

## Hospital Practice

# Cardiac tamponade complicating central venous catheter

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**Summary:** Cardiac tamponade complicating central venous catheters is usually fatal. We present a 23 year old woman who developed cardiac tamponade 12 hours after the insertion of a subclavian line. Early recognition of this complication and urgent pericardiocentesis led to her survival.

### Introduction

The use of central venous catheters either for nutrition purposes or for central venous pressure monitoring has become routine in modern medical care. The fatal complications of catheter-related cardiac tamponade have already been described<sup>1</sup> and continue to be reported.<sup>2</sup> Of the 37 cases of catheter-related cardiac tamponade, only 4 patients survived.<sup>2,3</sup> We present a patient in whom early recognition and treatment lead to survival. Immediate echocardiogram was helpful in confirming the diagnosis. The general guidelines for avoidance and management of cardiac tamponade are emphasized.

### Case report

A 23 year old epileptic woman was admitted following 5 grand mal seizures within a 5-hour period. Previous therapy consisted of phenytoin and primidone. On examination she was drowsy. The pulse was 80 per minute and blood pressure was 120/80 mm Hg. She had a left hemiparesis. Diazepam was given intramuscularly and then paraldehyde rectally but she continued to fit. Peripheral venous access was not available due to previous injuries and cut downs. Therefore a polyvinyl chloride subclavian line was inserted percutaneously in the right infraclavicular area to facilitate the administration of intravenous clonazepam. A free flow of blood back down the catheter was noted after insertion.

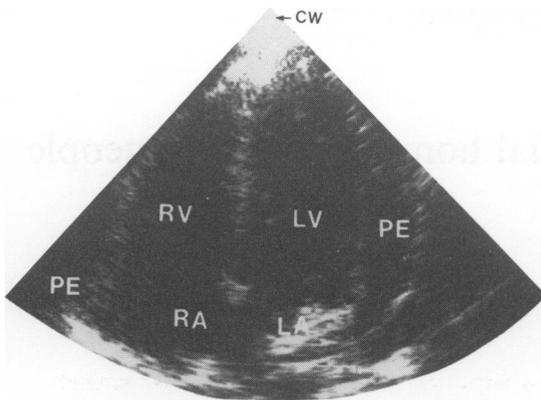
Twelve hours later she suddenly complained of burning retrosternal chest pain with difficulty in breathing. She felt dizzy, sweaty and then collapsed with a tachycardia of 120 beats/min. The blood pressure fell to 50 mm Hg systolic. No pulsus paradoxus was found and her heart sounds were quiet. The central venous pressure rose to 14 cm H<sub>2</sub>O and remained fixed with no movements on ventilation. By that time she had 500 ml of normal saline containing 6 mg of clonazepam infused. The intravenous infusion was stopped with no improvement in her condition. Chest X-ray showed slight cardiomegaly. Two dimensional echocardiogram was immediately performed revealing a moderately large pericardial effusion surrounding the heart (Figure 1). Urgent pericardiocentesis was undertaken and 200 ml of lightly blood-stained fluid removed. This led to a rapid clinical improvement in her condition. Blood pressure returned to normal although she continued with chest pain for a few days. She was discharged home well, and a follow-up series of echocardiograms revealed complete resolution of the pericardial effusion.

### Discussion

Cardiac tamponade associated with central venous catheters carries a high mortality rate.<sup>2</sup> Thirty-seven cases of catheter-induced tamponade have been reported in the English language literature.<sup>1–5</sup> In 19 cases the catheters were inserted in the antecubital fossa, in 13 instances the catheters were inserted through the subclavian vein and in 4 cases the insertion was through the external jugular vein. The

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**Figure 1** Apical four-chamber two dimensional echocardiogram revealing the pericardial effusion. PE=pericardial effusion; CW=chest wall; RV=right ventricle; RA=right atrium; LV=left ventricle; LA=left atrium.

time interval between insertion of the central venous catheters and cardiac tamponade varies from a few minutes to several days.<sup>4</sup> The onset of symptoms was sudden with nausea, dyspnoea and retrosternal chest pain associated with cyanosis and venous engorgement of the face and neck. Tachycardia, hypotension and paradoxical pulse were common. Confusion was frequently seen.<sup>4</sup> Radiological and electrocardiographic signs are not always present. Cardiac arrest occurs usually within hours of the initial symptoms. In most cases the perforation occurred in the right atrium or right ventricle. The tamponade fluid was usually not bloody and was similar to that of the fluid being infused via the catheter.<sup>5</sup>

Immediate echocardiogram can be very helpful as in our case. However, treatment should not be delayed if the clinical diagnosis of cardiac tamponade is made. Greenall<sup>4</sup> suggested that in

most cases, clinical diagnosis of cardiac tamponade could probably have been made had the medical attendant been aware of the possibility and there was usually enough time to aspirate the pericardial fluid.

Based on reported observations and our experience of the case described the following suggestions seem justified: (1) It is preferable not to use polyethylene or nylon catheters as they are rigid and the catheter of choice seems to be the silicone one (Silastic).<sup>2</sup> No case of myocardial perforation by this type of catheter has been reported. (2) The catheter position should be checked by a chest X-ray immediately after insertion. It should lie no more than 2cm below a line joining the lower borders of the clavicles.<sup>6</sup> Central lines should not be within the cardiac silhouette by chest X-ray. (3) Cardiac tamponade should be suspected in a patient with a central line who develops breathlessness, chest pain, cyanosis with tachycardia and hypotension. (4) When tamponade is suspected the bottle connected to the central venous catheter should be placed below the patient (to siphon pericardial fluid) and an attempt should be made to aspirate fluid from the catheter. The aspiration of fluid other than blood supports the diagnosis. If improvement is not immediate the central line should be withdrawn. If deterioration continues, pericardiocentesis should be performed. If, despite pericardiocentesis severe hypotension persists, urgent thoracotomy is indicated.<sup>3,5</sup>

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