# Cardiac Perforation Due to Crochet Hook: A Pediatric Patient with Penetrating Cardiac Injury

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## Introduction

In adult and pediatric patients, major cardiac trauma is an important cause of mortality (1-3). Although cardiac injury is a trauma encountered throughout the history, the true incidence has not been determined yet (1, 3, 4). In children, blunt cardiac injury is reported after major trauma and penetrating injuries are reported to occur particularly after stabbing, gun shot injuries or diagnostic cardiac catheterization (1, 5, 6). These patients require emergent medical intervention because of the possible mortality (5, 7).

Home accidents are the leading case of morbidity and mortality during childhood, caused by stabbing kitchenery, chemical and hot materials. However, penetrating cardiac injuries caused by home accidents are seen rarely (8).

We report a pediatric patient who has a penetrating cardiac injury due to home accident caused by falling down over a crocket hook.

## Case Report

A four-year-old girl who was healthy until she fell down over a crochet hook and stabbed the needle to her left chest. She removed the needle from her chest by herself. The patient admitted to the emergency department due to her annoying crying. She seemed to be agitated, and only a small hole of 1mm in diameter was noted 2 mm under her left nipple. The heart rate, respiration and blood pressure were measured as 189 per minute, 55 per minute and 80/50 mmHg respectively. And the physical examination was normal except for the sinus tachycardia and deep heart sounds. The complete blood count was found as 8.9 gr/dl for hemoglobin, %27 for hematocrit and 365.000 / mm3 for platelet count. Sinus tachycardia with a sinus rate of 190 beat/minute was observed in her electrocardiogram. Telecardiography was within normal limits with cardio-thoracic ratio of 50% (Picture 1). After the cardiovascular support with intravenous fluid and blood infusion is initiated, the emergency echocardiography revealed pericardial effusion with tamponade and disruption of left ventricular wall continuity (Picture 2). The patient underwent emergency median sternotomy. The hole had no active hemorrhage and it was noted 5 mm to the left of her left anterior descending coronary artery. Left ventricular (entrance) and posterior wall (exit) perforations were repaired, and 700 cc of hemorrhagic fluid was evacuated from the pericardial space. Five hours after the operation, the echocardiography was noted within normal limits and the patient discharged on the 5th days of operation without any sequel.

## Discussion

Major cardiac injury is rare during childhood, which may cause fatal outcome. There are no clear diagnostic criteria for cardiac injury. For this reason, many incidental studies are reported from emergency departments, from autopsies, and intensive care units (1, 2, 3, 5). Scorpio et al. reported that 14.5% of pediatric trauma patients had cardiac tra-

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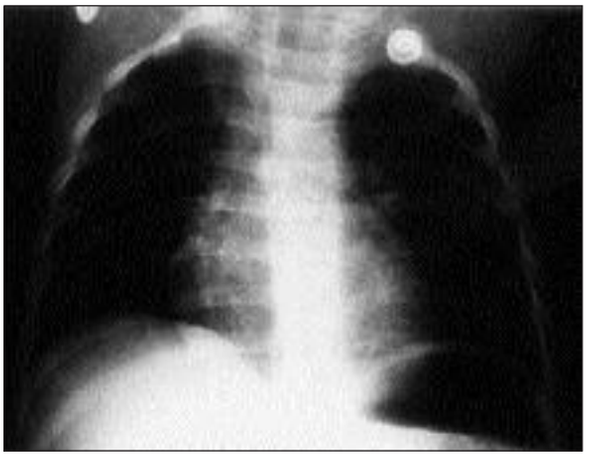

**Figure 1. Patient's telecardiography.**

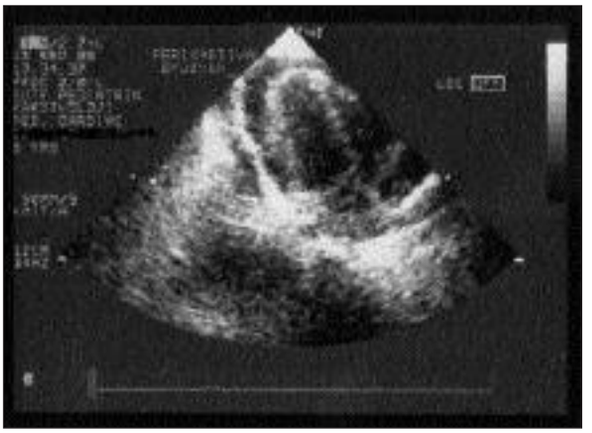

**Figure 2. Pericardial effusion and cardiac tamponade in transthoracic echocardiography.**

uma, and cardiac trauma accounts for the 39% of mortality. Many other studies report cardiac injury cases after major blunt trauma to be 0-43% (4).

In our patient, pericardial tamponade due to left ventricular perforation was seen after falling down over a crocket hook. The electrocardiogram of this patient was normal except for sinus tachycardia. While abnormal findings may be observed in electrocardiograms, these changes are quite rare in cardiac traumas during childhood (9).

The telecardiography of the patient was also within normal limits. It is well known that rapidly developing pericardial tamponade does not make significant changes in telecardiography (5).

The sensitivity and the specificity of echocardiography in diagnosing cardiac trauma reported to be 90% and 97% respectively (10). Since other laboratory tests were nonspecific in our patient we use echocardiography for the early diagnosis of the cardiac trauma. It is obvious that early diagnosis is important for survival.

Transventricular cardiac catheterization may cause tear of the myocardium and pericardial tamponade (12). But there are differences between the trauma and the diagnostic applications. A crochet needle has tiny hook at its tip causing the tear of the left myocardium resulting in pericardial tamponade. During diagnostic left ventricular puncture, it is important to perform the stick swiftly and not leave the needle in place for a prolonged period of time as this may create a sawing effect and tear the myocardium. In our case, the self-removal of the needle might have aggravated the tear that was caused by the hook.

Cardiac perforation due to home accidents is extremely rare (7, 8). However stabbing injuries of the chest with the physical findings should rise the suspicion for the possible trauma. It is obvious that echocardiography is mandatory in these patients after hemodynamic stability is achieved. İn these situations, since the diagnostic role of invasive pericardiocentesis is limited, echocardiography remains the major noninvasive diagnostic tool for diagnosis of cardiac injury.

In conclusion, in every perforating trauma to the chest with non-specific laboratory tests, the suspicion for a possible cardiac injury should be kept in mind. Early diagnosis may be life saving if the underlying pathology is cardiac trauma.

## References

1. Baum VC. Cardiac trauma in children. Paed Anaesth 2002; 12: 110-7.
2. Asensio JA, Salvador NS, Walter F, et al. Penetrating cardiac injuries: A complex challenge. Surg Today 2001; 31: 1041-53.
3. Scorpio RJ, Wesson DE, Smith CR et al. Blunt cardiac injuries in children: a postmortem study. J Trauma 1996; 41: 306-9.
4. Ildstad ST, Tollerud DJ, Weiss RG et al. Cardiac contusion in pediatric patients with blunt thoracic trauma. J Pediatr Surg 1990; 25: 287-9.
5. Dowd MD, Krug S. Pediatric blunt cardiac injury: epidemiology, clinical features, and diagnosis. J Trauma 1996; 40: 61-7.
6. Asensio JA, Murray J, Demetriades D, et al. Penetrating cardiac injuries: a prospective study of variables predicting outcomes. J Am Coll Surg 1998; 186: 24-34.

7. Cooper A, Foltin GL. Thoracic trauma. In: Barkin A, editor. Pediatric Emergency Medicine: Concepts and Clinical Practice. St Louis: Mosby; 1992. p. 261-75.
8. Lindblad BE, Terkelsen CJ, Lindblad LN, Terkelsen CJ. Home accidents involving children. An epidemiologic investigation. Ugeskr Laeger 1990; 152: 1587-90.
9. Tellez DW, Hardin WD, Takahashi M. et al. Blunt cardiac injury in children. J Pediatr Surg 1987; 22 : 1123-8.
10. Jimenez E, Martin M, Krukenkamp I, et al. Subxiphoid pericardiotomy versus echocardiography: a prospective evaluation of the diagnosis of occult penetrating cardiac injury. Surgery 1990; 108: 676–80.
11. Pons F, Lang-Lazdunski L, de Kerengal X, Chapius O, Bonnet PM, Jancovici R. The role of videothoracoscopy in management of precordial thoracic penetrating injuries. Eur J of Cardiothorac Surg 2002; 22: 7-12.
12. Smith GA, Salness RA. Cardiac trauma. In: Pine JW, editor. Moss and Adams Heart Disease in Infants, Children and Adolescent. Baltimore: Williams & Wilkins; 1995. p.1521-9.