Stroke complicating penetrating heart injury: Keys to the diagnostic workup and management

Sir,

Stroke is a rare but serious complication of penetrating heart injuries (PHIs). This complication should be suspected in patients with focal neurologic signs.

A 28-year-old man was brought to the emergency department with a single stab wound to the left fourth intercostal space. He had no associated injuries. He was agitated with a blood pressure (BP) of 80/60 mmHg and a heart rate of 130 bpm. The external jugular veins were distended. Cardiac tamponade was highly suspected, rapid fluid resuscitation was initiated, and pericardiocentesis was immediately performed with aspiration of 75 ml of nonclotting blood. The patient was emergently transferred to the operating room where a left posterolateral thoracotomy was done. The effusion was evacuated. A laceration measuring 2 cm in length over the left ventricle was repaired.

Transient episode of asystole has occurred. He responded to internal cardiac massage and intravenous epinephrine, followed by initiation of the massive transfusion. A 32 French chest tube was left in the left pleural cavity and the chest was closed.

Postoperatively, the patient was admitted to the Intensive Care Unit. His BP was stabilized with 1 mg/h of norepinephrine and was extubated on the following day. A bedside transthoracic echocardiography (TTE) was performed on postoperative day 1 with normal left ventricular (LV) size and good ventricular wall function.
The patient was weaned off of vasopressors by postoperative day 2. However, the patient remained somnolent and developed right-sided hemiparesis and a partial visual field loss. Brain computed tomography (CT) scan showed the bilateral occipital and right frontal cortico-subcortical hypodensities [Figure 1a and b]. Brain magnetic resonance imaging (MRI) performed shortly after the CT scan revealed the bilateral frontal and right occipital high-signal lesions in fluid-attenuated inversion recovery compatible with recent infarct on the diffusion-weighted imaging B1000 image [Figure 1c and d] associated with the presence of microbleeds on T2-weighted image [Figure 1e and f]. These imaging findings were suggestive of cardioembolism.

Repeated TTE showed no abnormal findings. Transesophageal echocardiography found neither intracavitary thrombus nor patent foramen ovale. There was only a thin rim of pericardial effusion.

An emergency neurology consultation was called. Given the high suspicion of cardioembolic source of the stroke, it was decided to start careful anticoagulation therapy. The patient was discharged after 2 weeks of hospital stay. At last follow-up, we noted a significant neurofunctional improvement.

We propose through this case presentation to summarize the main causes of heart trauma-related sources of embolism and the current approaches for the diagnosis and management of this complication.

**Figure 1:** (a) Noncontrast computed tomography: Bilateral occipital cortico-subcortical hypodensities. (b) Noncontrast computed tomography: Right frontal cortico-subcortical hypodense area. (c) Axial fluid-attenuated inversion recovery image: bilateral frontal and right occipital high-signal lesions (arrow) compatible with recent infarct on the diffusion weighted imaging B1000 image (d). (e) Axial fluid-attenuated inversion recovery image: bilateral occipital high-signal lesions with microbleeds (arrow) on T2-weighted image (f)

**Figure 2:** Sources of embolic stroke complicating penetrating heart injury *late presentation; Blue boxes: the main causes. LV: left ventricle; LA: left atrium; PFO: patent foramen ovale; VSD: ventricular septal defect; RPA: right pulmonary artery; ACF: aortocaval fistula; RV: Right ventricle
Stroke complicating PHI is a preventable and treatable complication: Heparin anticoagulation followed by warfarin is the first-line treatment for most causes of cardioembolic stroke. Anticoagulation therapy affords substantial protection against early recurrent emboli. However, this benefit must be weighed against the risks of hemorrhage.


echocardiographic periodic follow-up is mandatory.[5]

- Neuroimaging features: Neuroimaging studies, including CT and MRI, are the important diagnostic tools. As illustrated by our case, bihemispheric combined anterior and posterior circulation or bilateral or multilevel posterior infarcts are suggestive of cardioembolism. Hemorrhagic transformation of an ischemic infarct and early recanalization of an occluded intracranial vessel are suggestive of a cardiac origin of the stroke.

- Stroke complicating PHI is a preventable and treatable complication: Heparin anticoagulation followed by warfarin is the first-line treatment for most causes of cardioembolic stroke. Anticoagulation therapy affords substantial protection against early recurrent emboli. However, this benefit must be weighed against the risks of hemorrhage.[3]

Stroke is a relatively rare but well-documented complication of PHIs. Echocardiography is the cornerstone imaging modality for diagnosis of LV thrombi and other trauma-related sources of embolism. Anticoagulation therapy should be conducted carefully to prevent the first or recurrent stroke after PHIs with close clinical and neuroimaging monitoring.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References
1. Bamous M, Abdessamad A, Tadili J, Kettani A, Faroudy M. Evaluation of penetrating cardiac stab wounds. Scand J Trauma Resusc Emerg Med 2016;24:6.
2. Pepi M, Evangelista A, Nihoyannopoulos P, Flachskampf FA, Athanassopoulos G, Colonna P, et al. Recommendations for echocardiography use in the diagnosis and management of cardiac sources of embolism: European Association of Echocardiography (EAE). Eur J Echocardiogr 2010;11:461-76.
3. Dunne B, Tan D, Ildayhid A, Xu XF, Edwards M, Merry C. Penetrating cardiac injury managed without surgery but with systemic heparinisation. Heart Lung Circ 2015;24:e210-3.
4. De Bruin G, Pereira da Silva R. Stroke complicating traumatic ventricular septal defect. J Emerg Med 2012;43:987-8.
5. Reddy D, Muckart DJ. Holes in the heart: An atlas of intracardiac injuries following penetrating trauma. Interact Cardiovasc Thorac Surg 2014;19:56-63.

How to cite this article: Jendoubi A, Bourguiba B, Gaja A, Houissa M. Stroke complicating penetrating heart injury: Keys to the diagnostic workup and management. Saudi J Anaesth 2017;11:239-41.
© 2017 Saudi Journal of Anaesthesia | Published by Wolters Kluwer - Medknow