Case Report

Pulmonary laceration

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A R T I C L E    I N F O

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A B S T R A C T

Introduction: Pulmonary laceration is usually caused by penetrating trauma but it can also be found in non-penetrating trauma. It usually resolves quickly and with few problems if proper and timely treatment is given for which an adequate diagnosis is mandatory. In some cases it may require a surgical approach.

Case: A 21 year-old male was admitted after a car accident with multiple trauma lesions. He presented with tachycardia and tachypnea. Thorax CT revealed evident pulmonary lacerations. After placing two chest tubes he evolved favorably.

Conclusion: Since we can usually find different kinds of injuries in multiple trauma, it is important to distinguish pulmonary lacerations from other types of lesions such as pneumothorax or concussions taking special consideration for mechanically ventilated patients and possible associated complications.

Introduction

Pulmonary laceration is usually caused by penetrating trauma but it can also be found in non-penetrating trauma. It is diagnosed by chest computed tomography.

It usually resolves quickly and with few problems if proper treatment is given. In some cases it may require a surgical approach.

Case report

A 21-year-old previously healthy male patient was admitted to the emergency department after collision against a truck while driving a motorcycle with a helmet.

Physical examination showed blood pressure 95/60 mm Hg, heart rate 117 beats/min, saturation 88%, diminished breath sounds on both hemithorax and Glasgow coma scale 10/15.

Endotracheal intubation and mechanic respiratory assistance was performed.

The extended focused assessment with sonography for trauma (eFAST) proved the presence of bilateral pneumothorax without free abdominal fluid or pericardial effusion. Laboratory test results revealed: hematocrit 21%, platelet count 211,000/ml, lactic acid 5.2 mmol/l, lactic acidosis and PaO2/Fio2 180.

After initial assessment, axial computed tomography of the brain, cervical spine, abdomen and pelvis was obtained showing no
lesions. Thorax CT scan (Fig. 1) revealed bilateral pulmonary contusions, bilateral pneumothorax (white arrow) and right oval air-fluid level cavities (black arrows) compatible with pulmonary lacerations.

Two bilateral chest tube drainages were placed, leading to adequate pulmonary expansion and improvement of hypoxemia.

Seven days after admission the patient was extubated. New chest computed tomography revealed improvement of lung lesions. Two days later, the patient was discharged from the intensive care unit with medical follow up.

Discussion

Lung laceration usually appears as a serious consequence of severe blunt chest trauma, penetrating injuries, pleural or lung perforation due to rib fractures or by inertial deceleration. As a result there is disruption of alveolar walls and tearing of pulmonary parenchyma [1,2].

On the initial chest radiograph, around 50% of pulmonary lacerations may go unnoticed since they are commonly obscured by the consolidation associated with pulmonary contusion. As the lung contusion resolves, pulmonary lacerations may become more evident as thin-walled cystic spaces or as soft tissue nodules (pulmonary hematomas). Radiographic images of traumatic lung cysts may resolve within weeks or months, even though these cysts may also persist for years in a few cases. An adequate medical interview on previous chest trauma can be crucial for differentiating between pulmonary nodules and other forms of cystic lung disease, entities with which could be easily be mistaken with [3,4].

When performing computed tomography imaging, traumatic lacerations manifest as ovoid structures due to the elastic recoil of the lung. Blood may completely fill the cavity causing an ovoid pulmonary hematoma or can partially fill the cavity, causing an air-fluid level. Large cystic spaces can be formed, or blunt trauma can create multiple, small, air-filled lung cysts, sometimes referred to as “pulverized” or “Swiss cheese” appearance of the lungs. Several complications may follow pulmonary laceration, being pneumothorax the most common one. Other complications include infection with formation of a pulmonary abscess, the development of a bronchopleural fistula or air embolism.

Pulmonary laceration may be classified in four different types based on the imaging findings. Type 1 is the most common type and it occurs when a sudden compressive force causes alveolar rupture. Type 2 results from shear injury of the lower lung near the spine as a compressive force causes the lung to shift across the vertebral column. Type 3 manifests as lung cysts near the chest wall adjacent to a rib fracture fragment that has directly punctured the pulmonary parenchyma. Type 4 occurs when previously formed pleuropulmonary adhesions tear the lung after sudden movement or fracture of the attached chest wall.

Under mechanically ventilated patients, these lesions may rapidly become larger as a result of positive pressure possibly leading to

Fig. 1. Axial computed tomography of the thorax with bilateral hyper dense lesions compatible with pulmonary contusions, bilateral pneumothorax (white arrow) and right oval air-fluid level cavities (black arrows) compatible with pulmonary lacerations.
the requirement of a surgical approach. Direct connection of the laceration with a bronchus or the pleura determines a bronchopleural fistula with pneumothorax or hemopneumothorax. A pneumothorax, especially during mechanical ventilation, can become a “tension” pneumothorax [5,6]. Despite the fact that only a small proportion of patients with thoracic injury require thoracotomy, of those that proceed to surgery, about one third may require lung resection, usually with the intention to remove severely injured lung tissue, to control hemorrhage, or to remove irreparable proximal bronchus injuries. Of the majority of penetrating injuries, lung-sparing techniques such as simple suture or “tractotomy” are sufficient. Not surprisingly, there is a stepwise increase in mortality with increasing extent of lung resection for trauma: wedge resection (19%), lobectomy (27%), and pneumonectomy (53%).

Pulmonary laceration should be suspected in every trauma, even more when they are related to high energy or high speed accidents. Since we can usually find different kinds of injuries, it is important to distinguish pulmonary lacerations from other types of lesions such as pneumothorax or concussions to which they can be associated.

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ICB and NAG contributed with the writing of the manuscript and presentation of information. MLH and CB were in charge of the conceptual framing and supervision. The manuscript has been read and approved by all the authors, the requirements for authorship have been met, and each author believes that the manuscript represents honest work.

Declaration of competing interest

Authors declare not to have any conflict of interest.

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