Reminder of important clinical lesson

Missed cardiac tamponade

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Summary

Cardiac tamponade can have an insidious onset, becoming life threatening when an adequate cardiac output can no longer be maintained. This case provides an example of a presentation where all the classic signs were present but unfortunately they were missed, in this way providing good revision of what these signs are. It gives some anaesthetic and procedure based perspectives for this rare presentation. It is noteworthy for the speed at which symptoms and signs resolved after the tamponade was relieved.

BACKGROUND

This case is a reminder of the importance of being thorough when assessing people in both the clinical examination, and when scrutinising images and investigations. It illustrates how we dispense with patients' safety nets by not making our own opinion about results before reading the interpretation of others, and by not taking time to consider medical history and old images even when it is busy, or the timing of results is staggered.

It goes on to provide an example to non-anaesthetists of where intubation and ventilation may be harmful rather than helpful, and some useful tips on how to discriminate between blood and blood stained fluid when performing procedures. Finally the full set of signs for cardiac tamponade is presented and interpreted.

CASE PRESENTATION

A-54-year-lady treated 2 years ago for right-sided non-small cell lung carcinoma presented with 4 days of hyperemesis. She was slightly hypertensive at 110 beats per min but otherwise her bedside observations were all within normal range. Admission liver, renal and inflammatory blood results were all elevated. The admission chest x-ray (CXR) (figure 1) showed a right basal pleural effusion and possibly a globular cardiac shadow compared to previous films, though the latter was not commented on in the formal report. She was treated for community acquired pneumonia with a CURB65 score of one. Atypical organisms were screened for. In the initial assessment no record is made of the quality of the heart sounds, jugular venous pressure (JVP) or peripheral perfusion.

Two days into her admission the night staff was unable to record a blood pressure or oxygen saturation using non-invasive monitoring. She was more dyspnoeic with a respiratory rate of 28 on 15l of oxygen but was able to complete sentences. A thready radial pulse was palpable and her capillary refill was found to be 7 s distally and 5 seconds centrally. She remained afebrile and orientated.

She was transferred to intensive care. A hugely distended JVP was noted with no visible wave forms. This, together with muffled heart sounds and the globular cardiac silhouette, made cardiac tamponade secondary to reoccurrence of her squamous lung cancer an alternative working diagnosis.^{1 2}

INVESTIGATIONS

The bedside ECG recorded is shown in figure 2. On citing of an arterial line, her blood pressure was found to be about 120/80 mm Hg. When watched closely the peak of the arterial line trace had an exaggerated swing, particularly on inspiration. Placement of a central venous line revealed a JVP of 40 mm Hg (usual 5–8 mm Hg). On catheterisation her urine output was 0.05 ml/kg/h.

DIFFERENTIAL DIAGNOSIS

- ▶ Squamous cell carcinoma with pleural effusion +/- pneumonia +/- cardiac tamponade.
- ▶ Aortic dissection.

TREATMENT

The patient had presented to a hospital without a cardiothoracic service and was now deteriorating rapidly. Intubating for transfer to cardiothoracics was felt to be unsafe because positive pressure ventilation would provide another insult to her venous return and therefore further impair cardiac output. She was deemed to be too unstable for transfer unintubated. Cardiothoracics could not provide a service at the hospital she was located in.

A transthoracic ultrasound showed a 3 cm rim of circumferential pericardial fluid confirming the diagnosis of cardiac tamponade. Pericardiocentesis under ultrasound guidance using local anaesthesia and the Seldinger technique with the patient fully awake was performed on the intensive care unit by the consultant anaesthetist. On entry into the pericardial space, red fluid was aspirated. Having immediately occluded the end of the needle to prevent further aspiration a number of techniques to establish whether this was blood stained pericardial fluid or blood, which could have indicated a punctured ventricle, were performed. We

- ▶ established that the aspirate did not clot.
- ▶ ran the aspirate through a gas machine and noted the significant difference in Hb and pH compared to a concurrent blood sample.
- ▶ noted stable respiratory, cardiovascular and neurological function in the patient.
- ▶ retraced the path of the needle with ultrasound.

Figure 1 Admission CXR.

Figure 2 ECG.

These are useful bedside tests in other scenarios where aspirate comes out blood stained and there is a need to establish a vascular structure has not been punctured.

OUTCOME AND FOLLOW-UP

Within 2 h 1500 ml of blood stained pericardial fluid had drained, her JVP had fallen from 40 mm Hg to 18 mm Hg, pulsus paradoxus was no longer apparent, she was polyuric, with improving peripheral perfusion and managing well on 2l oxygen. She felt much better.

The pericardial aspirate was sent for cytology. The underlying diagnosis was confirmed as recurrence of her squamous cell lung carcinoma for which she was offered palliative chemotherapy. The right pleural effusion seen on her admission CXR had been malignant, not infective, in

origin and in the weeks following this presentation had recurrent pleural effusions that required draining. A significant amount of pericardial fluid was not demonstrated again. Six months later metastasis to the humerus was detected with the patient still alive 1 year after presenting with cardiac tamponade.

DISCUSSION

Beck's Triad, diagnostic of cardiac tamponade, consists of hypotension, muffled heart sounds and elevated jugular venous pressure. Although invasive monitoring did not show a low blood pressure she had several signs of poor organ perfusion secondary to poor cardiac output, and pulsus paradoxus. The ECG showed small complexes and electrical alternans. I will briefly outline the

physiology behind these signs to help understand the condition.

In cardiac tamponade heart sounds are quieter and ECG complexes smaller because of increased distance between the heart and chest wall. As a result of the heart moving around in a mass of pericardial fluid, the ECG electrodes receive the beat to beat electric current in different orientations giving rise to electrical alternans. If you look at the strip line of the ECG you can see how the orientation of the p on the qrs changes from complex to complex.

The JVP is elevated with loss of y wave because the presence of the pericardial fluid impedes diastolic relaxation which in turn diminishes venous return and thereby cardiac output. Poor venous return results in pulsus paradoxus which is why there is exaggeration of the normal variation of 10 mm Hg in blood pressure between inspiration and expiration.

A literature search reveals other cases of squamous cell carcinoma complicated by cardiac tamponade. The severity of the presentation described in this case required prompt pericentesis. However it should be borne in mind that mild/moderate presentations, and/or with different aetiologies example Dressler's syndrome, may respond satisfactorily to less invasive treatment, and indeed this was true for this patient in the following months where a minor reaccumulation did not progress, in conjunction with chemotherapy treatment. This is in contrast to other cases presented in the literature where despite chemotherapy cardiac tamponade reoccurrence proved fatal, with metastatic deposits found within the pericardium at autopsy.³

Learning points

- ▶ interpret presenting complaints in the context of previous morbidities, and don't simply look at the report of radiology investigations, but look at the image oneself.
- ▶ revision of the signs of cardiac tamponade, including an ECG showing electrical alternans, and their underlying pathophysiology.
- ▶ where all the signs of cardiac tamponade are present one is probably managing a severe, life threatening presentation and prompt pericardiocentesis is required. Intubation should be weighed up carefully.
- ▶ tips to establish whether one is aspirating blood or blood stained fluid when performing a procedure are outlined.

Competing interests None.

Patient consent Obtained.

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