Case report

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Surgical emphysema complicating inferior alveolar nerve cryoablation

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We present a case of widespread surgical emphysema following cryoablation of the right inferior alveolar nerve in the setting of trigeminal neuralgia refractory to carbamazepine pharmacotherapy.

Case report

A 62-year-old female presented for elective cryotherapy of the right inferior alveolar nerve under general anaesthesia. The patient had a greater than twenty year history trigeminal neuralgia with persistence of intermittent lancinating pain in the right hemifacial area despite ongoing carbamazepine therapy. She had achieved an interval of relief following a microvascular decompression 12 years prior and a previous inferior alveolar nerve cryoablation in 2015. Other than social debilitation from her symptoms and smoking, there was no other significant medical history.

The procedure was conducted in the operating theatre by a specialist maxillofacial surgeon under a general anaesthetic. She received 100 mcg fentanyl, 140 mg propofol, and 35 mg rocuronium as intravenous induction of anaesthesia and the patient's trachea was intubated under direct laryngoscopy with a size 6 nasal tracheal tube without any noted difficulty or requirement of adjuncts. Cryotherapy was administered to the right inferior alveolar neurovascular bundle with three fifteen-second applications of liquid nitrogen. The neurovascular bundle was further treated with 2 ml of 0.25% bupivacaine and adrenaline via direct needle and syringe injection. The total operating theatre time was 30 minutes and the patient was extubated in the operating theatre before being recovered in the post anaesthesia care unit and after a period of routine observation was discharged home with normal vitals.

Thirty-six hours later she developed diffuse swelling with a ‘bubble wrap’ sensation extending over her neck and anterior chest wall without any respiratory distress. She presented to the emergency department. Here her pulse oximeter saturations were noted to be 91% on room air. A chest x-ray demonstrated surgical emphysema (**Figure 1**). Computerised tomography confirmed extensive surgical emphysema involving the neck, chest, bilateral upper limbs with a pneumomediastinum involving the trachea, oesophagus, great vessels, and pericardial sac (**Figures 2-4**). The specific point of air entry could not be radiologically identified.

The patient was admitted to the high dependency unit overnight for close observation and oxygen therapy administered at 10 litres per minute via Hudson mask. She was transferred to the ward on day three of her admission after significant subjective and objective improvement in her surgical emphysema (**Figure 5**). She was discharged to home the following day.

Discussion

Trigeminal neuralgia is a complex pain syndrome that is characterised by pain in one or more divisions of the trigeminal nerve but most commonly affecting the second and third divisions. The pain is classically unilateral and paroxysmal with onset secondary to a stimulus (i.e. touch, mechanical), though this may be innocuous (i.e. from chewing). Classical trigeminal neuralgia arises from neurovascular contact and compression of the trigeminal nerve. (1) Carbamazepine is considered to be the most efficacious pharmacotherapy whilst surgical treatment may entail microvascular decompression, though cryo-

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surgical therapy of the nerve supply to the symptomatic area has been described. (2)

Surgical emphysema (or subcutaneous emphysema) occurs when air and/or gas is located in subcutaneous tissues. The clinical presentation may vary dependent upon the sites involved (commonly the chest, face or neck). Localised symptoms may arise from pneumo-compression of structures and/or organs and generalised symptoms include that of nonspecific pain. Common signs include crepitus to palpation. Surgical emphysema has been described following cryoablation procedures. (3) It is important to rule out a pneumothorax as a precipitating cause.

Similar to other case reports, we suggest a possible mechanism of injury in our patient whereby thermal injury from cryoablation due to the rapid liquid to gas phase changes of nitrogen leads to. surgical emphysema. (4) Though the expected time for presentation of the surgical emphysema would be expected to be in the sudden postoperative period, the literature suggests that the time taken for presentation may vary from minutes to hours. Other additive mechanisms may include forced air under pressure dissecting communicating fascial places through mediastinal, pericardial, and thoracic spaces. Speculative mechanisms which are also considered include that of subtle trauma from intubation or pneumothorax secondary to positive pressure ventilation with decompression into subcutaneous tissue. The mainstay of therapy appears to be supportive care with oxygen therapy and expectant management which support an excellent prognosis. The administration of antibiotics may be justified to prevent microbiological extension into sterile tissue planes. (5)

Figure 1. Chest X-ray on initial presentation demonstrating surgical emphysema

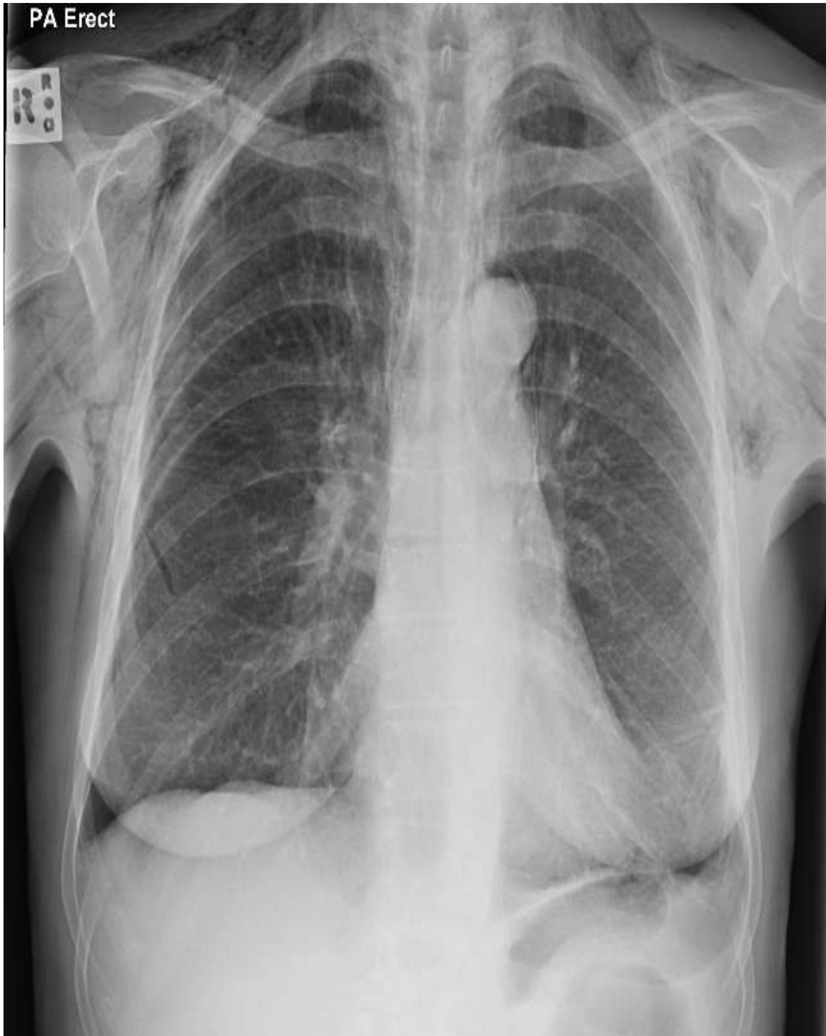


Figure 2. Computerised tomography showing extensive surgical emphysema (pneumomediastinum) involving the trachea, oesophagus, great vessels, and pericardial sac

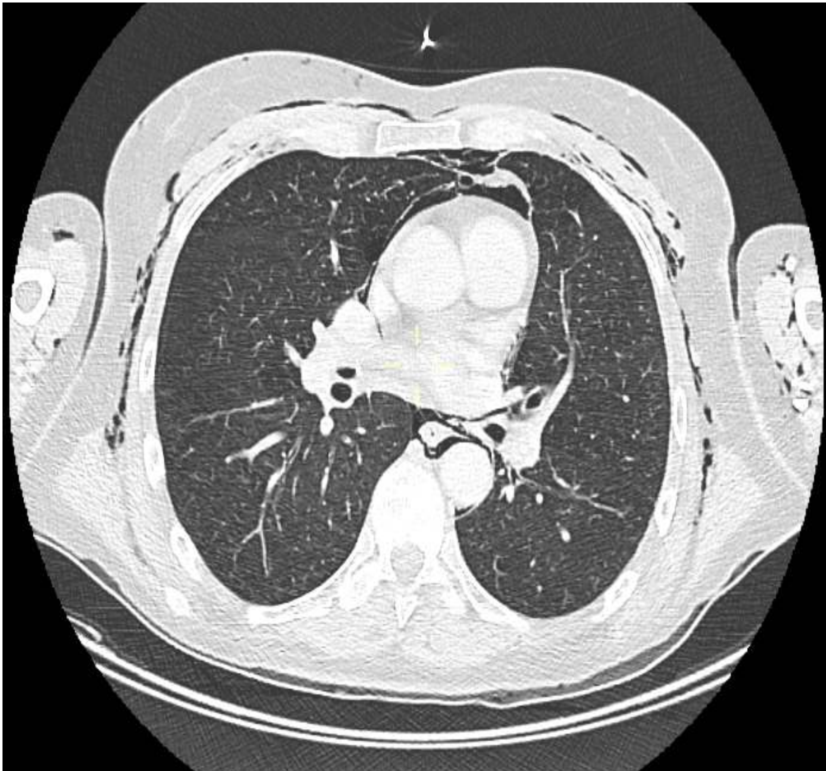


Figure 3. Computerised tomography showing extensive surgical emphysema involving trachea, oesophagus, and great vessels

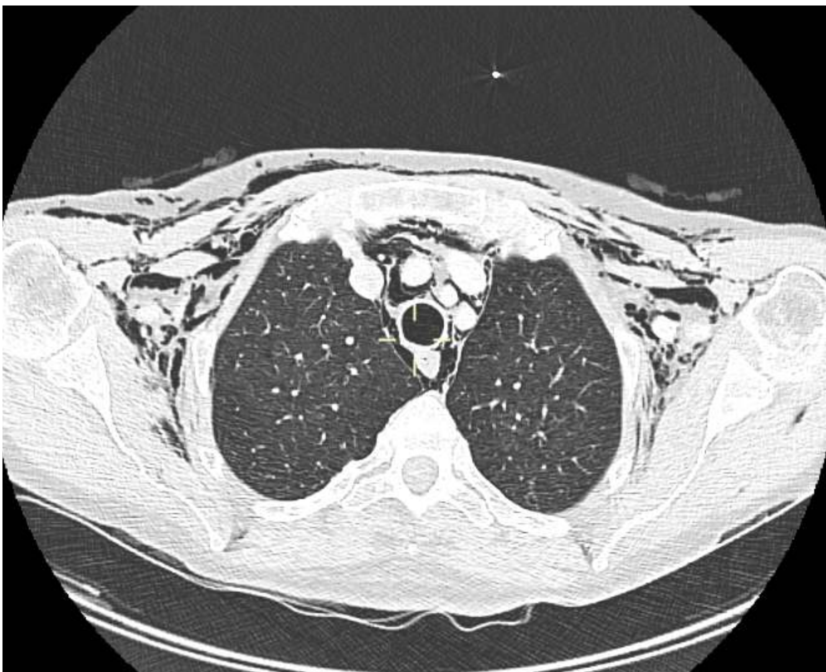


Figure 4. Computerised tomography showing extensive surgical emphysema involving the neck, chest, bilateral upper limbs with a pneumomediastinum

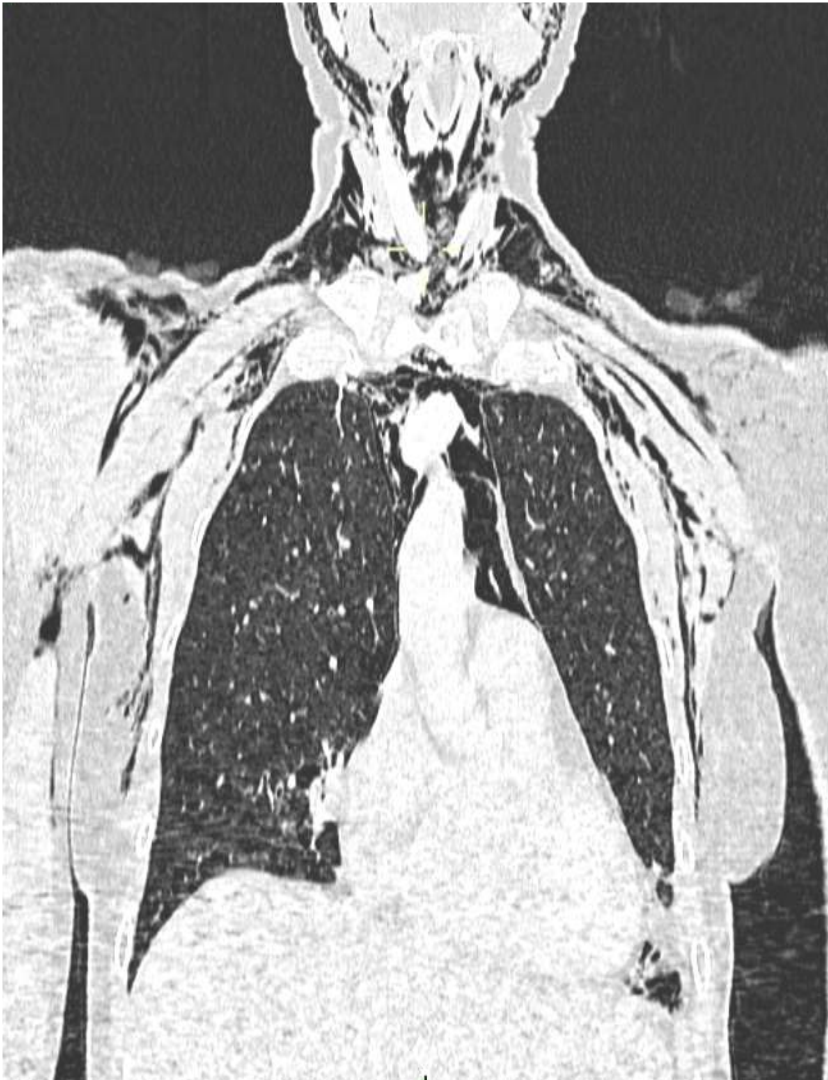
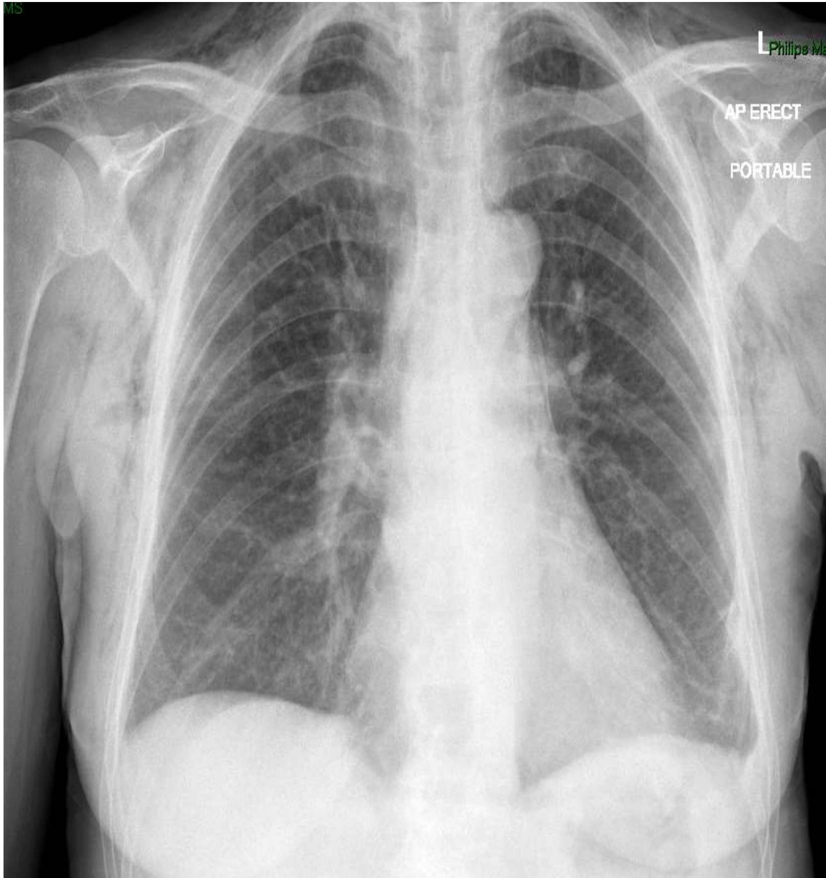


Figure 5. Chest X-ray after significant subjective and objective improvement in the surgical emphysema



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