

Unexpected tension Pneumothorax occurring in an elderly patient in the post Anesthesia Care Unit

Jingguang Du¹, Yunxia Zuo²

ABSTRACT

Tension pneumothorax presents as a medical emergency since it spreads rapidly, disturbs the respiratory and hemodynamic functions and may be complicated by subcutaneous emphysema. Here, we report a case of an acute pneumothorax, pneumomediastinum and widespread subcutaneous emphysema that occurred unexpectedly in a 76 year old man, five minutes after his transfer to the Post Anesthesia Care Unit (PACU) following an uneventful general anesthesia for elective cholecystectomy. The main cause of the pneumothorax is believed to be rupturing of pulmonary alveoli, which might have been associated with an abrupt increase in thoracic cavity pressure. Prompt diagnosis and insertion of an underwater-seal chest drainage produced immediate recovery. The patient was sent back to his room within twenty minutes after the event and was discharged from the hospital seven days later. Anesthesiologists should be aware of the occurrence of pneumothorax in the PACU, regardless of which surgical procedure, patient population, or induction situation is associated with the event.

KEY WORDS: Tension Pneumothorax, Pneumomediastinum, Subcutaneous Emphysema, PACU, Underwater-seal chest drainage.

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INTRODUCTION

Pneumothorax is a common complication in the perioperative setting and has been associated with numerous causes.¹⁻⁸ Its presentation in the PACU is particularly serious since many factors can occlude accurate and rapid diagnosis and its cause may not be readily apparent. Tension pneumothorax presents as a medical emergency since it spreads rapidly, disturbs the respiratory and hemodynamic functions

and may be complicated by subcutaneous emphysema. High index of suspicion and immediate management by PACU staff are necessary to safeguard patients from this life-threatening situation. Here, we report a case of unexpected pneumothorax and subcutaneous emphysema caused by a severe bucking in a geriatric patient in the PACU with no predictors of trauma from surgery or anesthesia.

CASE REPORT

A 76 year old man was scheduled for elective cholecystomy under general anesthesia. His preoperative history and physical examination were unremarkable. Pulmonary function tests performed preoperatively indicated a mildly obstructive airway disease. Arterial blood gas analysis two days prior to surgery showed pH=7.30, PaCO₂=40, and PaO₂=82. The patient was routinely monitored throughout the operative procedure. Anesthesia was induced with intravenous administration of propofol (70mg) and fentanyl (0.2mg). Tracheal intubation was facilitated by vecuronium (6mg) and

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was performed without difficulty. Anesthesia was maintained with propofol and fentanyl, Anesthetic depth was monitored by the bispectral index (BIS) which was maintained between 40 and 60.

After a smooth anesthesia event and an uneventful surgery, the patient experienced a slightly delayed regain of consciousness despite complete reversal of muscle relaxation, so he was sent to the PACU with tracheal catheter in place. The patient was given Oxygen through the endotracheal tube in the PACU and his pulse oxygen saturation (SpO_2) was maintained around 98%. Five minutes after transferring the patient to PACU, he experienced a series of severe bucking coupled with coughing and choking on the tube. Physical examination of the patient's condition identified rigid abdominal and respiratory movements that gradually diminished. Ventilation was immediately and gently assisted through the endotracheal tube; however, the patient did not improve and widespread subcutaneous emphysema of neck, thorax and perineal region was observed despite being assisted ventilation. The patient's SpO_2 level dropped to 92%, his heart rate increased to 100 bpm and noninvasive blood pressure was around 90/50 mmHg. Normal breathing sounds were not heard on the left hemithorax upon auscultation, and there was a diminished air entry detected on the right side.



Fig-1: Computed tomography of the chest taken on the first postoperative day demonstrated small amounts of air in the mediastinum.

Pleural puncture was performed immediately by inserting a 10ml syringe containing approximately 2 ml saline into the second left intercostal space at the mid-clavicular line and air was aspirated. Subsequently, a 28 French sized-chest tube was inserted into the 5th intercostal space in the left mid-axillary line and was connected to an under-water seal drain. Following assisted ventilation for three minutes, the patient's respiration gradually returned. Ten minutes later, the patient's SpO_2 was recorded at 94% while breathing air and the circulatory system was deemed to be stable. Patient's consciousness was recovered and extubation was performed after a short time. After complete recovery of consciousness, respiratory and hemodynamic functions, the thoracic surgeon and anesthesia physician approved the patient to be sent back to the ward. Chest CT was performed for the patient on the first postoperative day and demonstrated a small amount of air in the mediastinum (Fig-1). The patient was discharged to home seven days later.

DISCUSSION

In this case report, unexpected pneumothorax and subcutaneous emphysema developed rapidly in an elderly patient in the PACU. The patient was received in the PACU following cholecystomy and still intubated. Pneumothorax developed after severe bucking and progressed swiftly. Rapid diagnosis and management resulted in complete recovery.

Perioperative pneumothorax and subcutaneous emphysema usually develop as a result of injury to the pleura during surgery.¹⁻³ or anesthesia.⁴⁻⁶ Other reported causes include perioperative strong coughing, vomiting and bucking.^{7,8} Pneumothorax may also occur spontaneously in susceptible patients.⁹⁻¹⁰ In the present case, although pulmonary function tests and blood gas analysis were within normal limits, emphysema cannot be excluded completely as a cause; regardless, the uncomplicated surgical procedure and anesthesia administration provided no predictors for an impending pneumothorax event and exclude traumatic injury to the pleura completely. Severe postoperative bucking appears to be the main cause of this patient's pneumothorax because the patient was sent to PACU intubated.

The causative events that led to pneumothorax in our case are hypothesized to be as follows: forceful coughing and severe bucking increased alveolar pressure causing rupture of the alveoli;¹¹ from there, air traveled along the pulmonary vascular sheaths, where it entered the mediastinum and formed pneumomediastinum; then, the air dissected through the

soft tissue planes of the neck, and produced the subcutaneous emphysema. Alveolar rupture into the pleural space is known to cause pneumothorax.¹² This type of pneumothorax is often a tension pneumothorax because air enters the pleural cavity during inspiration and does not exit during expiration. This progressively enlarges the pleural space and thereby increases intrathoracic pressure. Hypoxia results from increased shunt caused by perfusion of unventilated lung areas. Venous return to the heart is decreased leading to a reduced cardiac output and, subsequently, a decreased blood pressure.

Tension pneumothorax represents a medical emergency which cannot often accommodate the time spent waiting for the capture and interpretation of a chest radiograph. It requires immediate management upon diagnosis. Initial treatment involves the insertion of a large bore cannula or needle into the second intercostal space on the mid-clavicular line, thereby releasing the pressure in the pleural cavity and converting the tension pneumothorax to a simple pneumothorax, which is then treated at the earliest opportunity by inserting a chest tube. There remains some debate on the efficacy of needle thoracostomy, which may be avoided in patients without hemodynamic instability.¹³

CONCLUSION

Anesthesiologists should be aware of the occurrence of pneumothorax in the PACU, regardless of which surgical procedure, patient population, or induction situation is associated with the event. This is especially the case for high risk patients. A smooth recovery period should be planned to include extubation in a suitable amount of time to avoid post-operative bucking. Once tension pneumothorax is suspected, prompt management is crucial to ensure patient survival.

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