

anaesthesia, which comprised the remaining 4.5%, was used during the implantation in the children, and the adults who had epicardial implantations. Three hundred and fifty-three cases (99.4%) were by transvenous endocardial implantations and 2 (0.6%) were epicardial. This is the current practice since most pacemakers are transvenously passed and anchored in the endocardium under fluoroscopy. Exhausted pulse generator replacements accounted for 15.5%. This value is similar to the 16% accepted by the ACC/AHA/NASPE 2002 guidelines¹⁰. The shortest duration of a pacemaker before replacement was 2 years 9 months and the longest duration was 10 years 11 months with the mean duration of 7.8 ± 1.7 years.

There was no peri-operative mortality. This means the procedure is quite safe. The complication rate was 7.0%. Most studies have found complication rates from 3.3 – 8.4%^{6,7,8,11} with lead-electrode displacement being the commonest and pulse generator site erosion or haematoma among the least. This is also similar to our findings.

Permanent complete heart block as a complication of cardiac surgery formed 2.5% of the pacemaker implantations. Intra-cardiac repair of Tetralogy of Fallot was the commonest (1.1%). The next was isolated VSD repair (0.6%) and double valve replacement (0.6%). Aortic valve replacement was the least (0.3%). Liberman¹² found isolated VSD repair as the commonest, followed by A-V septal defect repair. In the case of the TOF and the VSD the cause of the complete heart block is most likely due to the interruption of the conduction pathway, which is in close proximity to the rim of the VSD where sutures for patch closure are placed. Similarly, in the case of the valve replacement the cause of the complete heart block is also most likely due to the interruption of the conduction pathway where it is in close proximity to the annulus of the mitral or the aortic valves. The children with Intra-cardiac repair of Tetralogy of Fallot and VSD repair in this study have been reported by Edwin¹³ in another study.

Conclusion

Permanent pacemaker implantation is a very vital part of Cardiology and Cardiac surgery. It is a safe procedure with low complication rates. There is a gradual increase in the number of cases performed annually in Accra, with a slight male preponderance. Most patients are elderly, with complete heart block as the commonest indication. It is life-saving, improves the quality of life and enhances survival.

References

1. Gabriel Gregoratos. Indications and Recommendations for Pacemaker Therapy *Am Fam Physician*. 2005; 71(8):1563-1570
2. Nicholas T., Kouchoukos. Kirklin/Barratt Boyes cardiac surgery. 2003; 45:1630. Elsevier
3. Frank W., Sellke. Sabiston & Spencer Surgery of the Chest. 2005; 79. Elsevier
4. Arthur E. Baue. Glenn's Thoracic and Cardiovascular Surgery. 1996; 133: 2182 McGraw-Hill Publishing Co
5. Gregoratos G. Permanent pacemakers in older persons. *J Am Geriatr Soc*. 1999;47(9):1125-35
6. Fleck T., Khazen C., Wolner E., Grabenwoger M. The incidence of reoperations in pacemaker recipients. *Heart Surg Forum* 2006; 9(5):E779-82
7. Aggarwal R.K., Connelly D.T., Ray S.G., Ball J. and Charles R.G.. Early complications of permanent pacemaker implantation: no difference between dual and single chamber systems. *Br Heart J* 1995; 73(6): 571–575
8. Harcombe A., Newell S., Ludman P., Wistow T., Sharples L., Schofield P., Stone D., Shapiro L., Cole T., and Petch M. Late complications following permanent pacemaker implantation or elective unit replacement. *Heart* 1998 ; 80 (3): 240–244
9. Ekpe EE., Aghaji MA., Edaigbini SA., Onwuta CN. Cardiac pacemaker treatment of heart block in Enugu a 5-year review. *Niger J Med* 2008 ; 17(1):7-12
10. Gregoratos et al., ACC/AHA/NASPE 2002 Guideline Update for Implantation of Cardiac Pacemakers and Antiarrhythmia Devices
11. Kiviniemi MS., Pirnes MA., Eränen HJ., Kettunen RV., Hartikainen JE. Complications related to permanent pacemaker therapy. *Pacing Clin Electrophysiol* 1999; 22(5):711-20
12. Leonardo Liberman., Robert H., Pass Allan J., Hordof and Henry M. Spotnitz. Late Onset of Heart Block After Open Heart Surgery for Congenital Heart Disease. *Pediatric Cardiology*. Volume 29, Number 1 / 2008
13. Edwin F., Aniteye E., Tettey M., Sereboe L., Kotei D., Tamatey M., Entsua-Mensah K., Frimpong-Boateng K.. Permanent complete heart block following surgical correction of congenital heart disease. *Ghana Medical Journal* 2010; 44(3)



CHIRURGIE CARDIAQUE / CARDIAC SURGERY

PENETRATING CARDIAC INJURY: A CASE REPORT

M.N. TAMATEY, L.A. SEREBOE, M.M. TETTEY, K. ENTSUA-MENSAH, B. GYAN

National Cardiothoracic Centre, Korle-Bu Teaching Hospital, Accra, Ghana

Correspondence : **Dr Martin N. Tamatey**
Korle-Bu Teaching Hospital
P. O. Box KB 846, Korle-Bu, Accra, Ghana
E-mail : mtamatey@yahoo.com

Summary

Penetrating cardiac injuries are uncommon, but when they occur they are associated with a very high mortality. Most patients die before reaching hospital. And for those who reach the hospital alive, their survival depends on prompt diagnosis and rapid surgical intervention. We present the spectacular case of a patient who sustained a penetrating cardiac injury in which almost the whole length of a huge industrial needle was impaled in his heart. He arrived in hospital in haemorrhagic shock. He was resuscitated and quickly referred to the Cardiac Centre. He even had to be flown for part of the journey. At the Centre he had an emergency sternotomy, removal of the impaled object and repair of the cardiac injury with a very good outcome.

Keywords: Penetrating cardiac injury, early diagnosis, early surgery

Résumé

Les plaies pénétrantes cardiaques sont rares, mais quand elles arrivent, elles sont associées à une mortalité très élevée. La plupart des patients meurent avant d'atteindre l'hôpital. Et pour ceux qui atteignent l'hôpital vivants, leur survie dépend du diagnostic précoce et de l'intervention chirurgicale rapide. Nous présentons le cas spectaculaire d'un patient qui a supporté une plaie cardiaque pénétrante dans laquelle presque la longueur entière d'une aiguille industrielle énorme a été empalée dans son cœur. Il est arrivé à l'hôpital en état choc hémorragique. Après une réanimation rapide dans un centre de Cardiologie. Il fut transporté au service de Chirurgie Cardiaque où après une sternotomie d'urgence, l'objet empalé a été enlevé, suivi d'une suture de la plaie cardiaque avec un très bon résultat.

Mots-clés : Plaie pénétrante cardiaque, diagnostic, chirurgie

Introduction

With the current advances in technology, increased speed of transportation, increasing incidence of civil strife and wars, so is the increasing incidence of trauma, including chest trauma. Penetrating cardiac injuries are among the most lethal forms of trauma^{1,2,3,4}. Exsanguination from haemorrhagic shock, or cardiac tamponade kills most patients before reaching the hospital. In order to increase the

chances of survival of patients with penetrating cardiac injury when they reach the hospital alive, it is important that the team that first sees the patient should have a high index of suspicion, initiate the appropriate treatment and then refer within the shortest possible time to a centre where the skill and equipment to perform emergency cardiac surgery are available.

Case report

A 32-year old farm worker was stabbed by a colleague on the left anterior chest wall with a long industrial needle during a scuffle on the farm. This was the kind of needle used to sow huge sacs of cocoa or other export products. It was 11cm long and 0.3 cm thick. He was taken to the Regional Hospital in haemorrhagic shock where he was resuscitated with 2 units of blood and 3L of normal saline. He was then referred to the Cardiothoracic Centre. Since the company he worked for could afford it, he was flown from the city where the Regional Hospital was to the city where the Cardiothoracic Centre was. On arrival he had emergency sternotomy. The time interval between injury and surgery was about 20 hours. The pulsating needle had gone through the 2nd left intercostal space 7cm from the midline and then through the right ventricle. After the sternotomy, the needle was removed under direct vision, digital pressure was applied and the injury was repaired using 3/0 prolene suture. There was 400ml of haemopericardium. Haemostasis was secured and the sternal wound was closed routinely. The post operative period was uneventful and he was discharged home on the 7th post operative day. Regular follow-ups every 3 months for 2 years have been uneventful.



Figure 1. Patient with impaled needle



Figure 2. Chest x-ray showing the needle

Discussion

Over 75% of penetrating cardiac injuries occur in males^{1,5,6}. This is due to their more frequent involvement in violent activities. The entry point is often through the left chest wall because most people are right handed and so are the assailants, who will usually have the offending object in the right hand and thereby facing the left chest wall of the victim. The right ventricle is the most chamber injured (43 – 46%)^{5,7,8} because it forms most of the anterior surface of the heart thereby being the first 'port of call' of the object after penetrating the anterior chest wall. Stab wounds are usually the majority, ranging from 50 - 95% of the penetrating cardiac injuries whilst gunshot wounds are usually the least ranging from 3 - 20%^{1,4,6,7,8}. However, in few localities there may be more gunshot wounds than stabs⁹. The overall survival of penetrating cardiac injury is 36%, the survival for stab wounds is 68% and that for gunshot wounds is 14%⁹. The two main mechanisms of death are haemorrhagic shock and cardiac tamponade. Stab wounds confer a better survival because the injury to the myocardium is often linear, which can appose spontaneously with the consequent reduction in the bleeding, whereas gunshot wounds produce circular injury patterns in the myocardium which do not appose, leading to exsanguination and therefore the high mortality of about 80%¹.

Since there is not much time to do elaborate investigations before the patient passes away, a high index of suspicion is needed to diagnose a penetrating cardiac injury. If the offending object is left in situ then the diagnosis is easy. Otherwise the history of trauma or assault, and the clinical presentation of shock and/or tamponade will provide a clue. The first thing to do is to start aggressive resuscitation while the patient is prepared for surgery or referred to the appropriate hospital. In the interim, if the patient is stable then a chest x-ray and/or a quick echocardiography may be done before surgery.

The incision is usually a sternotomy or a left anterolateral thoracotomy. Any stab object is left in place until in the theatre when the incision is made and pericardiectomy is also done. The object is then removed under direct vision where any consequent bleeding can be directly controlled. Digital pressure is applied and the repair of the wound is done under the finger using simple suturing with non absorbable suture through Teflon or pericardial pledgets. The haemopericardium is then sucked out, haemostasis is secured, a pericardial drain is inserted, the pericardium is closed and the sternal wound is also closed routinely. The outcome is usually good.