Perils of pericardiocentesis

Introduction

Iatrogenic injury following echocardiographically-guided pericardiocentesis is generally uncommon but can be associated with significant morbidity and mortality. This article reports a case of pericardiocentesis complicated by right ventricular cannulation in a patient with significant pericardial effusion following cardiac surgery. Myocardial injury should be suspected early when presented with a rapidly deteriorating patient following pericardiocentesis and urgent resuscitation instigated.

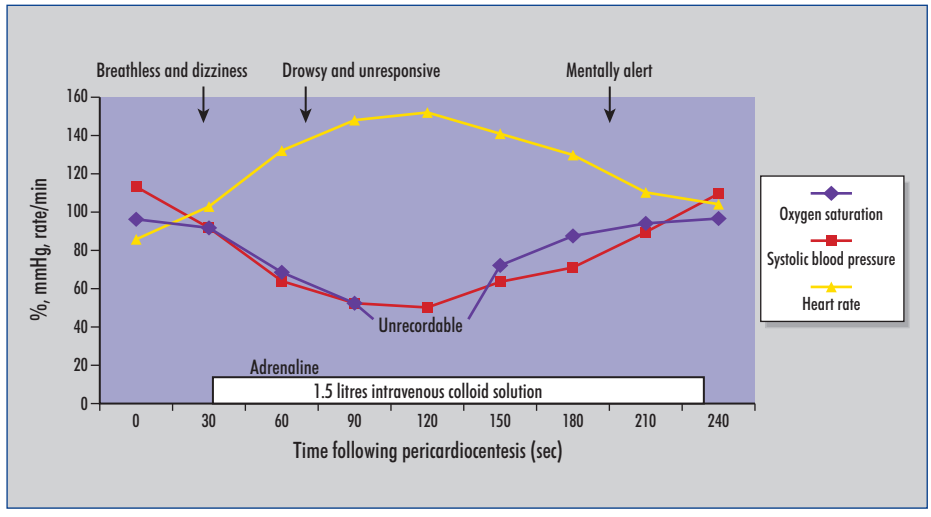


Figure 1. Vital signs immediately following pericardiocentesis.

Discussion

Echocardiographically-guided pericardiocentesis is the treatment of choice for significant pericardial effusion following cardiothoracic surgery with a reported success rate of 97% (Tsang et al, 1999). Major complications related to pericardiocentesis include chamber injury (particularly right ventricle) with cardiac tamponade, coronary artery injury and pneumothorax. The risk is higher following cardiac surgery because of pericardial adhesions and loculated effusions. Furthermore, the clarity of transthoracic echocardiography is suboptimal in the postoperative patient owing to the presence of multiple chest drains and wound dressings impeding on the ultrasound window.

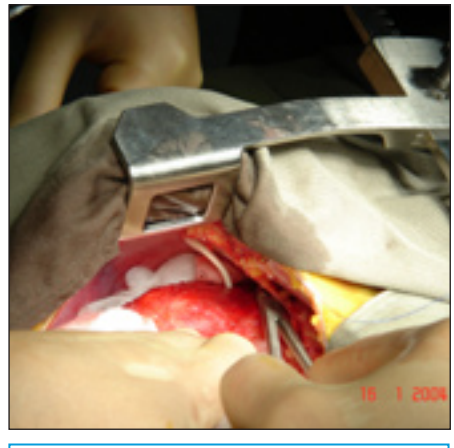
The drainage of heavily blood-stained fluid following pericardiocentesis with associated hypotension should alert the clinician to the possibility of myocardial or cardiac chamber injury. However, the significance of large pericardial drainage volume can be overlooked in patients who have had recent cardiac surgery because of the expected reactive pericardial effusion (Atar et al, 1999).

Case Report

A 51-year-old woman underwent elective cardiac surgery for the closure of an atrial septal defect. The surgery was uneventful and the patient was making good progress. On postoperative day 6, she developed shortness of breath, tachycardia and raised jugular venous pressure. Transthoracic echocardiography noted a high pulmonary artery pressure of 65 mmHg (preoperative 78 mmHg), and a 3 cm pericardial effusion with tamponade effect on the right atrium.

Pericardiocentesis under echocardiography guidance was performed without difficulty. The drainage from the pericardial catheter was good, and the patient noted immediate improvement in her dyspnoea. However, shortly following the procedure, she complained of increasing breathlessness, dizziness and became visibly pale. The oxygen saturation dropped rapidly from 96% to 53% and then became unrecordable. Systolic blood pressure fell to 52 mmHg and she became severely drowsy (*Figure 1*). The differential diagnosis included iatrogenic pneumothorax (tension) and myocardial injury. The bedside pericardiocentesis collection bag was then noted to be full to the bursting point of 2 litres with heavily blood-stained fluid. The draining tube was clamped, the bed was put to head down position, resuscitation with oxygen via rebreathable mask, and 1 mg intravenous adrenaline was administered. Intravenous colloid totaling 1.5 litres was actively squeezed into the patient through large intravenous catheters. At that point, the thought of elevating and inverting the pericardiocentesis collection bag to allow return transfusion of its contents did briefly cross the authors' minds. Fortunately, the patient swiftly regained consciousness, but her haemoglobin had fallen from 9.8 to 4.7 g/dl. She was rushed to the operating theatre for emergency surgery, which revealed the pericardiocentesis catheter had punctured and was lying within the right ventricle (*Figure 2*). The right ventricle was repaired with 3/0 prolene pleget and the pericardial blood clots were removed. The patient recovered well and was discharged 4 days later.

Figure 2. Intraoperative picture showing right ventricle cannulated by the pericardiocentesis catheter.



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In a large series, drainage of up to 2.6 litres of pericardial effusion may be expected following cardiothoracic surgery (Tsang et al, 1999). The phenomenon of acute left ventricular failure following large volume pericardiocentesis should also be considered in someone who develops hypotension following pericardiocentesis (Chamoun et al, 2003).

Death can occur quickly following injury to the cardiac chambers through the effects of tamponade and hypovolaemia. In addition, the coronary arteries may be injured causing myocardial ischaemia. Emergency bedside surgical pericardiotomy through the sub-xyphoid or anterior mini-thoracotomy approach can be life-saving by immediately relieving the effects of tamponade (Ball and Morrison, 1996; Soler-Soler et al, 2001).

Following resuscitation, emergency surgery is usually necessary to assess and repair the laceration. If a pericardiocentesis catheter is suspected to be within the heart chamber, as in this case, it is best left in-situ and removed only under controlled conditions intraoperatively. To the authors' knowledge, no report has described the feasibility of elevating and inverting the pericardiocentesis collection bag to allow return transfusion of contents back into the heart chamber in the emergency setting. Finally, it is interesting that this patient had initial subjective improvement in breathlessness following the procedure, probably as a result of the off-loading of the right heart.

The report serves a poignant reminder that rapid deterioration and drainage of heavily blood-stained fluid following pericardiocentesis should alert the clinician to possible myocardial injury, and extra caution should be taken in patients at high risk for iatrogenic injury. **BJHM**

Atar S, Chiu J, Forrester JS, Siegel RJ (1999) Bloody pericardial effusion in patients with cardiac tamponade. Is the cause cancerous, tuberculous, or iatrogenic in the 1990s? *Chest* **116:** 1564–9

Ball JB, Morrison WL (1996) Experience with cardiac tamponade following open heart surgery. *Heart Vessels* **11:** 39–43

Chamoun A, Cenz R, Mager A, Rahman A, Champion C, Ahmad M, Birnbaum Y (2003) Acute left ventricular failure after large volume pericardiocentesis. *Clin Cardiol* **26:** 588–90

Soler-Soler J, Sagrista-Sauleda J, Permanyer-Miralda G (2001) Management of pericardial effusion. *Heart* **86:** 235–40

Tsang TSM, Barnes ME, Hayes SN et al (1999) Clinical and echocardiographic characteristics of significant pericardial effusions following cardiothoracic surgery and outcomes of echo-guided pericardiocentesis for management - Mayo Clinic Experience, 1979-1998. *Chest* **116:** 322–31

A problem of epidemic proportions

It's happening. The measles epidemic has started, with five times as many cases so far this year than in the whole of 2005. A child has died. No one should be surprised. It is the inevitable result of the reduction in herd immunity consequent on the reporting of Andrew Wakefield's research.

I don't necessarily blame Wakefield directly – although as the General Medical Council could charge him with professional misconduct I may change my mind. I blame the media, and some parts of it more than others.

If a vaccine does harm a child, there are mechanisms by which compensation may be forthcoming; what now for children harmed because, too young yet to be immunized, they have been infected by another child whose parents shunned immunization? Would they be able, for example, to sue the *Daily Mail*? On June 15, it did report the measles outbreak. Unlike most of its prominent advertising of Wakefield's flawed ideas – the last only a few weeks ago in the *Mail on Sunday* reporting unconfirmed and unpublished findings under the headline 'Scientists fear MMR link to autism' – the story was on page 36. The opening paragraph of June's story should have read, 'Thanks to our long-running campaign, Britain is in the grip of its worst measles outbreak since the MMR (measles, mumps and rubella) jab was introduced nearly 20 years ago.' Unsurprisingly, the newspaper declined to take the credit.

As I have written before, there are some people who will never be persuaded that MMR does not cause autism. I suspect they will blame the outbreak on the government for not making single vaccines available. Never mind the lack of safety data on single vaccines, nor that the complication of the single vaccine regimen means children tend to miss the later injections.

We can only hope that the resurgence of the disease will convince parents that they really should get their children immunized. Only 12% of children in Westminster, London, are now immunized by their fifth birthdays; the national average is 75%. For herd immunity to be effective, 93% need to be protected. Parents who hold back, wanting to be in the 7% that gain for no pain, may find selfishness brings more pain than they expected.

An internet page for parents in the US, where there is not the fear of MMR, ends by saying, 'Remember that measles is very rare.' In Britain that is no longer true.

So it is for some relief that I turn to the football World Cup – otherwise known as the Simulated Injury and Land Diving Festival. Footballers able to weave and duck almost the whole length of the pitch seem unable to remain vertical at all once they've crossed into the penalty area. How long will it be before teams have medical advisors to tutor their players in ways to convince a referee? Somebody certainly needs to tell footballers that if you're really hurt you don't roll over and over clutching the injured part. You go down, and stay down, lying very still. **BJHM**

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