CASE REPORT

Post-traumatic Left Ventricular Aneurysm with Massive Hemopericardium in a Child Presenting 3 Years After a Fall

Wei-Ting Lai a, Shan-Miao Lin a, Shyr-Jao Wu b, Haw-Kwei Hwang a,c,d, Chun-Chih Peng a, Ming-Ren Chen a,d,*

a Department of Pediatrics, Mackay Memorial Hospital, Taipei, Taiwan
b Department of Cardiovascular Surgery, Mackay Memorial Hospital, Taipei, Taiwan
c Department of Pediatrics, Taipei Medical University, Taipei, Taiwan
d Mackay Medicine, Nursing and Management College, Taipei, Taiwan

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A 7-year-old boy developed a left ventricular aneurysm with massive hemopericardium 3 years ago due to a fall from a fourth-floor window. He had mild neurological sequelae including cranial nerve III palsy and abnormal electroencephalography findings at that time. He had no chest pain until recently when he presented with chest tightness and abdominal pain for 2 days prior to admission. Chest X-ray showed marked cardiomegaly. Echocardiography revealed massive pericardial effusion and a large left ventricular aneurysm. The massive hemopericardium was surgically drained, and the aneurysm was resected under cardiopulmonary bypass. He was discharged uneventfully 1 week after operation. Because symptoms and signs can vary in patients with ventricular aneurysm, we strongly suggest a close clinical follow-up, preferably with chest X-ray or echocardiography, for patients experiencing a blunt chest trauma.

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1. Introduction

Forceful blunt chest trauma is known to cause a wide spectrum of cardiovascular injuries, including myocardial contusion, cardiac valvular injury, pericardial and myocardial rupture, aortic dissection, aortic rupture, and
aneurysm or pseudoaneurysm. Damage to the heart is not usually uppermost in the minds of physicians dealing with acutely injured persons, and the manifestations of cardiac trauma can be easily omitted when other more obvious injuries are present. Herein, we present a case of post-traumatic left ventricular aneurysm with massive hemopericardium, which developed 3 years after a fall.

2. Case Report

A 7-year-old boy had suffered from a fall from a fourth-floor window 3 years ago. He had multiple skull bone fractures, cranial nerve injuries, epidural hematoma, intracerebral hemorrhage, subarachnoid hemorrhage, seizures, and left femoral bone fracture. He underwent orthopedic surgery with open reduction and internal fixation, and gradually recovered after intensive care. The patient was discharged with mild neurological sequelae including right cranial nerve III palsy and abnormal electroencephalography findings. He was regularly seen by neurologists and treated with anticonvulsants.

The patient had no chest pain until recently when he complained of chest tightness and abdominal pain 2 days prior to admission. He had a seizure episode while walking and was sent to our emergency department. He was admitted to the pediatric intensive unit due to severe shortness of breath. On admission, he was in sinus rhythm with a heart rate of 116 bpm. His blood pressure was 98/55 mmHg. Physical examination showed a distant heart sound, a grade I/VI systolic murmur, and mild hepatomegaly. Chest X-ray showed marked cardiomegaly. A 12-lead electrocardiography revealed sinus tachycardia and T wave inversion in the lateral leads suggestive of ischemia. A two-dimensional transthoracic echocardiogram revealed massive pericardial effusion and a large left ventricular aneurysm measuring 4.1 × 3.4 cm², which connected with the left ventricular chamber through a neck portion with turbulent flow measuring 3.8 cm (Figure 1). A computed tomographic (CT) scan also showed the same findings (Figure 2). Because echocardiography and CT scan were sufficient for diagnosis, we did not perform angiography. The patient underwent emergent operation on that day. Surgical repair was performed through a median sternotomy with the use of cardiopulmonary bypass. During the operation, a total amount of 350 mL of hemopericardium was drained. The left ventricular aneurysm, which measured 8.0 × 3.5 cm² and included some blood clotting, was totally resected, and the ventriculotomy incision was closed with a knitted Dacron patch (Figure 3). The postoperative course was smooth, and the patient was discharged on the 8th postoperative day. Follow-up echocardiography showed no residual aneurysm. He was symptom-free at the 6-month follow-up.

3. Discussion

Cardiac ventricular aneurysms are quite rare in the pediatric population. These aneurysms are multifactorial in origin. Left ventricular aneurysms can be congenital or acquired. The congenital form probably is caused by endocardial fibroelastosis, myocarditis, or ischemic myocardial injury during the fetal period. The acquired form

Figure 1 Preoperative two-dimensional apical four-chamber view of the left ventricular aneurysm.

Figure 2 Computed tomography scan of the left ventricular aneurysm: (A) axial view and (B) coronal view.
may develop after transmural myocardial infarction (55%), particularly inferior wall myocardial infarction; cardiac surgery (33%); trauma (7%); or infection (5%).

Cardiothoracic trauma occurs in approximately 30% of all traumatized patients. The mechanism of cardiac injury from blunt trauma can be either a direct compression between the sternum and the vertebral column, or a sudden increase in the intrathoracic pressure from abdominal and lower extremity compression causing a "hydraulic ram effect". When there is a sudden deceleration of the chest with the heart thrust forward against the sternum, the tensor apparatus of the atrioventricular valves or the cusp of the aortic valve may rupture. The majority of blunt cardiac injuries are myocardial contusions. Other injuries from blunt trauma include valvular insufficiency, septal defects, coronary artery injury, and, rarely, a myocardial aneurysm, which develops after acute rupture of an infarcted area of the left ventricle.

Several mechanisms are considered to lead to the formation of a post-traumatic ventricular aneurysm. The contusion of the myocardial wall, a vascular lesion involving the left anterior descending coronary artery with subsequent ischemic necrosis, or an intramyocardial dissection after blunt chest injury is thought to result in the formation of aneurysm. In our patient, post-traumatic myocardial dissection is likely to be the mechanism responsible for aneurysm formation years after the accident. In addition, injury of the coronary artery, most commonly the left anterior descending artery, also played an important role. Either transmural myocardial contusion and necrosis or trauma-induced thrombosis of coronary vessels causes ischemic damage leading to the formation of a true aneurysm (wall formed by the scarred myocardium), while pseudoaneurysm (hematoma from ventricular rupture contained by pericardium) often follows penetrating trauma. Our patient is an example of a case with chest contusion leading to true aneurysm associated with gradually developing hemopericardium. We speculate that the aneurysm developed slowly over the past 3 years. Although the pathology of the present case was not diagnostic, we consider this case as an example of acquired lesion because the patient had negative radiographic finding initially. Symptoms and signs in patients with ventricular aneurysm appear to be variable, so we strongly suggest a close clinical follow-up, preferably with chest X-ray or echocardiography, for patients experiencing a blunt chest trauma.

References

1. Stephenson JD, Hulse MA. Combination of traumatic thoracic aortic pseudoaneurysm and myocardial contusion leading to left ventricular aneurysm. Pediatr Radiol 2006;36:258–62.

Figure 3 Surgical photograph of the left ventricular aneurysm.