

## Clinical Article

## Fever, Facial Swelling and Dyspnea

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## Abstract

We report the development of severe subcutaneous emphysema in a child presenting with facial swelling during an acute respiratory infection. We review the known etiologies of air leaks and their appropriate mode of therapy, but also emphasize the importance of searching for other less known etiologies, such as child abuse, trauma to the airways, illicit drug abuse, hydrocarbon inhalation, which will require specific interventions. *Int Pediatr.* 2003;18(2):92-94.

*Key words:* extapulmonary air leak, subcutaneous emphysema

## Case Report

A 2-year old boy presented with a 24-hour history of progressive swelling of his face and eyelids, without pruritus. This was preceded two days earlier by fever, cough and dyspnea, for which he was prescribed inhaled bronchodilators and oral Azithromycin. There was no preceding history of insect bite, sore throat, oliguria or hematuria. He was known to have moderate asthma with infrequent episodes, for which was he treated with intermittent inhaled bronchodilators. The rest of his past history was unremarkable.

On examination, temperature was 39.1°C, pulse 140/minute, respirations 60/minute, blood pressure 110/70 mmHg and capillary refill 2 seconds. There was a diffuse swelling of his torso, neck, face and eyelids, without redness, hotness, tenderness or venous distension (Fig 1). There was no stridor but intercostals retractions were present. There was no swelling in the sacral area or on the lower limbs. The heart sounds were muffled on auscultation but there was no gallop or murmur. Diffuse ronchi and crepitations were heard



Fig 1 - Subcutaneous emphysema involving the chest wall, neck, face and eyelids.

on lung auscultation. There was no hepatosplenomegaly or ascites.

Total blood white cell count was  $8.6 \times 10^9/L$ , 70% neutrophils, 26% lymphocytes, Hb 104 g/L, platelets  $333 \times 10^9/L$ . Serum sodium was 132 mmol/L, potassium 8 mmol/L, chloride 94 mmol/L, bicarbonate 22 mmol/L, blood urea nitrogen 3.8 mmol/L and serum creatinine 35.4  $\mu\text{mol/L}$ . Urinalysis showed 1+ proteinuria on dipstick (30 mg/dL) but no blood.

Crepitus was elicited on palpation of his neck and upper chest. Subcutaneous emphysema involving the eyelids, face, cervical and thoracic soft tissues was confirmed by the chest x-ray which showed an associated pneumomediastinum (Fig 2). There was no

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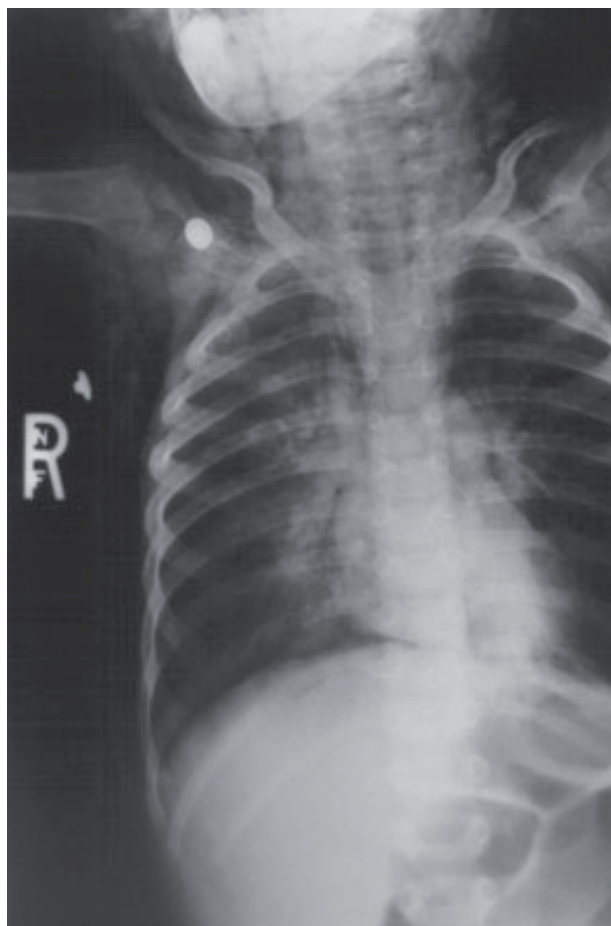


Fig 2 - Pneumomediastinum with extensive thoracic and cervical subcutaneous emphysema.

history of foreign body inhalation, laryngotracheal injury or dental procedure.

Following therapy with parenteral antibiotics, inhaled bronchodilators, oxygen supplementation and steroids, the child made a complete recovery within 72 hours.

### Discussion

Subcutaneous emphysema involving the face, neck and upper chest may mimic edema such as in nephrotic syndrome, allergic or angioneurotic edema, or superior vena cava syndrome. The presence of crepitus is pathognomonic, radiology is confirmatory and the other causes are easily ruled out. Any extrapulmonary air leak escaping into lung interstitial tissues, dissecting along the peribronchial and perivascular connective tissue sheaths may cause mediastinal emphysema, pneumomediastinum, pneumothorax, and

subcutaneous emphysema. Although the neck and the chest wall are the usual anatomical location of the subcutaneous emphysema, pneumoscalp and subconjunctival emphysema have been reported, as well as self-induced pneumoparotitis.

The condition may complicate any laryngeal, tracheal or bronchial blunt or penetrating trauma injury. It may occur following tracheal intubation, percutaneous tracheostomy, lung perforation by chest tubes or traumatic injury to the hypopharynx in children who fall with a pen in their mouth.<sup>1</sup> It has also been reported as a complication in dentistry and oral surgery, during dental anesthesia, with the use of high pressure dental instruments and of compressed air around patent root canals, and also with upper airway laser surgery. It may also occur following tonsillectomy, temporomandibular joint surgery, surgery for cleft palate, endoscopic intranasal ethmoidectomy and laparoscopy. It has also been reported as a complication of asthma where inhaled bronchodilators are thought to be an additional risk factor.<sup>2,3</sup> Bronchiolitis, Staphylococcal pneumonia, measles, pertussis or pulmonary tuberculosis may be complicated by air leak.

Spontaneous emphysema, with or without pneumomediastinum or pneumothorax, defined as a non-traumatic air leak without underlying lung disease, is usually a benign and self-limiting condition. The Valsalva maneuver may induce air leak in conditions such as thoraco-abdominal straining against a closed glottis during violent exercise, strenuous exertion such as weightlifting, competitive sport or criminal assault, or with coughing and vomiting. Vomiting and hyperpnea have been reported as likely contributing factors for extrapulmonary air leak in diabetic ketoacidosis.<sup>4</sup> Laryngeal or hypopharyngeal tear during excessive phonation may cause subcutaneous emphysema, as well as pulmonary barotrauma in divers.

Child abuse is sometime associated with air leak and should not be overlooked.<sup>5</sup> Respiratory tract foreign body aspiration is another etiology to always consider.<sup>6</sup> Cervicofacial emphysema may be the result of self abuse in a disturbed adolescent or Munchausen's syndrome.<sup>7,8</sup> Extrapulmonary air leak may be associated with illicit inhalation drug use, probably in relation to prolonged Valsalva maneuvers with or without the use of positive pressure devices.<sup>9</sup> Accidental or deliberate ingestion of hydrocarbons such as kerosene may lead to the formation of

pneumatocoles, pneumothorax and subcutaneous emphysema. Spontaneous perforation of the oesophagus (Boerhaave's syndrome) and pneumatosis intestinalis in chronic rejection of liver transplant are rare causes.

Radiologic studies are essential to diagnose the primary cause and the extent of intrathoracic air leaks. Computed tomography (CT) is helpful in the diagnosis of tracheal injuries, although the definitive diagnosis is made by bronchoscopy.

Although subcutaneous emphysema carries no particular risk on its own, the primary cause and the associated intrathoracic air leaks, such as pneumothorax, pneumomediastinum or pneumopericardium may lead to serious complications. In most instances, subcutaneous emphysema is self-limited and requires no specific treatment. The underlying condition is treated and resolution of the air leak occurs by resorption of subcutaneous air.

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