

A case of massive subcutaneous emphysema in comparison to pneumothorax due to lung injury, following laryngeal edema

Hiromichi Ohsaka¹, Kazuhiko Omori¹, Kei Jitsuiki¹, Toshihiko Yoshizawa¹, Kouhei Ishikawa¹, Youichi Yanagawa¹

¹Department of Acute Critical Care Medicine, Shizuoka Hospital, Juntendo University, Japan

***Corresponding author**

Youichi Yanagawa

Email: yyanaga@juntendo.ac.jp

Abstract: A sixty-nine-year-old male fell down and his right chest bumped into something while he was drunk. On arrival, he showed swelling of the face, neck, abdomen, scrotum and extremities. An emergency chest roentgen revealed massive subcutaneous emphysema. Subsequently, CT demonstrated right rib fracture, a medium amount of right pneumothorax and a small amount of hemothorax and pneumomediastinum, in addition to massive subcutaneous emphysema throughout the whole body. After CT, stridor was detected at the neck by auscultation with a stereoscopic sound field. Tracheal intubation was performed because he had signs of upper airway obstruction. He was diagnosed with trauma-induced thoracic injury with massive subcutaneous emphysema, laryngeal edema. He was extubated on the 7th day of hospitalization, after the improvement of pneumothorax and subcutaneous emphysema. He discharged on foot on the 16th day of hospitalization. This case is unique because he had a discrepancy in the volume of gas between the intrathoracic cavity and the subcutaneous region. This might have been due to local intrathoracic adhesion at the site of lung injury that had been caused by his rib fracture. A deep-seated mass in the neck may block the venous return of the epiglottis, leading to life-threatening laryngeal edema and upper airway obstruction. Accordingly, physicians should pay attention to this complication, even in cases in which thoracic injury is induced by a low energy accident.

Keywords: subcutaneous emphysema; pneumothorax; laryngeal edema.

INTRODUCTION

The etiologies of subcutaneous emphysema include injury to the trachea, bronchus, lung, esophagus, gastroenterocolon, positive pressure gas-related injury, and iatrogenic conditions such as pneumoperitoneum, soft tissue injury or infection [1-5]. Without adhesion of the intrathoracic cavity, the range and volume of subcutaneous emphysema tends to be less than the volume of pneumothorax (when it develops due to lung injury). We herein introduce a case of massive subcutaneous emphysema in comparison to pneumothorax due to lung injury.

CASE PRESENTATION

A sixty-nine-year-old male fell down and his right chest bumped into something while he was drunk. His right chest deteriorated pain and he called an ambulance. He had untreated hypertension, smoked 30 cigarettes and drank 130 g of alcohol per day. On arrival, his consciousness and airway were clear, and he had a blood pressure of 190/100 mmHg, a heart rate of 120 beats per minute (BPM), and an SpO₂ of 97% under room air. He showed swelling of the face, neck, abdomen, scrotum and extremities. He had right

chest tenderness. An emergency chest roentgen revealed massive subcutaneous emphysema. Subsequently, CT demonstrated right rib fracture, a medium amount of right pneumothorax and a small amount of hemothorax and pneumomediastinum, in addition to massive subcutaneous emphysema throughout the whole body (Figure 1). After CT, stridor was detected at the neck by auscultation with a stereoscopic sound field. Tracheal intubation was performed because he had signs of upper airway obstruction. Mild-grade laryngeal edema was recognized when his larynx was developed. Thoracostomy was also performed. The major results of a blood analysis that was performed on arrival were as follows: white blood cells, 11900/μl; aspartate aminotransferase, 70 IU/L; alanine aminotransferase, 55 IU/L; gamma-glutamyl transferase 550 IU/L. He was diagnosed with trauma-induced thoracic injury with massive subcutaneous emphysema, laryngeal edema and alcoholic hepatitis. He was extubated on the 7th day of hospitalization, after the improvement of pneumothorax and subcutaneous emphysema (including the neck). He discharged on foot on the 16th day of hospitalization.

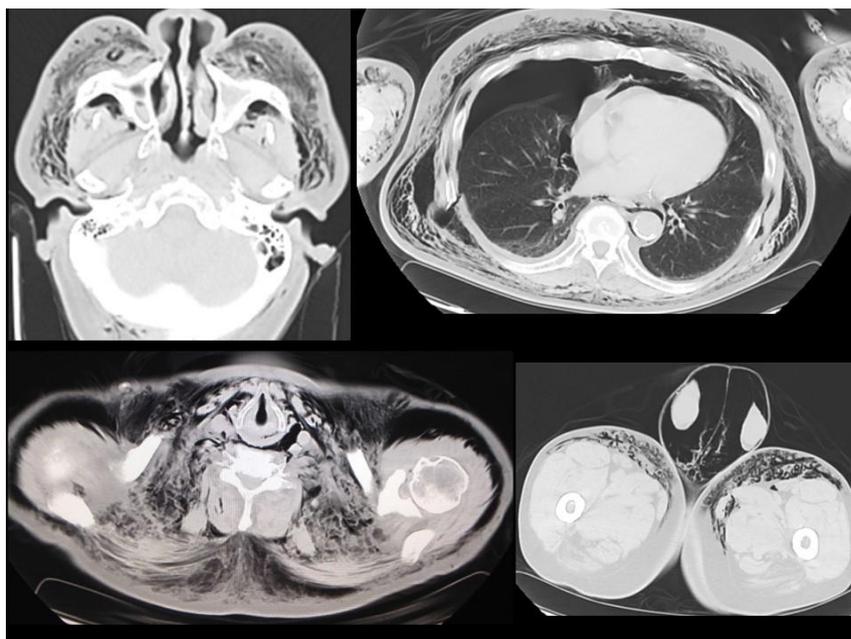


Fig-1: Computed tomography demonstrated a right rib fracture, a medium amount of right pneumothorax and a small amount of hemothorax and pneumomediastinum, in addition to massive subcutaneous emphysema throughout the body

DISCUSSION

The causes of massive subcutaneous emphysema include a major lacerations of the airway (i.e., the trachea or bronchus), and minor injury due to positive gas pressure (i.e., mechanical ventilation). This case is unique because he had a discrepancy in the volume of gas between the intrathoracic cavity and the subcutaneous region without a major gas leak from the main air way or positive gas pressure. This might have been due to local intrathoracic adhesion at the site of lung injury that had been caused by his rib fracture. A deep-seated mass in the neck (including air) may block the venous return of the epiglottis, leading to life-threatening laryngeal edema and upper airway obstruction [6-8]. Accordingly, physicians should pay attention to this complication, even in cases in which thoracic injury is induced by a low energy accident.

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REFERENCES

1. Jeavons RP, Downen D, Rushton PR, Chambers S, O'Brien S. Management of significant and widespread, acute subcutaneous emphysema: should we manage surgically or conservatively? *J Emerg Med.* 2014;46(1):21-7.
2. Lin LW, Wu CC, Chong LW, Lin AC. Periapillary Diverticulum Perforation Following

Endoscopic Retrograde Cholangiopancreatography (ERCP); a Case Report. *Emerg (Tehran).* 2015 ;3(2):78-80.

3. Parmaksizoglu F, Koprulu AS, Unal MB. Massive subcutaneous emphysema and pneumomediastinum after finger subtotal amputation with barotrauma. *J Emerg Med.* 2011 ;41(4):e79-82.
4. Chang CY, Cheng SL, Chang SC. Conservative treatment of severe tracheal laceration after endotracheal intubation. *Respir Care.* 2011 ;56(6):861-2.
5. Verelst W, Verbrugge W, Lammens M, Snoeckx A, Jorens PG. Ventilation-induced massive lethal air embolism and subcutaneous emphysema in a patient with a lung cavern. *Respir Care.* 2015 ;60(1):e6-e10.
6. Porzionato A, Macchi V, Rodriguez D, De Caro R. Airway obstruction by laryngeal masses in sudden and homicidal deaths. *Forensic Sci Int.* 2007 ;171(1):e15-20.
7. Pickard A, Schou H. Unexpected epiglotticoedema and failed intubation following blunt trauma. *Br J Anaesth.* 2006 ;96(4):539-40.
8. Ahmed S, Clarke D, Vaughan RS, Wheeler MH. An unusual case of stridor after thyroidectomy. *Anaesthesia.* 2002 ;57(6):581-3.