Pneumoscrotum after tracheal intubation

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ABSTRACT

Air in the scrotum is an unusual clinical finding and a thorough search should be done in order to locate the air leak or source of gas production. We report an 81-year-old patient who developed severe acute respiratory failure after fiberoptic bronchoscopy and was intubated immediately. After tracheal intubation, excessive subcutaneous emphysema from the head to the scrotum was obvious. Chest tube thoracostomies were placed to treat pneumothorax. The emphysema was absorbed after 13 days without any sequela. Air or gas inside the scrotum may originate from intraperitoneal, extraperitoneal, or local sources. The majority of the cases can be managed conservatively, but emergent intervention is needed in life-threatening situations.

1. Introduction

Pneumoscrotum is a rare clinical manifestation that is observed whenever air or gas accumulates in the scrotal sac. The leakage may derive from the chest, the abdomen (peritoneal cavity, retroperitoneum), or the scrotum. Only a few cases have been reported in the English literature, especially after tracheal intubation. Immediate intervention must be provided in deteriorating patients. Otherwise, close observation is indicated.

2. Case report

An 81-year-old male patient was referred to our hospital for fiberoptic bronchoscopy due to atelectasis of the left lung. The day following the procedure, the patient developed severe acute respiratory failure. No signs or symptoms of pneumothorax were obvious by this time. Due to his deteriorating condition, he was intubated immediately. The intubation was successful with the first attempt and without difficulty. After tracheal intubation, subcutaneous emphysema extending from the head to the scrotum was observed (Fig. 1A). Two chest tubes were placed to the left hemithorax to relieve tension pneumothorax with immediate improvement of the vital signs. The patient was transferred to the intensive care unit (ICU) for mechanical ventilation and cardiovascular support. One day after admission in the ICU, a third chest tube was placed to the right hemithorax due to expansion of the subcutaneous emphysema. The emphysema was absorbed after 13 days. By this time, pneumoscrotum had completely resolved without any further intervention (Fig. 1B). The rest of the course was uneventful and the patient was discharged from the ICU without any sequela.

3. Discussion

A small number of published cases presenting with pneumoscrotum exist in the English literature. Even fewer reports refer to pneumoscrotum after endotracheal intubation. The first case was reported in 1985 by Redman and Pahls. The suspected mechanism was barotrauma from mechanical ventilation and the subcutaneous emphysema resolved after cessation of ventilation. Cardiopulmonary resuscitation and mechanical ventilation were the etiologies in another report by Menzies et al. In this case, air from the mediastinum propagated to the subcutaneous tissues of the neck, chest, and abdomen down to the scrotum. Varon et al reported...
scrotal emphysema in a ventilated patient. The etiology was baro-trauma from artificial ventilation and bilateral pneumothorax. Reiche-Fischel and Helfrick\(^5\) published two patients who developed subcutaneous emphysema after endotracheal intubation. Only the first case developed pneumoscrotum. The most possible mechanism was a small tracheal perforation caused by multiple attempts for intubation and the use of high frequency jet ventilation. In 1995, Trübel et al\(^6\) reported a sudden massive swelling after intubation and high pressure ventilation. Tension pneumothorax and severe tracheal stenosis were the underlying mechanisms for developing pneumoscrotum after intubation. Finally, in 2012, Wilson et al\(^7\) presented a case with pneumoscrotum after dilation of a tracheal stenosis. First, the patient was jet ventilated through a catheter and then he was intubated for the remainder of the operation. The authors ascribed the pneumothorax, pneumoperitoneum, and pneumoscrotum to high airway pressures from a jet ventilation.

Air or gas within the scrotum may derive from three different sources: (1) intrathoracic [lungs, mediastinum (trachea, major bronchi, cervical and thoracic portion of esophagus)]; (2) intra-abdominal, which is further divided into intraperitoneal (abdominal portion of the esophagus, stomach, small and large intestine) and retroperitoneal (ascending and descending colon, duodenum); or (3) local sources (infection, trauma).\(^1,8\) Gas is usually produced by microbes or originates from retained CO\(_2\), which fills the scrotum during infection or laparoscopy, respectively. The etiology of pneumoscrotum may be of procedural or pathological origin (Table 1).\(^1,8\)

In the presented patient, the source was identified in the thorax. Either pneumothorax [rupture of an alveolus as a result from mechanical ventilation (baro trauma)] or pneumomediastinum (rupture of trachea or major bronchi) was the initial mechanism. In the former case, the air was propagated from the lungs to the subcutaneous space between Camper’s and Scarpa’s fascial planes up to the scrotum.\(^8\) In the latter case, air passed through the aortic and esophageal hiatus to the retroperitoneum, and subsequently to the spermatic fascia and the inguinal canal.\(^8,9\) The sternocostal attachment of the diaphragm could be an alternative route to the retroperitoneum.\(^10\) It must be emphasized that air from the pleural space can travel through the perivascular and peribronchial fascial

![Fig. 1.](A) Subcutaneous emphysema of the scrotum after tracheal intubation. (B) Normal scrotum after 13 days.)

Table 1: Etiologies of pneumoscrotum.

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<tr>
<th>Pathologic origin</th>
<th>Procedural origin</th>
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<td>Perforation of GI tract, pneumothorax, pneumomediastinum, trauma (of the abdomen ± retroperitoneum), scrotal trauma, abscess (retroperitoneum), rapid decompression, Fournier’s gangrene, inflation of the scrotum for erotic purposes, pneumatosis intestinalis, spontaneous</td>
<td>Liver or kidney biopsy, endoscopy (colonoscopy, arthroscopy, peritoneoscopy, sphincterotomy), laparoscopic procedures, retroperitoneal sympathetomy, pacemaker placement, intubation of the trachea, cardiopulmonary resuscitation, hemorrhoidectomy, chest tube placement, anastomotic leak (GI surgery), jet ventilation, treatment of tuberculosis, iatrogenic scrotal injury, artificial pneumoperitoneum, pulmonary resection, mechanical ventilation</td>
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GI = gastrointestinal.
otherwise. Despite the fact that CO₂ can fill the scrotum during laparoscopy (with no long-lasting effects), an accidental bowel injury cannot be excluded. A computed tomography scan of the abdomen and pelvis must be obtained in these cases and the patient must be observed closely for the next hours (even days) for signs and symptoms of acute abdomen or retroperitoneal infection.

In conclusion, pneumoscrotum is an extremely rare complication after tracheal intubation. Although it is a benign clinical entity, the primary source of air leakage must be clarified and appropriate treatment must be provided. Infectious causes and tension pneumothorax or/pneumomediastinum must be managed as emergent conditions.

References