Dear Editor,

A healthy 21-year-old male patient was admitted to the emergency department 25 min after head-on motor vehicle collision. On admission, the patient was conscious, pale; his respiratory rate was 26–28 breaths/min, his blood pressure was 80/50 mmHg, and his pulse was 112 beats/min. The patient had no clinical signs of head injury and musculoskeletal trauma. Focused Assessment with Sonography for Trauma (FAST) revealed free fluid in the left hemithorax (<500 ml) only, no hemoperitoneum and hemopericardium. Despite resuscitation, the patient remained unstable. Computed tomography head, neck, chest, and abdomen were performed which revealed massive left-sided hemothorax [Video 1]. No other injury was found. The patient was immediately transferred to the operating room and left-sided anterolateral thoracotomy was performed (40 min after admission, 65 min after trauma), which revealed massive hemothorax (more than 4 L blood), rupture of pericardium, and both atria [Figures 1 and 2]. However, this was the instance when the surgeon “lost heart:” The patient’s heart because the patient developed persistent asystolia and died intraoperatively and his own heart because of a delayed diagnosis of an extremely complex injury.

Blunt thoracic trauma is a significant cause of hospitalization and mortality due to trauma in most countries with different socioeconomical conditions, accounting for 66% of all thoracic injuries and 25% of all mortalities due to trauma.[1] The cardiac rupture caused by blunt thoracic trauma is rare, making up 0.041–0.5%; however, resulting in high mortality up to 90%.[2] The most common cause of blunt injury to heart is motor vehicle accidents, followed by auto-pedestrian accidents, falls from a height, and crash injury.[3] Rupture of two cardiac chambers is extremely rare, accounting for about 9% of all cardiac ruptures and is associated with extremely high mortality.[3]

The most common mechanisms of blunt cardiac rupture are described in Table 1.[2-4] The mechanism of the injury in our patient seems to be the compression of the heart between the sternum and vertebral column in late diastole or early systole.

| Table 1: Mechanisms of blunt cardiac rupture |
|---------------------------------------------|
| **Mechanisms of cardiac rupture**          |
| Direct precordial impact                    |
| Compression of the heart between the sternum and vertebral column |
| Rapidly increased hydrostatic intraatrial pressure transferred from the abdomen and lower extremities |
| Sudden forceful deceleration                |
| Evolution of myocardial contusion to necrosis |
| Direct injury secondary to orthopedic injuries of the chest wall |
| Lateralizing shear forces                    |
| Late diastole or early systole (full chambers) |

The instance when a general surgeon “lost heart:”
Isolated blunt traumatic rupture of both atria and pericardium

Figure 1: Rupture of the right atrium shown by arrows (autopsy picture)

Figure 2: Rupture of the left atrium shown by arrows (autopsy picture)
The most commonly injured heart chamber is right atrium, accounting for about 50% of all blunt cardiac ruptures.\textsuperscript{[3]} The most challenging cases are the presence of combined pericardial rupture with blunt cardiac rupture which is encountered in 8% of cardiac injuries and is associated with the survival rate of <15%.

A surgeon facing this classical picture of cardiac tamponade, such as Beck’s triad, is always ready to perform even emergency room thoracotomy. Pericardial rupture saves the heart from tamponade; however, it contributes to massive hemothorax, thus obscuring the clinical picture and leading to a delay of the diagnosis and mortality.\textsuperscript{[3,4]}

To conclude, general surgeons, trauma surgeons, and emergency physicians should be aware of coexisting pericardial rupture complicating the diagnosis of cardiac rupture and leading to massive hemothorax rather than to cardiac tamponade. They also should be aware that in such cardiac injury FAST can be negative, and clinical presentation of persistent shock with hemothorax should be the indication to prompt surgical management.

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