

Cardiac Perforation by Firearm: Case Report

Gerez Fernandes Martins^{1*}, Claudio Assunção¹, Barbara Jessen¹, Gerez Martins²,
Joao de Deus e Brito³

¹Cardiac Surgery Department, Institute of Cardiology State Aloysio de Castro, Rio de Janeiro, Brazil

²Cardiology Department, Institute of Cardiology State Aloysio de Castro, Rio de Janeiro, Brazil

³Surgery Department, Souza Marques University, Rio de Janeiro, Brazil

Email: *gerezm@terra.com.br

How to cite this paper: Martins, G.F., Assunção, C., Jessen, B., Martins, G. and de Deus e Brito, J. (2018) Cardiac Perforation by Firearm: Case Report. *World Journal of Cardiovascular Surgery*, 8, 189-195. <https://doi.org/10.4236/wjcs.2018.810018>

Received: April 3, 2018

Accepted: October 27, 2018

Published: October 30, 2018

Copyright © 2018 by authors and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Heart trauma caused by a firearm projectile is the most fatal of cardiac injuries due to the great potential for death. The increase in the number of cases in recent years is observed, due to the greater urban violence. We report the case of a patient, a victim of firearm perforation, who suffered a cardiac transfixing lesion, with clinical presentation and with an unusual cardiac injury, operated at our service with success.

Keywords

Heart Trauma, Firearm Perforation, Cardiac Lesion, Urban Violence, Cardiac Surgery

1. Introduction

With the increase in the rate of urban violence has contributed to the growth in the number of patients with heart attacks by firearm projectiles [1] in recent times.

The case reported refers to a young woman of the underprivileged class of the population of Rio de Janeiro, who is struck by a firearm projectile from a distance while breastfeeding her son.

The survival rate is difficult to calculate, but several studies estimate survival rates ranging from 3% - 84% [1] [2]. We can find the mortality of 100% of the accidents related to the involvement of the heart structures.

The cases described in the literature with the presence of a firearm projectile in the intracardiac region are rare.

2. Case Report

DBL, female, 31 years old, firearm perforation victim (PAF) was admitted with-

out hemodynamic emergency service and with the projectile entering below the right shoulder in the posterior axillary line, leaving only a small entrance orifice without fractures. It performs radiographic examination with a projectile housed in a region of cardiac topography and hemothorax on the right (**Figure 1**).

The echocardiographic image suggested a projectile housed in an apical region of approximately 2.5 cm adhered to the myocardium, extending the left ventricular cavity (**Figure 2**). Chest tomography showed pericardial effusion, pleural effusion on the right and image of the projectile housed in apex. In this unit, the right hemothorax was drained.

After 4 days of hospitalization, the patient was transferred to the State Institute of Cardiology Aloysio de Castro (IECAC), remained stable and oriented.

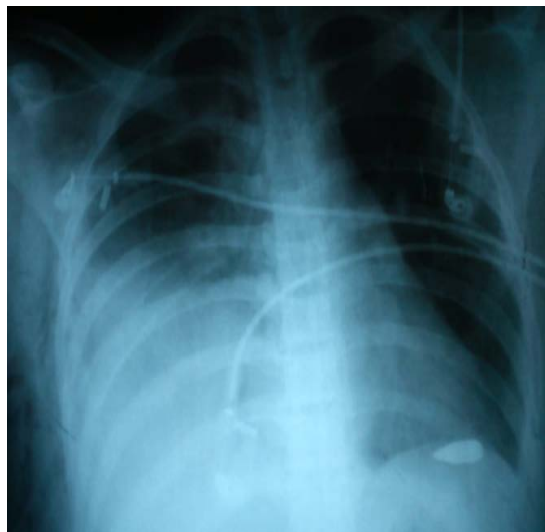


Figure 1. Radiographic with projectile in a cardiac topography and hemothorax on the right.

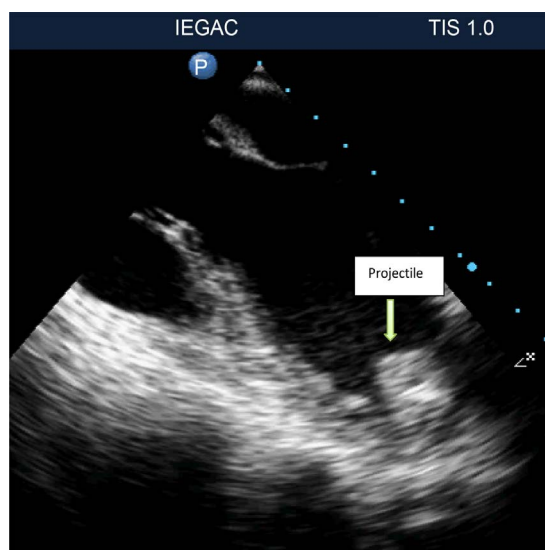


Figure 2. Echocardiographic image suggested a projectile in apical region.

She performed a transesophageal echocardiogram (ECOTE) to confirm the exact position of the projectile and then referred to the surgical center.

The surgeon began the procedure with thoracotomy and pericardiotomy. At that time, there was no leak or hemopericardium. The heart had a normal appearance. A small hole in the visceral pericardium was obturated and there was scar tissue in the right atrium in the same pericardium projection, with no apparent transfixation (**Figure 3**). No lesions were identified external to the ventricles, but a mass was palpable in the left ventricle (LV) and tremor in the direct ventricle, in the projection of the entryway.

No signs of cardiac tissue damage were observed, but intervention and removal of the foreign body and evaluation of intracardiac lesions were chosen. During the procedure, the projectile was placed on the apical wall of the LV and the closure of the communication in the ventricle septum and removal of clots in the right pleural cavity was performed (**Figures 4-6**).

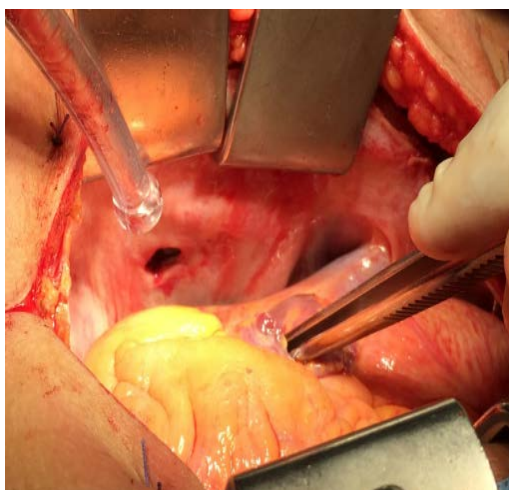


Figure 3. A small hole in the visceral pericardium was obturated and there was scar tissue in the right atrium in the same pericardium projection.

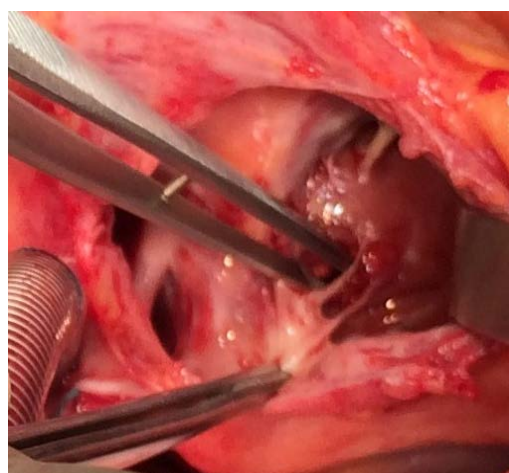


Figure 4. Interventricular septal communication.

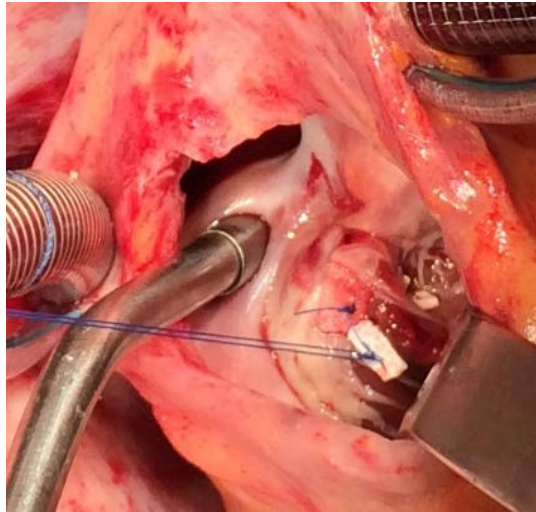


Figure 5. The closure of the communication in the ventricle septum.

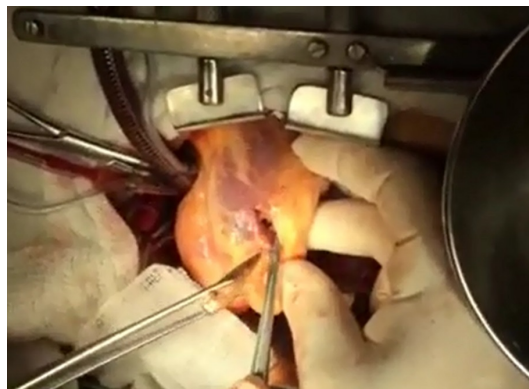


Figure 6. The projectile and apical wall of the LV.

In the postoperative unit the patient was admitted hemodynamically stable and remained, during all tachycardia hospitalization even after vigorous hydration and analgesia. The patient was extubated the same day and removed the drains one day after surgery. He remained for 6 days in the ICU postoperative due to persistent tachycardia but during all hospitalization without clinical interurrences.

After being discharged to the ward, a low fever and cough began. Three blood samples, one urine sample and the nasal, rectal and oral swabs were collected for culture, and antibiotic therapy (Clavulin) was introduced. After five days, without fever, we obtained the negative results of these cultures and interrupted the antibiotic therapy. Laboratory tests did not present leukocytosis; CRP was elevated, but declining since the surgical procedure (PCR 15).

A new echocardiogram showed a surgical patch by adequately closing the perimembranous IVC, an ecodensa image measuring 1.3 cm in length and 0.8 cm wide, located in the apical region in the same position where the projectile was suggesting thrombus (**Figure 7**), and we chose to initiate full anticoagulation.



Figure 7. Echocardiogram shows a patch (left arrow) and thrombus (down arrow).

The patient progressed in 14 days satisfactorily from a clinical and surgical point of view, being discharged from hospital. And she still remains under ambulatory care without presenting any restrictions related to the accident, being active and working.

3. Discussion

It is estimated that, currently, fewer than 10 admitted cases per year among all trauma admissions in most hospital institutions are due to cardiac arrest injury [1].

With the increase of the population and consequently of the urban violence there was an important increase of the cardiac traumas.

White-weapon injuries are more frequent than firearms in the case of penetrating heart injuries, but increased violence contributes to the increase by fire-arm drilling [3].

The highest mortality rates are related to projectile heart injuries [4].

Costa CL *et al.*, in a retrospective study in Manaus with 102 patients, observed that among cardiac injuries to white-collar injury were associated with lower mortality, grade IV cardiac lesions were associated with higher mortality and, also, that a shorter operative time was associated with greater severity and mortality [5]-[10].

Rodrigues *et al.*, of the 70 patients with penetrating heart injuries included in the retrospective study, 43 (61.4%) had white-arm wounds and 27 (38.6%) had firearms, and their mortality rates were 52.2% and 47.8%, and there were no statistically significant differences in mortality among patients in both groups [6].

Lone *et al.*, 40 patients operated on due to heart injuries by firearm or splinter projectiles, 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) [4].

Some variables interfere in the morbidity and mortality of the patient: time elapsed between admission to the emergency room and the beginning of surgery,

associated injuries, surgical management adopted, length of hospital stay, complications [6]).

There are analyzes that determine the prognosis of cardiac lesions, such as the presence of pericardial tamponade, the place where the thoracotomy was performed (emergency room or operating room), the injured cardiac chamber and the number of chambers involved, as well as physiological parameters [7].

In the case described, the patient presented a good clinical evolution. The initial care provided was fast there were no clinical signs or symptoms of clinical decompensation. It surprises us, as most of these patients show signs of cardiac tamponade due to significant bleeding. The absence of symptoms is extremely rare in patients with intracardiac firearm injury. Another common complication in this type of patient was seen at admission, hemothorax. Drained promptly in emergencies.

As soon as it was transferred and carried out all the complementary examinations for exact visualization of the position of the projectile. Today we use the help of ECO TT and TE to help in this positioning and guide the treatment.

She was referred to the surgical center. It left us surprised the absence of hemopericardium and the difficulty of locating the cardiac lesion being this a plot with high impact.

In the literature it is described that ventricular penetrating lesions tend to bleed less than atrial, because they are stagnant during myocardial contractions, it was surprising because there was a possible atrial lesion and no hemopericardium [8] [9].

In the postoperative ICU, he performed vigorous hydration. Quick removal of drains and pipes. He remained stable, but with persistent tachycardia this present since hospitalization. Still in the ward in the ward evolves with pneumonia. Started Clavulin 1 g 8/8hrs with favorable evolution. In the post-operative ECOTT, a thrombus was diagnosed in the same place of removal of the projectile, a rare event in these cases.

This case reports us several peculiar signs, such as hemodynamic stability with intracardiac projectile, absence of hemopericardium and thrombus in the former projectile site.

No other cardiac changes were seen during hospitalization other than those described as, for example, myocardial infarction. Common in patients with PAF cardiac lesions.

We must always remember that the main complications in these cases are: hemopneumothorax, pericarditis, myocardial infarction, valve injury, pneumonia, atelectasis, coagulopathy, sepsis, anoxic encephalopathy.

In the case presented, hospital discharge occurred 15 days after admission to the IECAC, totaling a period of 19 days from the time of admission to the emergency room. The length of stay varies in the literature between 4.6 and 15.2 days.

The patient remained hospitalized for more days than the average because the hospital of origin did not undergo cardiac surgery.

4. Conclusion

The patient had a favorable outcome due to prompt care in a nearby emergency unit, where there were only general surgeons, but who approached the hemothorax and identified the need of a more extensive and specialized surgery. The fact of having suffered a long distance impact and without great damages in the body and heart structure was also favorable to the procedure performed in the cardiology unit. I must emphasize the speed of the mobilization of the surgical team of the IECAC.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Karygio, C.J.T., Fan, O.G., Rodrigues, R.J. and Tarasiewich, M.J. (2011) Transfixante Cardiac Injury by Firearm Projectile: Case Report. *Revista Brasileira de Cirurgia Cardiovascular*, **26**, 298-300.
- [2] Kang, N., Hsee, L., Rizoli, S. and Alison, P. (2009) Penetrating Cardiacinjury: Overcoming the Limits Set by Nature. *Injury*, **40**, 919-927.
<https://doi.org/10.1016/j.injury.2008.12.008>
- [3] Mataraci, I., Polat, A., Cevirme, D., Büyükbayrak, F., Sasmazel, A., Tuncer, E., *et al.* (2010) Increasing Numbers of Penetrating Cardiac Trauma in a New Center. *Ulus Travma Acil Cerrahi Derg*, **16**, 54-58.
- [4] Lone, R.A., Wani, M.A., Hussain, Z., Dar, A.M., Sharma, M.L., Bhat, M.A., *et al.* (2009) Missile Cardiac Injuries: Review of 16 Years' Experience. *Ulus Travma Acil Cerrahi Derg*, **15**, 353-356.
- [5] Costa, C.A., Birolino, D., Araújo, A.O., *et al.* (2012) Retrospective Study in Manaus/AM. *Rev. Col. Bras. Cir*, **39**, 272-279.
<https://doi.org/10.1590/S0100-69912012000400006>
- [6] Rodrigues, A.J., Furlanetti, L.L., Faidiga, G.B., *et al.* (2005) Penetrating Cardiac Injuries: A 13-Year Retrospective Evaluation from a Brazilian Trauma Center. *Interactive Cardio Vascular and Thoracic Surgery*, **4**, 212-215.
<https://doi.org/10.1510/icvts.2004.099952>
- [7] Blake, D.P., Gisbert, V.L., Ney, A.L., Helseth, H.K., Plummer, D.W., Ruiz, E., *et al.* (1992) Survival after Emergency Department versus Operating Room Thoracotomy for Penetrating Cardiac Injuries. *Am Surg*, **58**, 329-333.
- [8] Thourani, V.H., Feliciano, D.V., Cooper, W.A., Brady, K.M., Adams, A.B., Rozycki, G.S., *et al.* (1999) Penetrating Cardiac Trauma at an Urban Trauma Center: A 22-Year Perspective. *Am Surg*, **65**, 811-818.
- [9] Kangah, M., Kirioua-Kamenan, A., Amani, A., Souaga, A., Katche, E., Kouame, J., *et al.* (2010) Biventricular Transfixing Wound by Firearm Operated in the Cardiology Institute of Abidjan: A Case Report. *The Journal of Thoracic and Cardiovascular Surgery*, **14**, 60-62.
- [10] Böstman, L.A., Salo, J.A. and Böstman, O.M. (1992) Stab Wounds to the Pericardium and Heart: An Analysis of 85 Consecutive Patients. *European Journal of Surgery*, **158**, 271-275.