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• Case Report •

Penetrating Cardiac Injury and Traumatic Pericardial Effusion Caused by a Nail Gun

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Penetrating cardiac injury caused by nail gun is an uncommon life-threatening condition characterized by a rapidly severe hemodynamic status compromise. We report non-contrast-enhanced CT findings of a right ventricle myocardium injury leading to a fluid collection in the pericardial space with the same attenuation as blood. The CT findings well depicted the pathological feature of a significant cardiac injury and may be helpful for the surgical management. [J Trauma Inj 2017; 30: 21-23]

Key Words: Nail gun, Cardiac injury, Pericardial effusion, CT

I. Introduction

Penetrating cardiac injury caused by a nail gun is a rare condition of very poor prognosis and mortality rates around 80%.(1,2) The severity of the injury varies depending on the applied force and the size of the nail, and prognosis is worse with the presence of cardiac tamponade.(1,2) We report the case of a penetrating cardiac injury caused by a nail gun with the characteristic imaging findings depicting the precise localization and characterization of the myocardial and pericardial lesion.

II. Case

A 21-year-old man presented to the emergency department with a wound in the anterior chest wall, accidentally caused by a nail gun. The patient complained of chest pain. Mental status was alert. The patient was tachycardic (120 beats per minute), with a blood pressure of 110/70 mmHg; other vital signs were stable. Physical examination was otherwise unremarkable. A chest radiograph showed a nail penetrating the anterior chest wall at the lower third of the sternum (Fig. 1A,B). Cardiac injury was suspected, and a non-contrast computed tomography (CT) scan of the chest was performed, since the patient reported previous allergy to contrast media; this examination documented that the distal tip of the nail perforated the sternum, with a pericardial effusion, and possible involvement of the anterior wall of the right ventricle (Fig. 2A,B). The total length of

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the nail was 4.2 cm, as measured on the CT scan. The patient underwent an emergency sternotomy and pericardiotomy. The nail was removed from the wall of the right ventricle, and pericardial and left pleural drains were left in place. The pericardium was left open and the myocardium did not require repair, since the nail did not fully penetrate the ventricular wall. The bleeding stopped spontaneously. Despite to have suffered a penetrating cardiac injury, eight days after hospital admission transthoracic echocardiogram was performed and reported no abnormalities. During the postoperative course, the patient's hemodynamic sta-

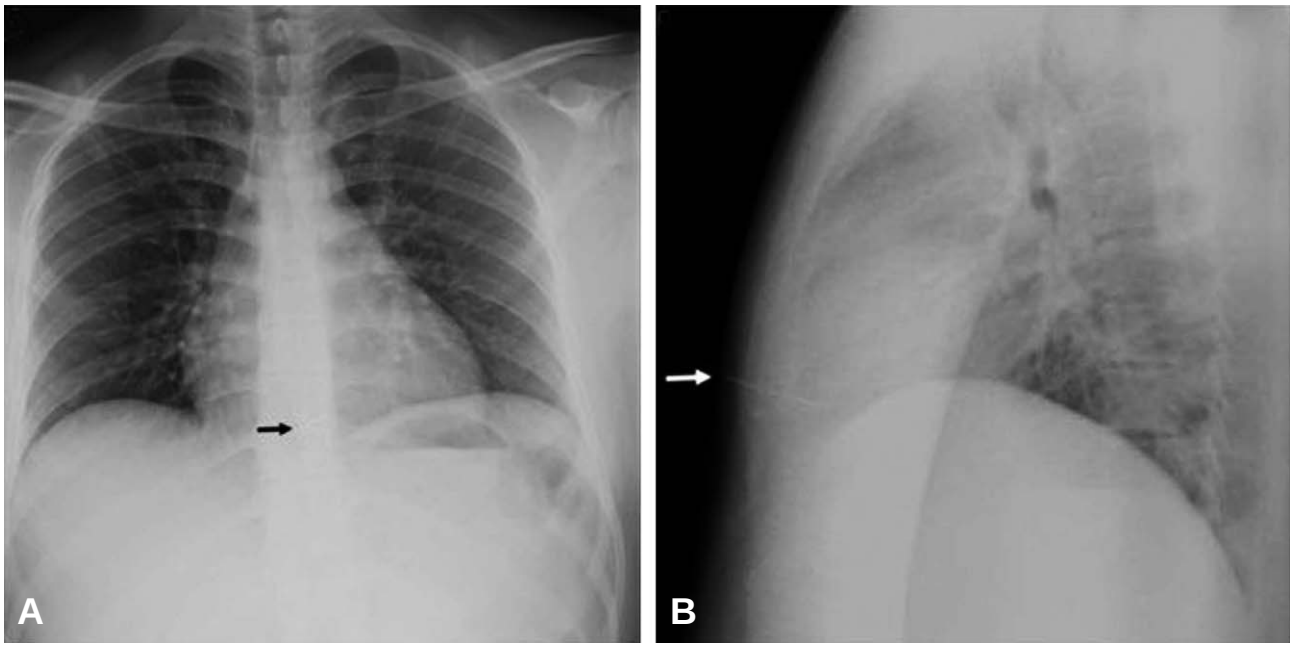

Fig. 1. AP (**A**) and lateral (**B**) chest radiographs reveal a nail (arrows) penetrating the lower sternum, with the tip pointing towards the heart. On the AP projection, the heart shadow appears enlarged, suggested a possible pericardial effusion.

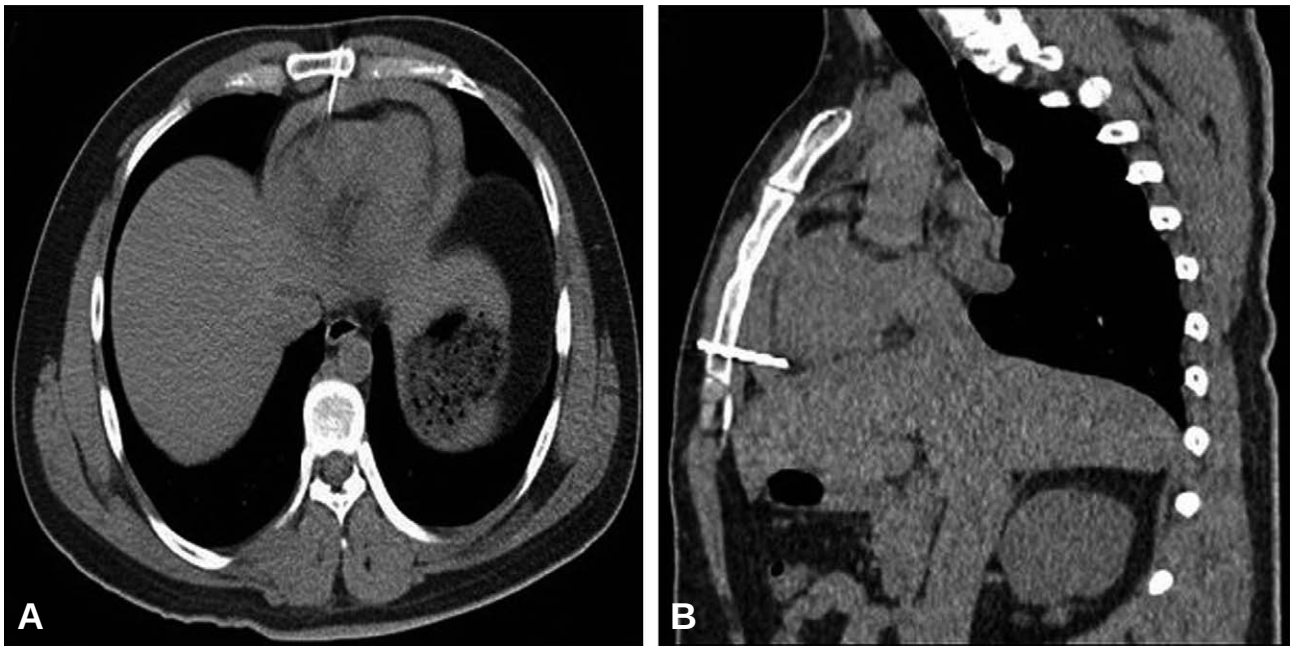

Fig. 2. Noncontrast CT scan of the chest, axial source image (**A**) and sagittal reformatted image (**B**) reveal show that the nail has penetrated the heart wall and caused a pericardial effusion.

tus remained stable. He was discharged in good clinical condition nine days after surgery.

III. DISCUSSION

Most of penetrating cardiac injuries are caused by firearms (65%) and stab wounds.(3) Nail gun injuries are uncommon and have been reported as work-related in male adults with a death risk of 25%. To reduce the risk of injury while manipulating nail guns, adequate training by experienced workers is important.(4) Patients with a rapidly deteriorating hemodynamic status may have a cardiac tamponade and require immediate surgical intervention;(5) referral to highly experienced institutions may be considered with better postoperative outcomes.(4) In this case, the patient never presented signs of hemodynamic instability, probably because bleeding into the pericardial space was gradual since the nail did not fully penetrate the myocardial wall. CT scan is an important imaging aid to diagnose cardiac injury in patients who present hemodynamically stable. Findings such as hemopericardium and pneumopericardium in CT scan have a sensitivity of 76.9% to detect cardiac injury.(6) In those patients, an urgent thoracoscopy previous to a thoracotomy is recommended, since injuries that do not penetrate myocardium can be managed with a minimally invasive approach. In the scenario when the patient is hemodynamically unstable, an urgent thoracothomy is recommended, since the risk of the foreign body penetrating the myocardial wall is high. Even though this is a rare case, the management of a penetrating cardiac injury requires and accurate diagnosis with the best and fastest imaging aid available and a rapid surgical intervention in order to reduce possible complications and death. This case highlights the above mentioned.

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