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Indian Journal of Forensic and Community Medicine

Journal homepage: <https://www.ijfcm.org/>

Case Report

Stab wound to the heart with cardiac tamponade — A case report

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ARTICLE INFO

Article history:

Received 11-01-2022

Accepted 12-01-2022

Available online 08-03-2022

Keywords:

Stabbing

Penetrating injury

Cardiac function

Cardiac tamponade

ABSTRACT

The rising incidences of violence nowadays have lead to increased cases of shootings and stabbings being reported. And among the stabbing cases, one of the frequently encountered are penetrating injuries to the heart, which is a highly lethal condition. If not treated promptly, more often than not results in death of the victim. In the scenario that the victim reaches the hospital, a number of factors come into consideration, which have a direct bearing on the outcome, for example, the physiologic state of the victim, involvement of other organs, location of injury, cardiac tamponade, etc. Among these presence of cardiac tamponade is a critical prognostic factor. Various studies have shown that a slow hemorrhage is much better tolerated as it can be gradually accommodated by the pericardium but any acute rise in intrapericardial pressure lead to a fatal effect in cardiac function and death. This scenario is discussed in the case being reported below.

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1. Introduction

The rising incidences of violence nowadays have lead to increased cases of shootings and stabbings being reported. And among the stabbing cases, one of the frequently encountered, are penetrating injuries to the heart, which is a highly lethal condition. Most cases of these injuries are found dead at the scene of incidence and hardly reach the hospital. In cases that they do reach the hospital, if not treated promptly, more often than not results in death of the victim.¹

Considering the mortality in these cases, a number of factors come into consideration which have a direct bearing on the outcome; mechanism of injury, i.e. gunshot versus stab wound, location of injury, i.e. right versus left ventricle, complexity of injury, i.e. single-chamber versus multi-chamber and intrapericardial great vessel injury including aortic injury, time, presence or absence of vital signs upon admission in the emergency department, absence of cardiac arrhythmia and pericardial tamponade.² In case

of injury to the heart, various studies have shown that a slow hemorrhage is much better tolerated as it can be gradually accommodated by the pericardium^{3,4} as shown in case discussed below where the knife was left insitu lead to a compression effect on the blood vessels and slower formation of cardiac tamponade and slightly longer survival of deceased.

1.1. Case details

A 28-year-old man with a history of a single stab wound to the chest was brought for autopsy to the Department of Forensic Medicine. As per the history given by the police and accompanying relatives, the deceased and his brother were businessmen who ran a travel agency. Apparently on the night of the incident, the brothers had an altercation with some men and during the argument one of the men stabbed the deceased on the chest with a knife. Even after having sustained the injury, the deceased continued to wrestle with the men for some 15 – 20 min with the knife insitu and after that walked back to his shop where he collapsed and was

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brought to the Emergency Department, where he was given CPR, but he could not be revived and was pronounced dead.



Fig. 1:



Fig. 4:



Fig. 2:

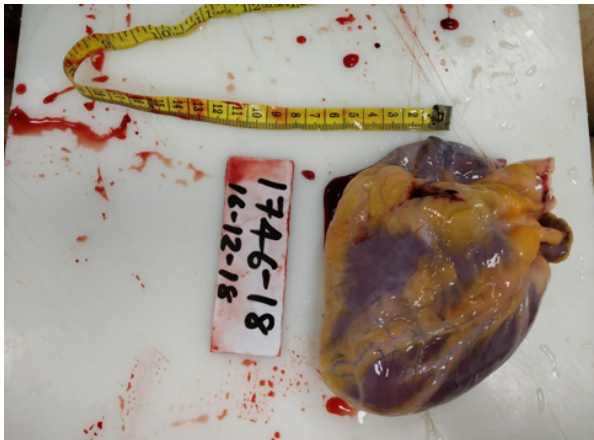


Fig. 5:



Fig. 3:



Fig. 6:

1.2. Autopsy findings

Deceased was a well-built, well-nourished person. A foldable knife was present insitu in the stab wound in the middle of anterior chest wall located 12 cm below the sternal notch. The blade was inserted inside with the handle sticking out

On careful removal of knife, the wound was vertically placed, wedge shaped and cavity deep. The wound was directed downwards backwards and towards right piercing the skin, subcutaneous tissue, cutting through the sternum at level adjacent to fifth intercostals space, puncturing the pericardium and the anterior wall of the right ventricle and entering the right ventricle at a level 9 cm above the apex. Multiple blood clots were present around the sternum externally and internally around the wound. Pericardial cavity contained approximately 600 ml of blood. All other organs were pale

Cause of death was given as shock as a result of stab wound to the heart which was homicidal in nature.

2. Discussion

There are three typical signs of penetrating cardiac injury hemorrhage, pericardial tamponade, and a combination of both.⁵ Cardiac tamponade is a medical or traumatic emergency that happens when enough fluid accumulates in the pericardial sac compressing the heart and leading to a decrease in cardiac output and shock. The diagnosis of cardiac tamponade is a clinical diagnosis that requires prompt recognition and treatment to prevent cardiovascular collapse and cardiac arrest. Usually, a small, physiologic amount of fluid surrounds the heart. When the volume of this fluid or any other fluid like blood builds up fast enough, the chambers of the heart are compressed, and tamponade develops rapidly even with much smaller volumes. This is what occurs in a traumatic cardiac injury specially in a penetrating cardiac injury, resulting in acute tamponade. Under this pressure, the chambers of the heart are unable to relax leading to decreased venous return, filling and cardiac output.^{6–9} In our case, even though cardiac tamponade was present, retention of the knife insitu lead to a protective effect as the knife kept on exerting pressure on the cardiac tissues which lead to minimal bleeding and a slow formation of cardiac tamponade which was better tolerated by the body and lead to the deceased's longer survival period.

3. Conclusion

Penetrating cardiac trauma is thought to be a fatal event with very less chances of survival and most victims die at the scene. But if medical services can be assessed promptly and with quick diagnosis and aggressive treatment, many patients survive. In this case, the deceased did not collapse

immediately following the injury and continued to argue and wrestle with his assailants as mentioned by his brother who was present during the incident. As a result his brother did not notice that the deceased had been stabbed and did not give priority to taking him to the hospital. Almost half an hour had passed before he noticed that his brother had been stabbed and another half an hour before they could reach the Emergency Department of our hospital. Also, the fact that the knife remained insitu and even after noticing the injury, the deceased's brother did not attempt to remove the knife, led to him actually reaching the hospital. Maybe prompt recognition of the condition and required evacuation of the tamponade could have saved the life of the deceased

4. Source of Funding

None.

5. Conflict of Interest

None.

References

1. Bamous M, Abdessamad A, Tadili J, Kettani A, Faroudy M. Evaluation of penetrating cardiac stab wounds. *Scand J Trauma Resusc Emerg Med.* 2016;6:24.
2. Maegele M, Harzheimb A, Hagn U, Steinbuechel T, STrojan. Stab wound to the heart: A pictorial report and short review of the literature. *Eur J Radiol Extra.* 2006;60(3):105–8. doi:10.1016/j.ejrex.2006.09.005.
3. Stashko E, Meer JM. Treasure Island ; 2020. p. 236. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK431090/>.
4. Richardson L. Cardiac tamponade. *J Am Acad PAs.* 2014;27(11):50–1. doi:10.1097/01.JAA.0000455653.42543.8a.
5. Moreno C, Moore EE, Majure JA. Hopeman AR: Pericardial tampon-ade: a critical determinat for survival following penetrating cardiacwounds. *J Trauma.* 1986;26(9):821–6. doi:10.1097/00005373-198609000-00007.
6. Bella JN. Constrictive Pericarditis ; 2019. p. 160.
7. Kuhajda I, Zarogoulidis K, Kougioumtzi I, Huang H, Dryllis G, Kioumis I. Penetrating trauma. *J Thorac Dis.* 2014;6(4):461–5. doi:10.3978/j.issn.2072-1439.2014.08.51.
8. Maegele M, Harzheim A, Hagn U, Steinbuechel T, Trojan S, Saad S. Stab wound to the heart: A pictorial report and short review of the literature. *Eur J Radiol Extra.* 2006;60(3):105–8. doi:10.1016/j.ejrex.2006.09.005.
9. Scully CG, Daluwatte C, Marques NR, Khan M, Salter M, Wolf J, et al. Effect of hemorrhage rate on early hemodynamic responses in conscious sheep. *Physiol Rep.* 2016;4(7):e12739. doi:10.14814/phy2.12739.

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Cite this article: Gajmer P. Stab wound to the heart with cardiac tamponade — A case report. *Indian J Forensic Community Med* 2022;9(1):29–31.