Massive Subcutaneous Emphysema Secondary to a Minor Blunt Chest Trauma: A Case Report

Eugene V. Yeika1,2*, Derrick T. Efie3, Joseph N. Fomengia3, Paul Tolefac2 and Marcelin N. Ngowe4

1Saint Elizabeth Catholic General Hospital and Cardiac Centre Shisong, Kumbo, Cameroon
2Clinical Research Education Networking and Consultancy, Douala, Cameroon
3Banso Baptist Hospital, Kumbo, Cameroon, Health and Human Development Research Network, Douala, Cameroon
4Professor of Surgery, Faculty of Health Sciences, University of Buea, Buea, Cameroon

Abstract

Background: Subcutaneous emphysema is a condition that occurs when air is trapped in the subcutaneous layer of the skin and soft tissues. We report this case to show how a minor blunt chest trauma can result in a life threatening massive subcutaneous emphysema due to a rib fracture.

Case presentation: We report the case of a 70-year-old farmer presenting to the Emergency Department of our centre with moderate chest pain following a fall from his height. Physical examination and a chest X-ray revealed massive subcutaneous emphysema from rupture of parietal pleural by rib fractures. The patient was managed successfully with “blowhole” incisions and chest tube placement.

Conclusion: Although minor traumas are often overlooked and considered to cause low potential injuries, this case report emphasizes on the possibility of developing massive subcutaneous emphysema following a minor blunt chest trauma.

Keywords: Subcutaneous emphysema; Minor chest trauma; Case report

Abbreviations

SE: Subcutaneous Emphysema; NPWT: Negative Pressure Wound Therapy, VATS: Video-Assisted Thoracoscopic Surgery

Introduction

Subcutaneous emphysema (SE) is a well-recognized and infrequent clinical condition that occurs when air is trapped in the subcutaneous layer of the skin or soft tissues [1–3]. SE has many causes amongst which are blunt chest trauma due to rib fractures, head and neck traumas, stabbing or bullet wounds to the chest and infections [3]. Latrogenic causes are the most common resulting from procedures like tonsillectomy, colonoscopies, oxygen administration via nasal cannula, and placement of a nasogastric tubes and dental extractions, head and neck surgeries, intubation, Valsalva manoeuvres and mechanical ventilation [3–6]. Trauma-induced SE can result from facial bone fractures, intraoral trauma or barotrauma in which air is forced into the surrounding soft tissues [3]. Characteristic findings in SE include crepitus and tenderness, facial and neck swelling, dyspnoea, chest pain and odynophagia and occasionally a brassy voice and dysphagia [3,7]. A crunching or bubbling sound (Hamman’s sign) can be heard on auscultation caused by movement of air accompanying cardiac pulsation [7]. In a few cases, SE can become life threatening due to compression of the airways, respiratory tract failure, tension pneumothorax, cardiac tamponade, air embolism, tracheal compression and mediastinitis [3,8]. In such emergency cases, surgical intervention using small “blowhole” incisions, needle punctures, and chest tubes to drain the air is inevitable. We report this case to show how a minor blunt chest trauma can result in a life threatening massive SE.

Case Presentation

A 70-year-old farmer presented with a five day history of chest pain after falling from his height with reception on the right side of the body. The chest pain was progressive, worst on inspiration and associated with an unproductive cough, dyspnoea and later with swelling of the chest, neck, upper extremities and face. There was no fever, difficulty in swallowing or orthopnoea.

Physical examination upon arrival revealed pink conjunctiva and anicteric sclerae. The blood pressure of 132/75 mmHg, pulse rate was 92 beats per minute, respiratory rate 22 breaths per minute, temperature 36.8°C and oxygen saturation 92%. The chest, neck, face and upper extremities were swollen with diffuse cracks on palpation. There were no distended neck veins and the trachea was centralised. There was tenderness on palpation of the right side of the thorax over the 3rd, 4th, and 5th ribs anteriorly. Breath sounds were markedly reduced with diffuse crepitation and Hamman’s sign was present. The heart sounds were normal and regular.

The following investigations were done: chest and abdominal ultrasound scan which revealed subcutaneous air, blood urea nitrogen and serum creatinine which were 35.7 mg/dl and 0.8 mg/dl respectively, a complete blood count which revealed a white cell count of 5.7 × 10^3/mm3, hemoglobin of 13.5 g/dl and platelet count of 120.4 × 10^3/mm3. The X-ray showed fractures of the right 3rd, 4th, and 5th ribs posteriorly and subcutaneous air in the chest, cervical region and upper extremities (Figure 1). We made diagnosis of massive subcutaneous emphysema from rupture of the parietal pleural by fractured ribs.

The patient was managed with chest physiotherapy and multiple “blowholes” incisions. “Blowholes” incisions were made on the chest and upper extremities and oxygen was delivered at a rate of 3 litres / minute via nasal prong. Pain was controlled, using

Figure 1: Chest X-ray before chest tube insertion showing massive subcutaneous air. A. Posterior-Anterior view. B. Lateral view.
intravenous tramadol hydrochloride 100 mg for 12 hours and paracetamol 1 g for 8 hours. Stationary evolution on day two of hospitalisation prompted the placement of a chest tube in the right pleural space (Figure 2). The patient was discharged on the 10th day of hospitalisation and was reviewed two weeks later with complete resolution of the SE.

Discussion
SE is an uncommon complication following minor traumas to the chest [1], but can easily occur in the context of rib fractures. We report this case to create an awareness on the possibility of developing a life threatening SE following a minor chest trauma due to rib fractures and emphasize on the importance of a thorough clinical examination of all trauma patients.

SE is usually diagnosed conventionally with chest x-rays; however, non-contrast computed tomographic or positron emission tomographic scans are more sensitive in cases with low levels of gas accumulate and further define the anatomical location of the SE [1], or in cases associated with other life threatening medical conditions like pneumomediastinum and pneumothorax [3]. Positron emission tomographic and computed tomographic scans are absent in most centres in sub-Saharan Africa. Due to the absence of these scans in our centre, we based our conclusion on the presence of radiolucent striations in the chest x-ray arranged in the region of the pectoral muscle group. Radiological findings in our patient reminded us of the poor correlation of a massive SE with the signs and symptoms.

Most cases of SE do not require a specific treatment, they generally resolves spontaneously [8]. Spontaneous resolution of SE depends on the severity of the SE and it may take several weeks of watchful-awaiting to attain significant resolution [9]. The time to SE resolution varies greatly due to the amount of SE, adequacy of control of escaping air and method of treatment [9, 10]. Many techniques have been developed to provide effective treatment to SE. These treatment modalities include tissue massage, “blowhole” incisions on the skin and subcutaneous fascia to allow air to escape, fenestrated angio-catheter insertion into the subcutaneous space, topical negative pressure wound therapy (NPWT) dressing and video-assisted thoracoscopic surgery (VATS) or open thoracotomy with repair of parenchymal injury [8,9–11]. Oxygen administration at a high flow rate can also be considered in conservative management [8]. This helps to resolve trapped nitrogen by decreasing the surrounding partial nitrogen pressure. “Blowhole” incisions are widely utilized to release trapped subcutaneous air and minimize further progression of air dissection into the face and neck [9]. “Blowhole” placement can be effective in decreasing tense SE over the course of several days; however, complete resolution in massive SE can take a week or more [9]. Insertion of a drain into the subcutaneous tissue provides rapid relief, aided by regular compressive massages. A variety of micro-catheter suction techniques have also been used to evacuate SE [10]. These methods utilize fenestrated angio-catheters or drains placed subcutaneously and set to continuous suction. Angio-catheters can significantly reduce SE within days. A more invasive technique for management of SE includes using VATS [11]. This technique helps to control persistent air leak. NPWT is also used in the treatment of SE and functions via a negative pressure gradient that pulls fluid out of tissues [9]. Our patient presented with a massive SE and was treated by surgical drainage through the use of ‘blowhole’ incisions and the later by insertion of a chest tube.

Conclusion
Although minor traumas are often overlooked as they are thought to bear low potential injuries, this case shows a possibility of developing a life threatening massive subcutaneous emphysema following rib fractures sustained from a minor blunt chest trauma. We recommend critical medical evaluation of all trauma patients.

Declarations

Consent for Publication
Written informed consent was obtained from the patient for publication of this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing Interest
None

Authors’ Contributions
Derrick Efie managed the patient and wrote the original manuscript with Eugene Yeika. Joseph Fomengia, Paul Tolefac and Marcelin Ngowe provided critical revision and correction of the manuscript. All authors read and approved the final manuscript.

References


*Corresponding author: Eugene Yeika, Saint Elizabeth Catholic General Hospital and Cardiac Centre Shisong, Cameroon, Tel: 237-679-934-736; E-mail: eugenembinglo@gmail.com, yeika_eugene@shisonghospital.org.

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