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# A Case of Pneumomediastinum Due to Blunt Neck Trauma in a 23-Year-Old Male Rugby Player

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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**Conflict of interest:** None declared

**Patient:** Male, 23
**Final Diagnosis:** Pneumomediastinum
**Symptoms:** Dysphonia • neck swelling • odynophagia
**Medication:** —
**Clinical Procedure:** Flexible bronchoscopy
**Specialty:** Otolaryngology

**Objective:** Rare disease

**Background:** Pneumomediastinum is an uncommon clinical condition that usually occurs spontaneously, or is caused by blunt thoracic or abdominal trauma. This report is of a rare case of pneumomediastinum caused by blunt neck trauma in an adult and describes the clinical and radiological features and the principles of clinical management.

**Case Report:** A 23-year-old man presented with increased neck swelling, dysphonia and pain on swallowing (odynophagia) after blunt neck trauma during a rugby game. Chest X-ray and computed tomography (CT) showed features that were consistent with pneumomediastinum, including extensive subcutaneous emphysema. The patient was intubated and monitored in the intensive care unit (ICU) and managed with early stabilization of the airway and with conservative methods. He had no complications on clinical follow-up following hospital discharge.

**Conclusions:** Although pneumomediastinum is an uncommon condition, the complications can be fatal. This case highlights the importance of thoroughly investigating cases of subcutaneous emphysema and the importance of early stabilization of the airway.

**MeSH Keywords:** Neck Injuries • Pneumomediastinum, Diagnostic • Subcutaneous Emphysema • Wounds, Nonpenetrating

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## Background

Pneumomediastinum is a condition where free gas or air is present within the subcutaneous tissue and fascial planes of the mediastinum, can be diagnosed by imaging and is classified as primary, or spontaneous pneumomediastinum, and secondary pneumomediastinum [1,2]. Primary pneumomediastinum is usually associated with benign conditions and results from a sudden increase in intrathoracic pressure, for example in acute exacerbation of asthma [2]. Secondary pneumomediastinum is caused by underlying thoracic disease, such as malignancy or infection, or by a specific injury, such as thoracic or abdominal trauma [1,2].

A previously published case has been reported of pneumomediastinum in an adult secondary to blunt facial trauma during a rugby game [1]. There have been no reports of pneumomediastinum secondary to blunt neck trauma in adults, although cases have been reported in children [3–5]. Previous cases of pneumomediastinum as a complication of sports injury have been reported [6,7]. In one case, a 24-year-old man developed pneumomediastinum after performing strenuous 'sit-ups' during rugby training [6]. Another case reported pneumomediastinum in a 20-year-old man who tackled another player during flag football, resulting in supraclavicular subcutaneous emphysema [7].

A case of subcutaneous emphysema and pneumomediastinum occurring after blunt neck trauma during a rugby game in a 23-year-old man is presented. This report describes the rare condition of pneumomediastinum caused by blunt neck trauma in an adult, and its radiological appearance, clinical presentation, and management.

## Case Report

A 23-year-old male was admitted to the hospital emergency department following blunt trauma to neck after being struck by the elbow of another player during a game of rugby. The patient reported feeling discomfort and 'gurgling' in the throat but continued to play throughout the rugby game. Following the rugby game, he went out for a meal and drank some alcoholic beverages. He then noticed increased neck swelling, dysphonia, and difficulty in swallowing (odynophagia).

On admission to hospital, the patient reported no significant past medical history, apart from a previous skin graft to his left hand. He admitted to smoking three cigarettes a day and cannabis rarely, in addition to drinking alcohol. However, had not been drinking alcohol prior to his injury.

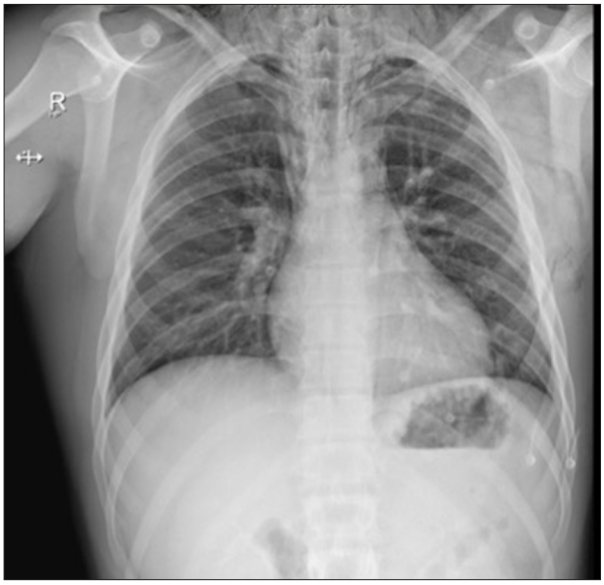


**Figure 1.** Posterior-anterior (PA) chest X-ray shows a pneumomediastinum and subcutaneous emphysema. A PA chest radiograph shows extensive subcutaneous emphysema, predominantly in the left chest and right neck, in keeping with pneumomediastinum. There is no pneumothorax, pleural effusion, or acute rib or other bone fracture.

On examination, the patient was hemodynamically stable, with stable vital signs. He had no signs of respiratory distress, hypersalivation, or stridor and showed no abnormalities of posture or position. There was a slightly abnormal quality to the patient's voice, and he was moderately distressed and anxious. He was noted to have neck swelling with subcutaneous emphysema palpable from the zygomatic arch to the suprasternal notch. Fiber-optic naso-endoscopy showed swollen vocal chords that were moving appropriately with no upper airway edema or blood in the hypopharynx.

Imaging investigations included a chest X-ray that showed extensive subcutaneous emphysema, predominantly in the left chest and right neck with findings in keeping with pneumomediastinum (Figure 1). No other acute abnormalities were identified on chest X-ray. Computed tomography (CT) of the neck and chest showed extensive pneumomediastinum with subcutaneous and fascial gas throughout the neck (Figure 2). Although the point of perforation was not identified on CT, there was assumed to have been tracheal injury, or possible esophageal injury. No hematoma or fluid collections were seen on CT.

The patient was intubated and flexible bronchoscopy was performed, which showed no apparent tracheal injury. The patient was reviewed and monitored in the intensive care unit (ICU). Conservative management included maintenance of the airway, empirical intravenous antibiotics, (piperacillin/tazobactam 4.5


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**Figure 2.** Computed tomography of the chest shows pneumomediastinum. Helical computed tomography (CT) scan of the chest and neck, with intravenous contrast, shows extensive pneumomediastinum with the presence of subcutaneous gas or air. The full series of neck, chest, upper limb, and abdominal CT images showed subcutaneous and fascial gas or air extending throughout the right neck to the base of the skull and down the left arm. The vocal cartilage was intact, and no tracheal, esophageal, upper abdominal visceral injury, pneumothorax, gas under the diaphragm, pulmonary contusion, or fractures were found. CT – computed tomography.

g three times a day) to prevent mediastinitis and insertion of a nasogastric tube. The patient was discharged from the ICU when he was able to tolerate solid foods, had no breathing difficulties and was free from pain. He had no complications on clinical follow-up following hospital discharge.

## Discussion

Subcutaneous emphysema and pneumomediastinum are rare clinical conditions, which can be primary (spontaneous) or secondary to severe trauma to mediastinal structures, most commonly to rupture or perforation of the trachea or esophagus [8]. Another cause of pneumomediastinum is Boerhaave syndrome, or transmural esophageal perforation due to vomiting, which was excluded from this case based on the patient's history. The development of secondary pneumomediastinum can be due to the 'Macklin effect,' which was first described in 1939, and involves the medial tracking of air along the broncho-alveolar sheath, resulting intra-alveolar rupture and interstitial emphysema, usually following blunt trauma, or the use of positive pressure ventilation (PPV), or episodes of acute asthma [8–10]. This mechanism allows free air to track along the bronchoalveolar sheath interstitial, which then spreads to the mediastinum [8].

A limited number of cases of pneumomediastinum secondary to blunt neck trauma, have been previously reported, which have all been pediatric cases [3–5]. This report describes a unique case of secondary pneumomediastinum and subcutaneous emphysema following blunt trauma sports injury in an adult. The cause was likely to have been due to micro-perforation of the trachea. However, in this case, we could not exclude esophageal perforation, which was a less probable cause. This case highlights the importance of taking a detailed clinical history and examination, and the importance of prompt investigation and management of subcutaneous emphysema and pneumomediastinum [8]. Subcutaneous emphysema or pneumomediastinum secondary to rib fracture or Valsalva maneuver, respectively, are usually conditions that resolve spontaneously and do not require antibiotic therapy [2,8]. There has previously been a cases report of pneumomediastinum developing in a patient following blunt trauma to the thorax after administration of ventilator support, with a fatal outcome [2].

There have been few studies on the risk factors, etiology, radiologic findings and outcome of secondary pneumomediastinum [2,10]. Previously published reports have shown that acute respiratory syndrome and barotrauma are predictors of increased mortality in pneumomediastinum and that blunt thoracic trauma and the presence of subcutaneous emphysema and pneumothorax were associated with lower mortality rates [2,10]. Computed tomography (CT) has been shown to be a useful tool in diagnosing pneumomediastinum and quantifying the degree of free air [8]. Although the CT scan is the gold standard imaging method for identifying secondary pneumomediastinum, spontaneous pneumomediastinum is more easily identified by chest X-ray when barotrauma is the cause, as opposed to blunt thoracic trauma [2].

Complications of pneumomediastinum include cardiac tamponade, airway compression, extensive subcutaneous emphysema, and pneumothorax. Also, air can dissect into the retropharyngeal and retroperitoneal space and, in rare cases, between the mediastinum and upper spine, resulting in intraspinal air, or pneumorrhachis [11]. If pneumomediastinum becomes life-threatening and leads to tamponade or airway compression, video-assisted thoracoscopic surgery (VATS) or thoracotomy may be required to perform decompression [11].

## Conclusions

To our knowledge, this is the first reported case of severe pneumomediastinum secondary to neck trauma in an adult. Although pneumomediastinum is an uncommon condition, the complications can be fatal. This case highlights the importance of thoroughly investigating cases of subcutaneous emphysema and the importance of early stabilization of the airway.

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We thank the patient for consenting to use his case for this report and confirm that all patient information has been de-identified. We would also like to acknowledge all the health professionals involved in the investigative workup and care of this patient.

**Conflict of interest**

None.

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