

Traumatic cardiac herniation presenting as dextrocardia: A case report

Christopher T Holt, Stephanie Fraser, Tom Richards, Robin Kanagasabay

From the Department of Intensive Care, St George's University Hospital, United Kingdom

Correspondence to: Dr Christopher T Holt, Intensive Care Clinical Fellow, St George's University Hospital, United Kingdom, Email - holtct@gmail.com

Received: 04 Nov 2016

Initial Review: 01 Dec 2016

Accepted: 16 Dec 2016

Published Online: 31 Dec 2016

ABSTRACT

Background: Cardiac herniation is a rare but significant complication of blunt traumatic pericardial rupture most commonly occurring as a result of high-energy road traffic accidents. Case reports to date highlight delays in diagnosis and management as well as high rates of morbidity and mortality. **Case presentation:** A 19 year old motorcyclist was brought into the emergency department via helicopter following a road traffic accident with severe injuries to his chest, abdomen and limbs. Following a period of haemodynamic instability, an urgent chest radiograph demonstrated new dextrocardia compared to his admission radiograph. A diagnosis of cardiac herniation was confirmed and the patient underwent emergency surgery with a mesh repair within 12 hours of his initial presentation. He made a full recovery from a cardiothoracic perspective and was well at follow up three months after discharge. **Conclusions:** Pericardial rupture and cardiac herniation should be considered urgently in the context of abnormal cardiac anatomy on imaging following blunt trauma. Here, we describe a case of prompt identification and definitive surgical intervention for cardiac herniation. The diagnosis was made following a chest radiograph showing new dextrocardia and the patient had a good clinical outcome.

Keywords: Blunt Trauma, Pericardial Rupture, Dextrocardia.

Cardiac herniation is a rare but significant complication of blunt traumatic pericardial rupture most commonly occurring as a result of high-energy road traffic accidents [1]. A ten year retrospective case review in a level 1 trauma center showed that only 0.3% of over 20,000 patients required emergency surgery for blunt trauma pericardial rupture [2]. Previous case reports emphasize the difficulties and delays in the diagnosis and management as well as high rates of morbidity and mortality [3]. A review of 23 recent case reports highlights diagnostic difficulties, as only 52% of pericardial ruptures were discovered on imaging, the majority by CT, and 48% were discovered during acute emergency exploratory surgery or occasionally during routine, unrelated surgery years later.

The majority of repairs were performed via thoracotomy (78%) with median sternotomy (17%) and emergency laparotomy (4%). Surgical repair techniques varied; although, early reduction of the heart followed by repair of the pericardium with sutures or a patch was associated with a better outcome [3, 4]. Here, a case of right-sided cardiac herniation following blunt trauma is reported which presented as haemodynamic instability and dextrocardia on chest radiography and was managed with early surgical intervention.

CASE PRESENTATION

A normally fit and well 19 year old male motorcyclist presented following a high speed road traffic accident involving a van. He had evidence of severe trauma and

deformity of his left leg and GCS was (Glasgow Coma Scale) 4 on the arrival of the helicopter emergency medical team. His cervical spine was immobilized, he was intubated at the scene of the injury and during transfer, bilateral thoracostomy incisions were performed due to visible chest trauma with a suspicion of pneumothoraces.

On arrival in the emergency department at 17:30, the patient was ventilated with stable oxygen saturations. His heart rate was 115 beats/min and his blood pressure was 115/60 mmHg. His initial survey was suggestive of major trauma to his chest, abdomen, head and extremities. As the patient was relatively stable, CT scan and plain x-rays were performed. These confirmed abdominal, limb and thoracic injuries, but showed no evidence of a significant brain injury. The patient's main injuries included bilateral pneumothoraces, bilateral pulmonary contusions, multiple left sided rib fractures (ribs 1-8), a left renal laceration and haematoma, a right distal radius fracture, an open left femoral fracture, an unstable L2-3 spinal fracture and a degloving injury of his left buttock.



Figure 1 – Chest X-ray on admission (A) and 7 hours later in intensive care (B)



Figure 2 – Operative findings at right antero-lateral thoracotomy

The plastic surgeons, orthopaedic and spinal surgeons were consulted regarding the above injuries. From a cardiothoracic perspective, his injuries were managed conservatively with insertion of bilateral chest drains in the emergency department and a plan to review the following day with a repeat chest x-ray.

The patient was transferred to the intensive care unit in a stable condition for monitoring overnight with a view to orthopaedic surgery the following day. Overnight, the on-call cardiothoracic team was contacted at 00:27 due to a sudden drop in the patient's blood pressure following a log roll onto the patient's right side. A blood gas was performed and showed type I respiratory failure and an urgent chest x-ray was performed. The x-ray revealed dextrocardia which had not been seen on the patient's earlier imaging (**Fig 1**). To confirm this finding, the chest drain was removed and the heart was palpated in the right side of the chest via the right thoracostomy incision. The patient was rolled into the left lateral position which resulted in a transient improvement in his blood pressure. However, on resuming a supine position, his blood pressure dropped further to 70 mmHg systolic and inotropic support was commenced.

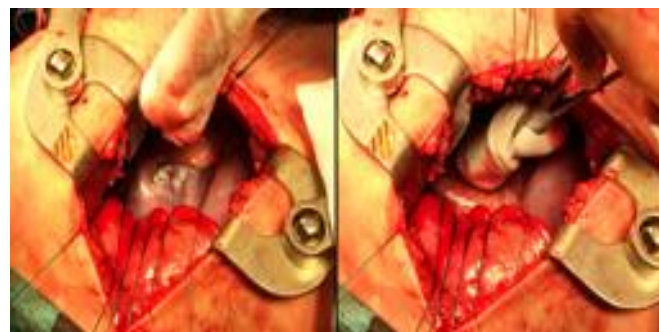


Figure 3 – Interrupted polyester sutures to the pericardial edges and reduction of the heart into its anatomical position prior to insertion of a mesh

The patient was transferred urgently to operation theatre in the left lateral position which he remained in for the duration of the procedure. The cardiothoracic anaesthetist was unable to site a bronchial blocker; therefore, surgery was performed with single-lumen ventilation and intermittent periods of apnoea. Surgery commenced at 05:00 with a small antero-lateral thoracotomy, which was performed by extending the previous right thoracostomy incision. Intra-operative findings included a large longitudinal pericardial tear from

the diaphragmatic recess to the superior vena cava with herniation of the heart into the right thoracic cavity (**Fig 2**). The right hemi-diaphragm was raised possibly due to stretching of the right phrenic nerve and there were extensive pulmonary contusions but no pulmonary lacerations.

Polyester sutures (ETHIBOND EXCEL®, Ethicon) were used to secure a knitted polypropylene monofilament mesh (PROLENE®, Ethicon) which was parachuted over the pericardial tear with the heart easily reduced into its anatomical position (**Fig. 3**). The lung expanded well following the repair and a single apical 28Fr drain was placed with standard thoracotomy closure in layers using absorbable sutures.



Figure 4 – Chest X-ray performed 3 months post-operatively

Post-operatively, the patient was transferred back to the intensive care unit where he continued to require inotropic support, but had complete resolution of the type I respiratory failure seen pre-operatively. His left chest drain was removed on day two post-operatively, he was weaned off inotropes on day three, transferred to the ward on day five and his right chest drain was removed on day six. A post-operative echocardiogram showed no significant abnormality and a chest x-ray prior to discharge showed a raised right hemi-diaphragm, but no other significant abnormalities. There were no other cardiovascular or respiratory issues during the patient's admission and he was discharged eighteen days later following numerous orthopaedic interventions.

At follow up in clinic three months later, the patient's chest x-ray was satisfactory (**Fig. 4**), he had no significant

cardiac or respiratory symptoms and he appeared to have made a full cardiothoracic recovery.

DISCUSSION

Mortality associated with blunt traumatic pericardial rupture is high and in patients who reach hospital, it is estimated that only 36.4 to 42.9% survive with overall mortality reported as high as 76% [2, 5]. Pericardial rupture is often a sign of significant polytrauma that in itself carries a high mortality as it is commonly associated with severe head injury, spinal fracture and organ perforation. Pericardial rupture leading to cardiac herniation carries an even greater risk of mortality with low rates of survival when occurring out of hospital and diagnosis is often made only on post-mortem examination [3].

When occurring in hospital, cardiac herniation often presents as haemodynamic instability with non-specific clinical signs and has been linked with myocardial contusion and vascular injury [2]. Clinical features include shock, arrhythmias, shortness of breath and murmurs associated with haemopericardium [6]. The incidence of cardiac herniation following blunt traumatic pericardial rupture is likely underdiagnosed, due to difficulties in diagnosis and non-specific clinical signs, and is estimated to be as high as 28% [3].

Although a diagnosis can be made on chest radiograph or computer tomography (CT), it can often be missed, particularly when occurring in the left thoracic cavity, with many cases diagnosed incidentally during emergency exploratory surgery following polytrauma. Previous case reports identify significant delays in diagnosis, with one case found during surgery for traumatic aortic insufficiency two years after the original injury [7].

Cardiac herniation following pericardial rupture is a rare but potentially fatal consequence of blunt trauma. Previous case reports describe how the diagnosis is often delayed despite signs on initial imaging [8]. Surgical intervention either via a thoracotomy or sternotomy and repair with sutures or patch is described with good clinical outcomes; therefore, early intervention and management is the key in reducing morbidity and mortality. Here, we have described one of the earliest cases of identification and surgical intervention in the current literature.

CONCLUSION

Given the high morbidity and mortality, pericardial rupture and cardiac herniation should always be considered in blunt trauma and that increased awareness of this serious complication is the key in improving outcomes.

REFERENCES

1. De Amicis V, Rossi M, Monaco M, Di Lello F. Right Luxation of the Heart: After Pericardial Rupture Caused by Blunt Trauma. *Tex Heart Inst J*. 2003; 30(2): 140–142.
2. Fulda G, Rodríguez A, Turney S, Dunham C, Cowley RA. Blunt Traumatic Rupture of the Heart and Pericardium: A Ten-year Experience (1979-1989). *J Trauma*. 1991; 31(2): 167-73.
3. Clark D, Wiles C, Lim M, Dunham C, Rodriguez A. Traumatic rupture of the pericardium. *Surgery*. 1983; 93: 495-503.
4. Thomas P, Saux P, Lonjon T, Viggiano M, Denis JP, Giudicelli R, et al. Diagnosis by video-assisted thoracoscopy of traumatic pericardial rupture with delayed luxation of the heart: case report. *J Trauma*. 1995;38(6): 967-70.
5. Sohn J, Sohn J, Seo J, Do K, Lee J, Kim D, et al. Pericardial rupture and cardiac herniation after blunt trauma: a case diagnosed using cardiac MRI. *Br J Radiol*. 2005; 78:447-449.
6. Chughtai T, Chiavaras MM, Sharkey P, Shulman H, Miller HA. Pericardial rupture with cardiac herniation. *Can J Surg*. 2008; 51(5): E101.
7. Kimura N, Kudo M, Takahashi T, Kokaji K, Yozu R. Aortic insufficiency and cardiac herniation associated with blunt chest trauma. *Int J Cardiol*. 2009; 137(2):e35-6.
8. Lindenmann J, Matzi V, Neuboek N, Porubsky C, Ratzenhofer B, Maier A, Smolle-Juettner FM. Traumatic pericardial rupture with cardiac herniation. *Ann Thorac Surg*. 2010; 89(6): 2028-30.

How to cite this article: Holt CT, Fraser S, Richards T, Kanagasabay R. Traumatic cardiac herniation presenting as dextrocardia: A case report. *Indian J Case Reports*. 2017; 3(1): 26-29.

Conflict of interest: None stated, Funding: Nil