



G11 When Ribs Penetrate the Heart in Blunt Chest Wall Trauma

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After attending this presentation, attendees will be able to identify with the possible mechanism of penetrating trauma caused directly to the heart by the fractured ends of the ribs in run over traffic mishaps.

This presentation will impact the forensic science community by illustrating a type of injury that is well known but rare. The injury is reported for the first time in a run over traffic accident. Cardiac lacerations caused directly as a result of rib fractures although a rare phenomenon in blunt force trauma to the chest, its possibility should be explored so that prompt and early treatment saves the patient from a fatal outcome.

Cardiac damage in non-penetrating chest trauma is uncommon. Direct penetrating injuries to the heart are commonly observed in stab and gunshot wounds. The fractured ends of the ribs are very rarely reported to cause penetrating injuries to the heart. One such rare case where the sharp ends of fractured ribs has caused extensive damage to the heart in a run over vehicular accident is reported. The reported rare case illustrates the possible mechanism of direct cardiac injuries from broken sharp jagged fractured ends of ribs in blunt force trauma to the chest in run over traffic mishaps.

A 45-year-old male fell from a moving bus while trying to get off. By the time brakes were applied, the moving bus had run over the left side of his chest, neck, and head. The victim died instantly and the body was subjected to medicolegal autopsy. On external examination, the head and face of the victim was deformed. Underlying comminuted skull fractures were palpable. No external injuries were evident on the chest region. Avulsed lacerations were present on the lower limbs. Internal examination revealed multiple fractures of the cranial vault and base of the skull with diffuse subdural and subarachnoid hemorrhage, intraventricular bleeding, and extensive brain damage. Fractures of the 2nd to 6th ribs in anterior axillary line on the left side, and fracture of 1st and 2nd ribs in mid-clavicular line on the right side with corresponding chest wall muscle contusions were present. Pleura contained 300 and 400 ml of frank blood in the right and left sides respectively. Pericardium was torn and extensive damage to the left ventricle was evident. The heart weighed 280 grams. Transmural lacerations of the left ventricle were present, corresponding to the pointed fractured ends of the ribs on the left side. Peritoneal cavity contained 200 ml of blood. Multiple lacerations over the right liver lobe were present. All visceral organs were pale on cut section. Lungs escaped any major trauma in the reported case.

The rib cage acts as a protection for the thoracic organs and support for the vertebral column. Penetrating injuries to the heart in blunt chest trauma thus remain uncommon. Even when the ribs are fractured recoil of the intercostal muscles keeps the architecture of the rib cage intact preventing subsequent injuries to the thoracic organs. Fractured ribs at times may act as a weapon of offense causing damage to the underlying organs directly. In the present case of a run-over traffic mishap, no external injuries or deformity were apparent on the chest wall. On internal examination, intercostal muscle contusions were present but apparently the rib cage had retained its shape due to recoil of the intercostal muscles. It was only on further dissection that the major insult to the pericardium and the heart was observed. It is illustrated how the sharp jagged ends of the fractured ribs move medially on external pressure to cause penetrating injuries to the heart. It is proposed that as a consequence of the transient phenomenon of deformation of chest cavity under pressure in run over traffic mishaps, the projecting fractured ends of the ribs penetrate the underlying thoracic organs causing fatal injuries.

Ribs, Heart, Run Over Traffic Mishap