

Blunt head and neck trauma: Interesting chest tomographic “effect”

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A 20-year-old male was admitted in the critical care unit with alleged history of blunt trauma to head and neck that was caused by falling heavy object while working at a construction site. On presentation, he had extensive subcutaneous emphysema over neck and chest bilaterally. He was intubated and put on mechanical ventilator in view of poor respiratory efforts and drowsiness. Chest radiograph showed extensive subcutaneous emphysema. Computed tomography (CT) of chest showed interesting “radiological effect” for which one bedside procedure was performed. The

patient was treated with intercostal tube drainage along with other supportive care and eventually he had prolonged intensive care stay.

QUESTIONS

1. What are the CT thorax findings?
2. What interesting “special radiological effect” was noticed by the radiologist?
3. Which procedure was performed and what are the expected findings?

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ANSWERS

Answer 1: CT of chest [Figures 1 and 2] showed extensive subcutaneous emphysema with pneumomediastinum and left-sided pneumothorax.

Answer 2: The radiologist noticed and gave special mention of air along the endobronchial tree, the WW effect [Figure 1], and suspected endobronchial tear.

Answer 3: Flexible bronchoscopy was done to identify any tracheobronchial injury as a cause of Macklin effect seen on the CT scan of thorax. It showed tracheal injury on posterior wall about 5 cm above the carina [Figure 3].

DISCUSSION

Tracheobronchial injuries although rarely observed following a blunt chest trauma, are associated with mortality ranging between 9% and 30%.^[1-3] Traumatic injuries of the airway are suspected in the presence of subcutaneous cervical emphysema expanding with mechanical ventilation, pneumomediastinum, and recurrent pneumothorax due to persisting air leak. Motor vehicle accidents have been reported as the commonest cause of tracheobronchial injuries.^[3] A theory for mechanism of tracheobronchial injuries is related to rapid deceleration, such as that experienced in motor vehicle accidents. The lungs are fixed at the carina, whereas they are more mobile within the pleural space. Rapid deceleration produces a shearing force, causing rupture of the trachea and bronchi.^[4] This mechanism of injury seems the most logical in the current population of blunt trauma victims, the majority of whom are involved in motor vehicle accidents. Both deceleration and crush injuries occur at or near the carina and most commonly involve the right main bronchus. Injury to the right bronchus or trachea predicts a worse outcome when compared with left-sided injuries.^[3]

The Macklin effect was first described by Macklin with an experiment in 1939.^[5] It is a pathophysiologic process characterized by the blunt traumatic alveolar ruptures and air dissection along bronchovascular sheaths, with the formation of blunt pulmonary interstitial emphysema.^[6] Its early diagnostic acknowledgment is important in the management of blunt chest trauma.^[6]

Although conventional radiography still plays an important role in the initial emergency room setting, for follow-up in the intensive care unit, multidetector computed tomography has established itself as the standard imaging method for the evaluation of chest trauma patients.^[7] The Macklin effect is present in 39% of severe blunt traumatic pneumomediastinum as detected by CT.^[6] Its identification, as possible origin of pneumomediastinum, should not prevent the performance of bronchoscopy and esophagoscopy in order to detect a possible concomitant tracheobronchial or

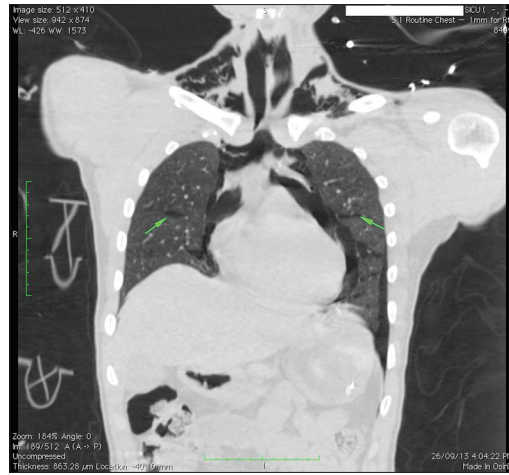


Figure 1: Computed tomography of chest showing extensive subcutaneous emphysema, pneumomediastinum, and left pneumothorax

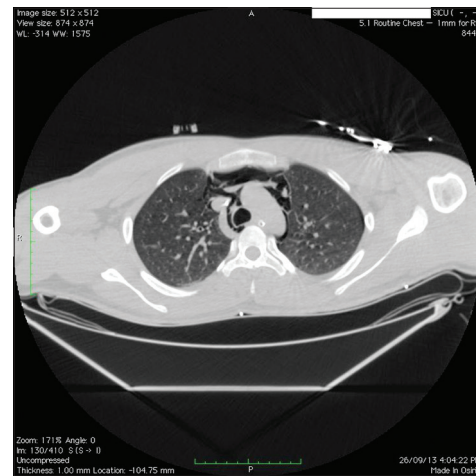


Figure 2: Computed tomography of chest showing pneumomediastinum

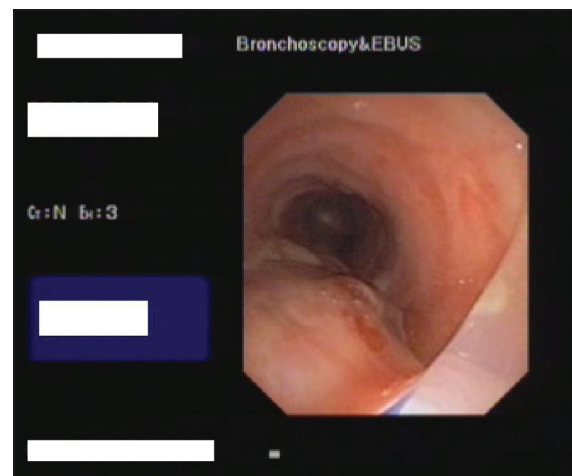


Figure 3: Bronchoscopy image showing tracheal injury over posterior wall about 5 cm above the carina

esophageal injury.^[6] Identification of the Macklin effect is associated with significantly longer intensive care stay.^[6] It

has been reported that close clinical observation with suspect and rigorous bronchoscopic evaluation are necessary to confirm the diagnosis.^[8]

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Conflicts of interest

There are no conflicts of interest.

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