Pneumomediastinum Following High Pressure Air Injection to the Hand

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Abstract
We present the case of a patient who developed pneumomediastinum after high pressure air injection to the hand. To our knowledge this is the first reported case of pneumomediastinum where the gas injection site was the thenar eminence. Fortunately the patient recovered with conservative management.

Introduction
A 42-year-old motor mechanic was brought by ambulance to the emergency department. The patient had been working alone on a vehicle, when the jack collapsed and he became pinned by his left hand. He related a sensation of a "cold, bubbling" in his hand while he was trapped. The ambulance crew revealed that when they lifted the car to free him a compressed air line with a pressure of 2000 psi was found adjacent to his hand. They estimated that he had been trapped for forty minutes prior to release.

Case Report
Physical examination revealed the patient was in a stable condition with no evidence of cardiovascular compromise; however he spoke with a high pitched tone, and had a notably swollen neck. Examination revealed a semi-circular wound of 3 cm's in diameter on the thenar eminence of his left hand. Subcutaneous emphysema was visibly present in the hand (Figure 1). Peripheral circulation, sensation, and motor function of the affected extremity were normal. There was no compartment syndrome. Palpation demonstrated crepitus of the hand, entire arm, neck, and the contra-lateral arm. Chest examination revealed no evidence of a crush injury. Auscultation demonstrated normal air entry through-out both lung fields. Hamman’s crunch was audible indicating the presence of pneumo-pericardium. His abdomen was soft and non-tender. On the chest x-ray, a hyper-lucent line was found on both sides of the pericardium, representing mediastinal emphysema (Figure 2). No pneumothorax was detectable.

Figure 1: Wound on thenar eminence with visible subcutaneous emphysema.

We assume that the patient had sustained a high-pressure air injection injury to his hand subsequent dispersion to the mediastinum, neck and to the opposite arm. Important differential diagnoses of pneumomediastinum secondary to traumatic perforation of a hollow viscus or Boerhaaves syndrome were excluded by the patient’s history, examination and a negative CT thorax and abdomen. To reduce the risk of infection, prophylactic antibiotic therapy with Co-Amoxiclav was commenced. In addition, a booster vaccination against tetanus was given. The hand injury was debrided in theatre with K-wire stabilization of the metacarpal fracture on the day of admission. A second debridement was performed on day three. Antibiotic prophylaxis was discontinued after seven days. Later, chest x-ray revealed resolution of the pneumo-mediastinum. He was discharged seven days post injury; his metacarpal fracture united at six weeks.

Figure 2: Mediastinal Radiolucency on chest x-ray

Discussion
Pneumomediastinum can be managed conservatively in most instances after oesophageal or tracheo-bronchial perforation has been excluded. In the rare event of profound cardiovascular compromise due to tension pneumomediastinum, decompression via anterior cervical mediastinotomy has been described. The passage of compressed air from the thenar eminence to the mediastinum in this patient, graphically illustrates the presence of an anatomic conduit via the arm vasculature, axillary sheath and pre-tracheal fascia. High pressure gas injection injury to the hand was first described in 1927 by Parker who reported the case of a patient who placed his hand over the exhaust of a pneumatic drill. More commonly high-pressure injection injuries involve injection of paint, solvents or grease; rarely in theatre debridement is advanced as these injuries carry a high incidence of infection requiring amputation.

This case demonstrates that high-pressure gas injection is a differential diagnosis of a pneumomediastinum even when the point of entry is far removed from the thorax. In our patient the pneumomediastinum was harmless and resolved spontaneously. However, cardio-respiratory compromise could theoretically occur, and other potentially life threatening causes must be excluded. A detailed history, careful clinical examination, appropriate radiological investigation and efficient surgical management are essential for positive outcomes for these patients.

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References