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CASE REPORT

Survival following resuscitative thoracotomy for combined left ventricle and left atrium ruptures secondary to blunt trauma

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Summary Improvements in pre-hospital care and the development of integrated Trauma Systems have streamlined access for the severely injured to sophisticated, specialist Trauma Centre reception and resuscitation. We describe the initial care of a survivor of combined ruptures of the left ventricle and left atrium secondary to blunt injury. This case emphasises the contribution of such a Trauma System in achieving a favourable outcome for a severely injured trauma patient with injuries previously considered non-survivable.

Case

A 54 male was the driver of a small motor car which was struck by a truck at high speed. The paramedics first at scene noted the patient was conscious and conversant with a nonrecordable blood pressure. There was an entrapment time of 67 min. A dually responded Mobile Intensive Care (MICA) paramedic staffed rotary wing aircraft attended the scene. The MICA paramedic noted left sided rib fractures and a left flail chest. The patient was paralysed, intubated and mechanically ventilated using Midazolam 3.5 mg, Suxamethonium 125 mg and Pancuronium 8 mg intravenously (i.v.). Bilateral Arrow Pneumocath™ catheters were placed and a Laerdal Stiffneck™ cervical collar and SAM sling™ pelvic binder applied. 5500 ml of 0.9% NaCl was administered i.v. en route and the patient arrived at the Alfred Trauma Centre 80 min after the accident.

On arrival at the Trauma Centre the patient had a systolic BP of 60 mmHg and a heart rate of 115 bpm. Pupils were 2 mm and equal and reactive.

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The patient was noted to have thoracic subcutaneous emphysema and left sided rib fractures. The pleura were decompressed bilaterally and 32 Fr Tyco Argyle™ pleural catheters were placed prior to supine chest X-ray. The initial chest radiograph demonstrated a lobulated prominence of the superior mediastinum and was suspicious for mediastinal injury—although heart size was within normal limits.

Despite fluid resuscitation with crystalloids and blood products (4 units of red packed cells and 2 units of fresh plasma via a Level 1™ infuser in the first minutes of resuscitation) systolic blood pressure did not increase. During this time a right subclavian Arrow Multi Access Catheter™ and a right Cook™ femoral arterial line were inserted. The patient was hypothermic (T 30 °C), coagulopathic (INR 2.4), with a pH of 6.97, PaO_2 84 mmHg and serum lactate 8.4 mmol/l. At 18 min postarrival the intra-arterial systolic blood pressure was 57 mmHg. Focused assessment with sonography for trauma (FAST) demonstrated free fluid in Morrison's pouch and around the spleen with a haemoperitoneum estimated to be <1000 ml. Cardiac views demonstrated haemopericardium with cardiac tamponade and right ventricular collapse, as well as extensive clot over the right ventricle (Fig. 1).

An emergency left anterolateral thoracotomy was performed. A left haemothorax and lacerated lower lobe of the left lung was noted. There was a tense haemopericardium which was decompressed. Following pericardial decompression the arterial systolic BP rose from 57 to 157 mmHg. A 3 cm laceration to the anterior aspect of the left ventricle was noted. The most inferior aspect of the laceration was full thickness with pulsatile haemorrhage that was controlled with digital pressure. The thoracotomy incision was extended through the sternum and the left internal mammary artery was clamped. The left ventricular wound was held with gentle traction and Vicryl 2.0 interrupted sutures with Surgicel™ pledgets were placed. During the ventricular wound repair substantial bleeding suddenly occurred from the superior and

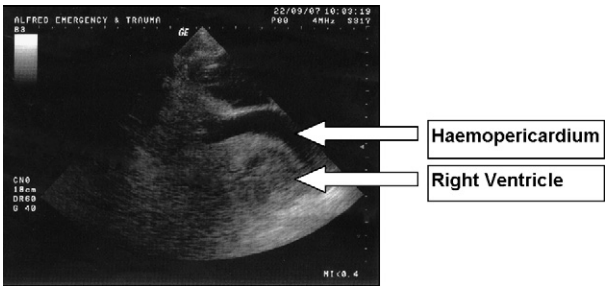
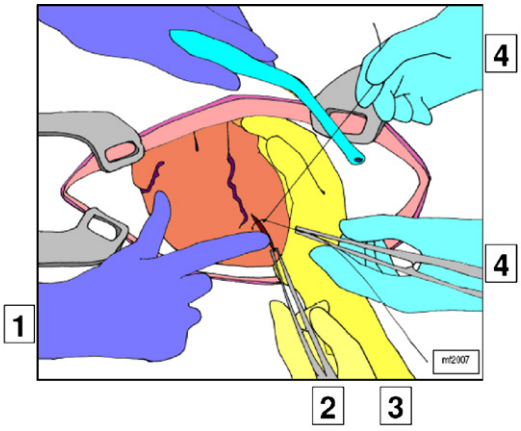


Figure 1 FAST scan demonstrating haemopericardium.



1 Digital control of LV rupture
2 LV wound stabilized with tension
3 LA rupture digital controlled whilst LV wound is repaired
4 LV wound closed with interrupted sutures and Surgicel® pledgets

Figure 2 Procedure.

posterior aspect of the heart. A torn left atrial appendage was identified and digitally controlled until the left ventricular wound was repaired (Fig. 2). A Satinsky clamp was then applied to the left atrial appendage and the patient was transferred to the Operating Room. The patient was supine in Trendelenburg's position during the procedure. During the resuscitation a total of 0.6 mg of adrenaline had been administered intravenously.

Definitive management of cardiac, pulmonary and abdominal injuries was performed in the operating theatre. The left atrium was repaired. A full trauma laparotomy with splenectomy and liver packing was performed. The BIS score on arrival in the operating theatre was between 30 and 40. It was low for very short periods of time when the heart was handled to facilitate the atrial repair and the patient became hypotensive. A postoperative trans-thoracic echocardiograph showed no associated valvular injury and no hypokinetic myocardial areas. The postoperative course was complicated by persistent chest infection and a pleural collection treated with surgical drainage and prolonged antibiotic therapy. The patients injuries are listed in Fig.3. Atlanto-occiptal instability was treated with halo fixation. The patient was discharged to a rehabilitation facility on postoperative day 39 independent.

Information for this case report was derived from the Alfred Trauma Net™ trauma registry, the patient record and the Trauma Reception and Resuscitation Project™ which captures real-time visual, physiological, procedural and diagnostic data.[6] This methodology has the prior approval of the Alfred Ethics and Research Committee.