



## The “Mediastinal Box” Has Four Sides

Ilya Shnaydman, Saskya Byerly, Howard Lieberman and Kenneth Stahl\*

Department of Trauma and Acute Care Surgery, The University of Miami School of Medicine, USA

### Clinical Image

Thoracic trauma accounts for approximately 25% of fatal civilian penetrating injuries in the United States [1]. Patients who suffer intrathoracic injury to one of the major structures of the mediastinum generally present in extremis and require emergent surgical intervention [2]. Therefore thoracic injuries to the mediastinum pose significant management challenges for both diagnosis and surgical treatment. The exact number of penetrating mediastinal trauma patients who suffer direct cardiac injuries in civilian life is hard to know as estimates range up to 90% of patients with heart injuries do not survive to reach hospital care [3].

Thoracic surgeons and trauma surgeons are taught to be extra vigilant when presented with wounds that fall within the anatomical confines of the surface projection of the mediastinum that has been called the “mediastinal box”. This area is defined superiorly as the level of the manubrium, laterally to the outer third of the clavicles and inferiorly to the level of the xiphoid. In the rush of emergency care, it is easy to forget that this box projects all the way through the patient posteriorly and also laterally such that any penetration within the three dimensions of this area pose a risk of major mediastinal structure injury. This can occur with a posterior injury or penetration of this anatomical region laterally through the axilla. This was poignantly reinforced in our center with a recent case of an isolated stab wound to the back. See photo number one below.

A 70-year-old female presented with single stab to back following a domestic dispute. She arrived to Ryder Trauma Center in cardiac arrest with CPR in progress. Resuscitative thoracotomy was performed demonstrating cardiac tamponade with injury to both posterior and anterior

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#### \*Correspondence:

Kenneth Stahl, Department of Trauma and Acute Care Surgery, The University of Miami School of Medicine, Ryder Trauma Center, Jackson Memorial Hospital, 1800 NW 10th Avenue, Suite T-215, Miami, FL 33136, USA, Tel: 305-326-7065; Fax: 305-326-7065; E-mail: [kstahl@med.miami.edu](mailto:kstahl@med.miami.edu)

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Figure 1: Single stab wound to left side of back.



Figure 2: Repair of cardiac injury.

surface of the heart. Return of spontaneous circulation was unable to be obtained and the patient succumbed from these injuries (Figure 1 and 2). Even an innocent lateral or posterior penetrating wound that lies within the surface projection of the mediastinum can cause devastating intra-mediastinal injuries. Trauma surgeons and thoracic surgeons who manage these patients occasionally need to be reminded that the “mediastinal box” is not just defined on the anterior thorax but is a three-dimensional construct that can allow fatal intrathoracic injuries from any angle.

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