



Pathology Biology Section – 2010

G100 Unusual Case of Blunt Chest Trauma Without Rib Fractures Leading to a Major Pulmonary Laceration

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The goal of this presentation is to describe and discuss a case of a major pulmonary laceration after a blunt chest trauma without rib fractures in an infant involved in a car accident as a passenger.

This presentation will impact the forensic science community by demonstrating an infrequently discussed mechanism of lung laceration due to a blunt chest trauma.

Pulmonary laceration is a common result of penetrating trauma but may also be caused by blunt trauma; broken ribs may perforate the lung, or the tissue may be torn due to shearing forces that result from different rates of acceleration or deceleration of different tissues of the lung.

This case involved a 6-year-old, Hispanic healthy female infant who was a partially restricted backseat passenger in a compact vehicle that was traveling along a local highway. She was lying across the back seat when the driver suddenly fell asleep and collided with the back of a large truck. As a result of the impact her body was thrown against the back of the passenger's front seat and died instantaneously.

At autopsy the body corresponded to a well-developed and well-nourished female infant. She was forty inches tall and weighed thirty-two pounds. External examination of the anterior torso disclosed the presence of a horizontal linear abrasion over the superior aspect of the left hemithorax. Also a small elliptical contusion was over the superomedial aspect of the right hemithorax. Other small abrasions were present in the lateral aspects of the right upper and lower quadrants of the abdomen and posterior aspect of the right arm. The body had no other external signs of trauma. Upon reflection of the skin of the anterior thorax, no hemorrhagic infiltrates were present. There were no rib fractures. The left pleural space had 420 mL of liquid blood. The right pleural space and pericardium had no hemorrhages. The left lung had an extensive oblique laceration that practically transected the upper lobe, from the apex to the inferior medial aspect of the base. In addition multiple contusions were present over the anterior and posterior aspects of both lungs. The rest of the thoracic and abdominal organs had no lesions. Toxicological evaluation was negative for alcohol, cocaine, opioids, and cannabinoids.

Major laceration of the lung is a rare and not a well-recognized complication of blunt chest trauma. Pulmonary laceration caused by blunt high-energy trauma results from a mechanical shear or puncture that disrupts the parenchyma, creating a cleavage plane within the lung. The mechanism of development of pulmonary laceration after blunt chest trauma is usually thought to be the result of direct impact leading to rib fractures and thereafter, the broken ends of the ribs directly tearing the lung. However, the absence of rib fractures in this infant makes this mechanism unlikely. In 1988 a group led by R.B. Wagner divided pulmonary lacerations into four types based on the manner in which the person was injured. In type 1 the laceration results from sudden compression of the thorax causing rupture of the lung. They usually occur in a central location of the lung and tend to be large as in this case. Type 2 laceration results from severe compression of the pliable lower thorax of younger patients. Sudden herniation of the lower lobe in front of the vertebral bodies causes a paravertebral shear injury with laceration. Type 3 lacerations result from direct puncture of the lung by a displaced rib fracture. Type 4 results from lung shearing at sites of pleural adhesions.

This case represents a particular mechanism involved in a blunt chest trauma in which a high-energy non-penetrating injury was applied to one hemithorax leading to a major unilateral pulmonary laceration without other organ involvement.

Pulmonary Laceration, Chest Trauma, Car Accident