Management of Cardiac Injury by Stab Wounds on the Right Lateral Chest Wall: a Case Report

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Abstract The report presented a 20-year-old male case with multiple stab wounds on the right lateral chest wall, and a latent heart injury was found during the right lateral thoracotomy. A laceration on the right ventricle was verified by a median sternotomy and repaired using an Inforce suture. The clinicians should not neglect the lower probability of life-threatening thoracic injuries following stab wounds to the chest, despite the initial location of anatomy.

Keywords Cardiac injury · Stab wounds · Thoracic trauma · Thoracotomy

Introduction

Hemodynamically unstable patients with penetrating thoracic wounds would more likely be considered as being accompanied with a cardiac injury, especially when the wounds were located on the left or anterior chest wall. Individuals with prompt ongoing aggressive resuscitation and emergency thoracotomy might have a favorable prognosis [1]. As to the cases whose wounds were located at the right or right lateral chest wall, the cardiac injuries found, at least, would not be the first diagnosis for doctors. It was only theoretically found and rarely reported in the literature due to the anatomy. Negligence of the low probability affair would be a disaster to the patient concerned.

Case Report

A 20-year-old male presented in the emergency room with multiple stab wounds on the right lateral chest wall about 4 h

prior to his arrival. On admission, he could speak and localize pain. He was agitated and pale with the blood pressure 90/60 mmHg. A tachycardia of 110 beats per min was detected, but no murmur was heard in the apex area. There were six stab wounds located at his right lateral chest wall (Fig. 1a), from sixth to eighth intercostal spaces, and three of them were penetrating wounds with active bleeding controlled by applying pressure using a towel. Accompanied with the intravenous transfusion of crystalloid fluid and red cells, the computed tomography of the thoracoabdominal region showed mass hemothorax and atelectasis in his right thoracic cavity (Fig. 1b). Again with the report of the ultrasonography in the absence of blood in the pericardium and upper abdomen, the patient was sent to the operating room for a thoracotomy.

After intubation, a right lateral thoracotomy was promptly performed. When cleaning a mass blood clot, two lacerations on the right lower lobe and one on the diaphragm (not penetrating) were found and repaired, respectively. Moreover, a rupture of the right internal mammary artery and a slight rib fracture were found during the exploration to the lowest wound tunnel. After suturing the ruptured vessel, the thoracic cavity was washed for several times, and a final check was performed for the operation. Just before closing, it was noticed that there used to be a small blood string from the position behind the sternum. Finally, a 5-mm hole was found on the anterior pericardium. With the high index of suspicion of a latent cardiac injury, a median sternotomy incision was made immediately. With the cardiopulmonary bypass (CPB) prepared, the pericardium was opened. An about 1-cm arc-shaped bleeding laceration was located at the right ventricle between the left anterior descending and right coronary artery (Fig. 1c). After about 30-min observation, confirmation was available that no ST-T change found in the ECG and abnormalities to the heart by the transesophagus echocardiography (TEE). Then, the laceration was carefully repaired with an Inforce suture by 3/0 Prolene (Ethicon) without CPB. The patient

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Fig. 1 **a** Stab wounds on the right chest wall (3 months after surgery). **b** The CT scan before surgery. **c** The laceration on the right ventricle

recovered soon and was discharged 7 days after surgery without complications or sequelae.

Discussion

Penetrating thoracic wounds is a potentially life-threatening injury, particularly when the area of penetration is located on the left or anterior chest wall. For cardiac injury, an immediate thoracotomy is needed, and the survival rates are usually reported to be around 9–12 % postoperatively [2].

In this case, the continuing bleeding and hemothorax found by serial physical examination and radiology are the indications of the immediate intervention. No one might prefer to perform the sternotomy first to treat this right-sided stab wounds case without any signs of cardiac injury. Actually, the similar case under this circumstance can hardly be found in the current literature. During the laterothoracotomy, exploration of the wound tunnels indicates that the young man was a typical stab victim. These wounds were caused by a long sharp blade, which is approximately 8 to 10 in. long which might cause quite traumatic injury internally, although the external wound may appear deceptively innocuous. The tip of the blade stabbed into the subcutaneous tissue, moving along with the rib and finally into the right thoracic cavity, ruptured the vessel and lacerated the right ventricle behind the sternum. The cardiac lesion was located in, so hiding a place that it could not be found by baseline examinations.

Penetrating cardiac wounds were fatal due to tamponade, exsanguination, injury to the major valves and conduction

system, or laceration to the coronary arteries and fistula between the aorta and heart [3]. A latent hemorrhage or valve insufficiency was also reported in the literature [4]. With a thorough understanding of these situations, the TEE was taken for intracardiac structures, while the ECG was observed for coronary artery in the reported case. These two measurements were not only efficient but also recommended for avoiding sequelae when the urgent situations were under control.

The fortunate operation on the unfortunate patient availed us to make the summary that the clinicians should not neglect the lower probability of life-threatening thoracic injuries following a stab injury to the chest, despite an initial location of anatomic position.

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