

Clinical Communications: Adults

MASSIVE SUBCUTANEOUS EMPHYSEMA AND PNEUMOMEDIASTINEUM AFTER FINGER SUBTOTAL AMPUTATION WITH BAROTRAUMA

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Abstract—Background: Advancement of pressurized air through subcutaneous tissue after barotraumas involving skin laceration has been documented in the literature. The type and anatomic location of injury, amount of pressure, and time elapsed all play a role in determining the destination of the air advancing through tissues. **Objectives:** To report a case demonstrating the vascular system as the anatomic pathway for subcutaneous pressurized air resulting from an industrial accident. **Case Report:** We present the case of a 28-year-old laborer wounded by an air valve blast. An enormous accumulation of air was released through a subtotal fingertip amputation. The clinical appearance of massive subcutaneous emphysema around the upper extremity, neck, and chest suggested chest trauma to the clinicians, despite the absence of signs of respiratory distress. X-ray studies revealed pneumomediastinum. After confirmation that the respiratory system was undamaged, microsurgical repair of the injured finger was performed. Resolution of subcutaneous emphysema and pneumomediastinum was complete at the end of follow-up. **Conclusion:** Compressed air injuries constitute a well-known form of industrial accident. Although most result in localized subcutaneous emphysema, the risk of pneumomediastinum should not be overlooked due to the anatomic structure of the vascular system. The clinician should consider the pressure of compressed air, and must be alert for potential complications. © 2011 Elsevier Inc.

Keywords—barotrauma; pneumomediastinum; subcutaneous emphysema; amputation

INTRODUCTION

Injuries to the hand with exposure to pressurized air may result in the accumulation of air in tissues. The main clinical indicator of air that leaks inside is subcutaneous emphysema. Review of the literature reveals that the emphysema is usually limited to the area around the cutaneous wound and rarely spreads proximally. The type and anatomic location of injury, amount of pressure, and time elapsed all play a role in determining the progression of air through the tissues.

CASE REPORT

A 28-year-old right-handed man who worked as a laborer presented to the Emergency Department with a laceration at the tip of the index finger and subtotal amputation at mid-phalanx level of the ring finger of the dominant hand (Figure 1). He had been injured by a blasting control valve operating compressed air with a pressure of 88 psi (pounds per square inch). On examination, there was no other skin laceration. The patient had massive swelling around the upper extremity, neck, head, and chest (Figure 2). The skin was distended and stretched. Palpation revealed subcutaneous emphysema with audible crepitation in these areas. X-ray studies demonstrated subcutaneous air



Figure 1. Wounded hand.

surrounding the entire upper extremity. Chest X-rays showed no evidence of pneumothorax, but revealed subcutaneous emphysema and pneumomediastinum (Figure 3). The patient had no signs of cardiorespiratory distress and his vital signs were normal. We considered no other diagnostic tests for respiratory system trauma, as he was conscious and certain about being injured just at the hand.

The patient was taken to the operating room for treatment of the injured fingers. The laceration of the pulp of the index finger was sutured. The ring finger was prepared for revascularization. Skeletal fixation of the phalanx was achieved with a k-wire. After debridement of damaged soft tissues, repair of the flexor digitorum profundus tendon was performed with a core suture. The severed digital nerve on the radial side was repaired with 9/0 ethilon. The digital nerve on the ulnar side was intact. The digital artery on the radial side was anastomosed with 10/0 ethilon for revascularization. The patient was admitted to the intensive care unit for close observation and monitoring. The pneumomediastinum completely resolved by the ninth day of admission. Edema of the neck, chest, and upper extremity subsided concomitantly. The subcutaneous emphysema almost disappeared by the end of the first week. The patient was discharged within 10 days after admission and reexamined at weekly intervals. The overall outcome of the hand injury was satisfactory (Figure 4).



Figure 2. Massive swelling of the chest, head and neck.

DISCUSSION

Subcutaneous emphysema secondary to injection of air has been reported in several cases in the literature, with circumstances including close contact of skin lacerations to compressed air in industry laborers, invasive interventions such as identification of extradural space in which resistance to the injection of air during epidural analgesia is lost, use of air-driven drills for dental extraction, close contact with air guns due to inserting a hand into a gas pipe to stop leakage, and direct injection of air, all resulting in localized or widespread subcutaneous em-

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