Exuberant subcutaneous emphysema and pneumomediastinum after urgent tracheotomy – case report

Clinical Case

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Abstract

Tracheotomy is a useful procedure for airway management but may lead to rare complications such as subcutaneous emphysema and pneumomediastinum, especially when performed in an emergency setting.
This case involves a 44-year-old male patient with an extensive laryngeal lesion who underwent emergency tracheostomy. In the immediate postoperative period, he developed extensive subcutaneous emphysema with pneumomediastinum but remained hemodynamically stable. Loosening the sutures and providing oxygen therapy were sufficient for resolution. Subcutaneous emphysema and pneumomediastinum after tracheostomy are rare and generally self-limiting complications. Early recognition and conservative management can prevent the need for invasive interventions.

Keywords: Tracheotomy; subcutaneous emphysema; pneumomediastinum

Introduction

Tracheotomy is a surgical procedure aiming for a direct connection between the skin and the trachea, thereby bypassing the upper airway.[1] It can be conducted electively—for example, in patients with prolonged intubation resulting from cerebrovascular disease—or on an urgent or emergency basis in patients presenting with acute respiratory distress in whom intubation is not possible or is not indicated, such as in cases of upper airway obstruction due to a laryngeal mass or supraglottitis.[2] Emergency tracheotomy is associated with higher mortality and a higher rate of severe complications.[2] Complications range from the more common, such as postoperative hemorrhage and local infection, to rarer ones, such as the creation of a false passage, subcutaneous emphysema,

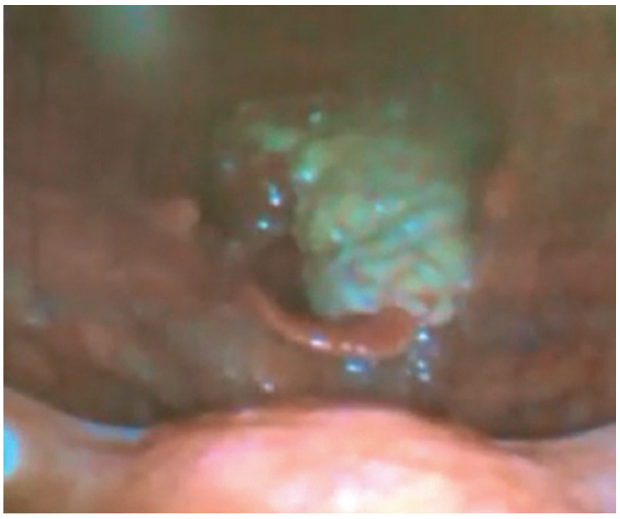
pneumothorax, and pneumomediastinum.[2,3] Although rare and generally benign when it occurs in isolation, subcutaneous emphysema can be associated with serious complications, such as pneumothorax, pneumomediastinum, or both, with a consequent increase in the morbidity and mortality.[1] It usually results from an overly tight closure of the tissues around the tracheostomy tube, rupture of the posterior tracheal wall, or tube malposition.[1,4]

Case Report

A 44-year-old man was brought to the emergency department with a 3-month history of respiratory distress. The patient also reported progressive dysphagia, primarily to solids; self-limited episodes of oral bleeding; and weight loss of approximately 22% (from 66 to 50 kg) over the same period. On physical examination, the patient had an oxygen saturation by pulse oximetry (SpO_2) of 88%, tachypnea, inspiratory stridor, and supraclavicular retractions. The medical history of the patient included heavy alcohol and tobacco use (8 standard drinks per day and 60 pack-years), and he denied taking any regular medication.

Otolaryngology was consulted, and flexible nasopharyngolaryngoscopy revealed an extensive exophytic, ulcerated transglottic lesion involving the left hemilarynx, extending from the left aryepiglottic fold and epiglottis down to the subglottic region, with immobility of the ipsilateral vocal fold and a very narrow glottic airway (Figure 1). The patient was subsequently taken to the operating room for an urgent tracheotomy under local anesthesia, and a cuffed, nonfenestrated tracheostomy tube with a 6.0-mm inner diameter was placed. After the procedure, with the patient under general anesthesia and mechanically ventilated through the tracheostomy tube, a biopsy of the lesion was conducted under suspension laryngoscopy, as the patient had been fasting. Approximately 10 minutes after emergence from anesthesia, the patient had an episode of severe coughing and agitation, resulting in the onset of extensive

Figure 1
Flexible nasopharyngolaryngoscopy revealing an extensive exophytic, ulcerated transglottic lesion involving the left hemilarynx



subcutaneous emphysema extending from the lower chest to the neck and head bilaterally. The patient's vital signs remained stable (blood pressure, 118/72 mm Hg; heart rate, 87 beats/min; SpO_2, 94%), and breath sounds were present bilaterally on auscultation. The suture around the tracheostomy tube was therefore loosened. A chest radiograph showed pneumomediastinum and ruled out pneumothorax.

The patient was closely monitored and received oxygen at 4 L/min through the tracheostomy tube to reduce respiratory effort; his SpO_2 was 96%. Computed tomography of the neck and chest showed pneumomediastinum and extensive subcutaneous emphysema extending to the chest, neck, head, and upper extremities (Figure 2).

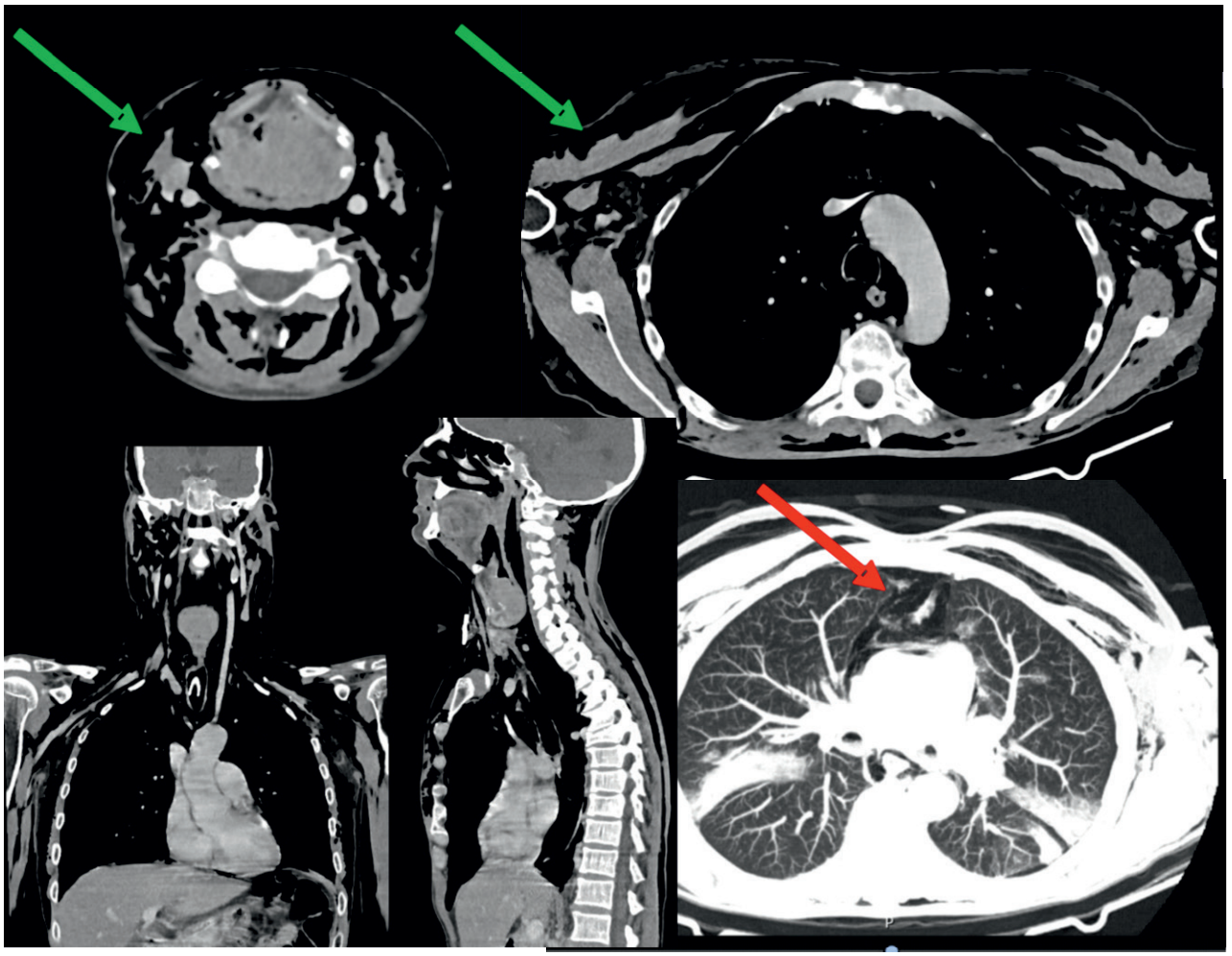
After 3 days, the pneumomediastinum and subcutaneous emphysema had resolved completely, and the patient proceeded with the diagnostic workup and treatment of the laryngeal lesion.

Discussion

Subcutaneous emphysema is defined as the presence of air in the subcutaneous tissue. In the head and neck region, it manifests as pain, swelling, and crepitus on palpation.[2]

In the setting of tracheotomy, it is associated

Figure 2
Computed tomography of the neck and chest showing extensive subcutaneous emphysema (green arrows) and pneumomediastinum (red arrow) after tracheotomy



with excessive dissection, tracheostomy tube obstruction, high-pressure mechanical ventilation, placement of the tube outside the tracheal lumen, and the use of a fenestrated tracheostomy tube.[1] The cause must be identified so that treatment can be tailored accordingly.

Subcutaneous emphysema is a recognized but relatively rare complication of tracheotomy, with a reported incidence of 1.4%.[5] In studies of early complications, subcutaneous emphysema is among the least frequently reported complications, occurring less often than hemorrhage or tracheostomy tube dislodgment.[6] The available evidence shows no statistically significant difference in the rate of subcutaneous emphysema between tracheotomies performed under local anesthesia and those performed under general anesthesia.[7] The literature indicates that the overall complication rates are higher for urgent and emergency tracheotomies than for elective ones. However, studies of urgent and emergency procedures—often conducted under local anesthesia because of acute airway obstruction—do not show an increased incidence of subcutaneous emphysema compared with elective procedures performed under general anesthesia.[7,8]

With respect to surgeon experience, the literature indicates that when tracheotomy is conducted by residents under appropriate supervision, the incidence of subcutaneous emphysema is similar to, or even lower than, that seen when the procedure is conducted by attending surgeons. This finding may

be partly explained by the fact that the most complex cases are usually handled by attending surgeons.[9]

In the case described, several factors may explain the incidence of this complication. An excessively tight closure around the tracheostomy tube can allow pressurized air to dissect through the tissues of the neck, especially during episodes of agitation and intense coughing, as occurred in this case, requiring the suture around the tube to be loosened. Mechanical ventilation during the biopsy under suspension laryngoscopy is also a risk factor, as is malposition or displacement of the tube outside the tracheal lumen. Laceration of the posterior tracheal wall—either during the tracheotomy itself or during closure, from excessive traction—may also have contributed, although this was not visualized. Subcutaneous emphysema and pneumomediastinum are generally self-limited and benign conditions, amenable to symptomatic treatment with pain control, monitoring, and avoidance of situations that increase intrapleural pressure.[1–3]

In severe cases, the administration of high-concentration oxygen may be useful, particularly in pneumothorax and severe pneumomediastinum. In severe subcutaneous emphysema, widening the tracheotomy incision can be effective.[1] Negative-pressure subcutaneous drains may also be useful.[2]

In cases of posterior tracheal wall rupture, treatment depends on the size of the laceration; direct closure may be indicated, or the tear may be bypassed to allow it to heal.[10]

In this patient, loosening the suture around the tracheostomy tube and providing supportive treatment (monitoring and oxygen at 4 L/min through the tracheostomy tube) were sufficient to resolve the condition, with no need for more invasive measures.

Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

Data Confidentiality

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

Protection of humans and animals

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the 2013 Helsinki Declaration of the World Medical Association.

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Availability of scientific data

There are no datasets available, publicly related to this work.

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