

Transfixing gunshot wound to the heart: case report

Ferimento cardíaco transfixante por projétil de arma de fogo: relato de caso

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Abstract

Penetrating cardiac trauma carries high mortality rates. It has been commonly associated with stabbing, but increasing urban violence has led to growing numbers of gunshot heart wounds. The latter have higher mortality rates among penetrating cardiac injuries and may affect multiple heart chambers, with even higher mortality rates. We report a patient, victim of an attempted armed robbery, who had a transfixing gunshot wound to the heart, successfully operated at our institution.

Descriptors: Heart injuries. Wounds, gunshot. Heart ventricles.

Resumo

O trauma cardíaco penetrante apresenta altas taxas de mortalidade. É comumente associado a lesões por armas brancas, porém crescentes índices na violência urbana têm contribuído para o aumento no número de ferimentos cardíacos por projéteis de armas de fogo. Estas possuem as maiores taxas de mortalidade dentre os ferimentos cardíacos penetrantes e podem acometer múltiplas câmaras cardíacas, com índices de mortalidade ainda mais elevados. Apresentamos um caso de um paciente, vítima de tentativa de roubo, que sofreu ferimento cardíaco transfixante por projétil de arma de fogo, operado com sucesso em nossa instituição.

Descritores: Traumatismos cardíacos. Ferimentos por arma de fogo. Ventriculos do coração.

INTRODUCTION

Penetrating heart trauma represents a lethal condition. This injury carries high mortality rates, even when its victims receive hospital care. Actual rates of survival are difficult to calculate, but many studies have estimated survival rates ranging from 3%-84% [1-7]. The mechanism of injury and clinical presentation on hospital admission are the most important variables in determining the outcome in these

patients, however, some studies indicate other variables than those mentioned above, the presence of multiple lesions in the cardiac chambers [1,7]. Despite the predominance of cardiac injury by weapons, a growing number of cardiac injuries due to firearms have been reported due to the increase in urban violence and the greater access of civilian population to firearms [1-7]. Higher mortality rates have been related to heart injury by firearm projectiles, reaching 100% in the presence of lesions in multiple chambers [6].

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CASE REPORT

This case report was performed after informed consent of patients studied and approved by the Ethics Committee of the Evangelical Hospital in Londrina.

Male patient, 40 years-old, at the time was brought to the emergency room of the Evangelical Hospital in Londrina with injuries from a firearm projectile in regions of the left hemithorax, as well as transfixing laceration and bruising in the left ear and left arm, respectively, caused during an attempted robbery. On admission, the patient was pale, and with decreased peripheral perfusion, tachycardia and decreased ventricular murmur in left hemithorax. Initial steps have been established to support the victim to stabilize his state. The chest X-ray showed the projectile from a firearm located posterior to the heart and moderate pleural effusion in left hemithorax, and pericardial effusion evidenced by chest CT.

Even with the patient hemodynamically stable, given the risk of cardiac tamponade and cardiac injury, we decided to perform emergency surgery. Surgical access to the thoracic cavity was obtained by left anterolateral thoracotomy. Following the opening of the cavity, it was observed a lesion in the lingula transfixing, as well as moderate amount of blood in the pleural cavity and hematoma in abundant pericardial fat. After dissection of pericardial fat, we noticed a small hole in the pericardial sac and therefore, we performed pericardiotomy. Blood clots in moderate quantities and in the pericardial cavity were identified and removed. The cardiac damage resulting from the projectile were observed in the anterior wall of the left ventricle (LV) (inlet hole), which presented abundant arterial bleeding near the anterior descending coronary artery, and in the posterior region of the right ventricle (RV) (outlet hole), near the right coronary artery (Figure 1).

Due to the difficulty in local exploration and repair of the wound on the posterior wall, it was decided to expand the incision (bilateral thoracotomy with transverse section of the sternum). Both cardiac lesions were repaired by separate sutures in "U" with polyester suture line 2-0 with pledge, and the lung segment corrected by suture in a continuous suture with polyglactin line 910 3-0. After repair of injuries and review of hemostasis, two drains were inserted; one in the pericardial cavity and another in the pleural cavity, and then, the operation was completed by closing the chest in layers. The patient was then referred to the Intensive Care Unit (ICU) in stable clinical condition. The patient developed cardiogenic shock 36 hours after the procedure; showing good recovery after clinical measures of support; remaining in the ICU for 19 days; and finally, being discharged 26 days after the operation. There was no evidence of ventricular septal defect during the follow-up.

Despite the severity of heart damage suffered by the patient, he returned to his daily life after hospital discharge, and seven years after the incident he remains active and asymptomatic. He follows clinical treatment to prevent ventricular remodeling using beta blockers and inhibitor of angiotensin converting enzyme in optimized doses.

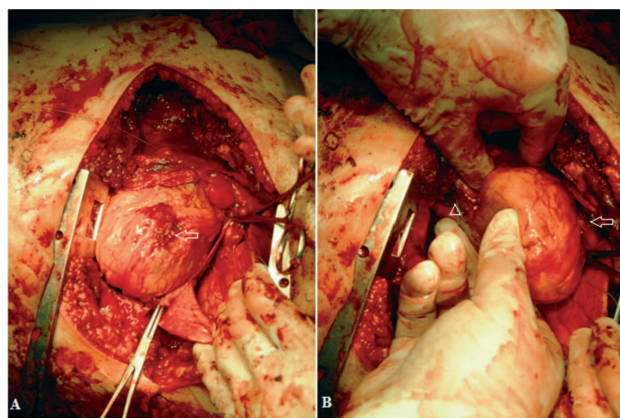


Fig. 1 - A: Inlet hole next to the anterior descending coronary artery (arrow), B: outlet hole near the right coronary artery (arrowhead)

DISCUSSION

Penetrating cardiac injuries are uncommon, being estimated at less than 10 cases per year among all trauma admissions in most hospitals [1], and despite the improvement of other areas of trauma care, a large number of victims of penetrating cardiac injuries die before their hospital admission [1,3]. Most penetrating cardiac injuries are caused by knives or firearm bullets, but such injuries can be caused by foreign bodies, as well as fractured ribs or sternum [1].

Injuries caused by knives are more frequent than by firearms when it comes to penetrating cardiac injuries, however, the increase in rates of urban violence has contributed to the growing importance of these injuries by firearms [4-9]. In a retrospective study conducted by Rodrigues et al. [5], out of the 70 patients with penetrating cardiac injuries in the study, 43 (61.4%) presented injuries from knives and 27 (38.6%) by firearms, and respective mortality rates of 52.2% and 47.8%, with no statistically significant differences in mortality between the two groups of patients. Degiannis et al. [7] in a study comprising 117 patients with penetrating cardiac trauma caused by knives or firearm bullets, demonstrated that those victims of cardiac

injuries inflicted by firearms (21/117 or 17.9%), mortality reached 81%, whereas the mortality associated with injuries from knives was 15.6% (with $P < 0.0001$). The same study showed no differences in mortality rates between patients with injuries to one or multiple heart chambers.

In a retrospective study conducted by Lone et al. [6] of 40 patients operated due to cardiac injuries by firearm projectiles or shrapnel, 35 (87.5%) had lesions in a single cardiac chamber, with a survival rate of 62.8% (22/35) while five (12.5%) patients had lesions in multiple chambers and none of them survived (100% mortality). The patient in this report presented transfixing injury that attacked both LV and RV, which is characterized as an extremely rare case not only by the mechanism of the injury, but also by the presented outcome. Kangah et al. [8] reported a similar case with biventricular injury and satisfactory outcome after surgery, 10 hours after the incident. The authors explain that the ventricular penetrating injuries tend to bleed less intensely than the atrial ones, due to being stagnant during myocardial contractions, which may have been relevant to the outcome presented by our patient, as well as by a patient reported by Meira et al. [9], where the bullet lodged in the RV was removed 18 days after the trauma.

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