdominal surgical interventions the air can leak through the peritoneal defects and accumulate into the scrotum [11].

In our case, patient developed pneumothorax, pneumoperitoneum, pneumoscrotum, and subcutaneous emphysema due to rupture of alveoli after chest drain insertion.

Diagnosis

The diagnosis of scrotal emphysema is often easy, palpation of the air in the scrotal sac confirms the diagnosis, additionally other diagnostic methods such as CT and X-rays can detect the presence of air in the scrotum [12,13]. The diagnosis of scrotal emphysema usually comes with finding the source of air leak within the patient. Patient with history of thoracic or abdominal trauma, or even surgical procedures and interventions can usually present with scrotal swelling and subsequently diagnosed with scrotal emphysema [14].

Treatment Options

Pneumoscrotum is a rare condition. Although it is a benign condition and can be treated conservatively by the use of antibiotics, further to this, it could also lead to life threatening illnesses. In this condition, treatment is focused mainly on targeting the etiological cause of pneumoscrotum [15].

CONCLUSION

Scrotal emphysema usually complicates thoracic traumas, but often is a benign and self limiting condition. The standard managements are well defined as long as the underlying cause of pneumoscrotum is identified. The diagnosis of scrotal emphysema is often clinically, other imaging methods could be done in order to ensure the etiological diagnosis, and accordingly treatment can be either supportive or surgical.

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