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CASE REPORT

Route to the Pericardium: Journey of a Misplaced Central Venous Catheter

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ABSTRACT

Cardiac tamponade is a rare but fatal and often underdiagnosed complication of central venous catheter (CVC) placement, associated with high mortality. Imaging and clinical findings with high degree of suspicion helps in diagnosis of the condition in patients. This case emphasizes the critical importance of confirming the correct position of catheter tips prior to initiating any infusion therapy. Clinicians should maintain a high index of suspicion for tamponade in patients whose clinical parameters and vital signs worsen following central line placement. Additionally, caution is advised during resuscitation efforts, and using the catheter in question should be avoided until proper placement is verified. In this case report, we discuss this highly critical case, the immediate emergency diagnosis and prompt treatment she received in the emergency department and final outcome.

KEYWORDS

• Central venous Catheter • CVP line • Pericardium • Misplacement

INTRODUCTION

Central venous catheters are associated with a wide range of potential complications, among which cardiac tamponade, though uncommon, is a recognized and often fatal event. Despite its severity, this diagnosis is frequently overlooked, even when patients present with classic acute symptoms.[1,2] The onset of tamponade symptoms can range

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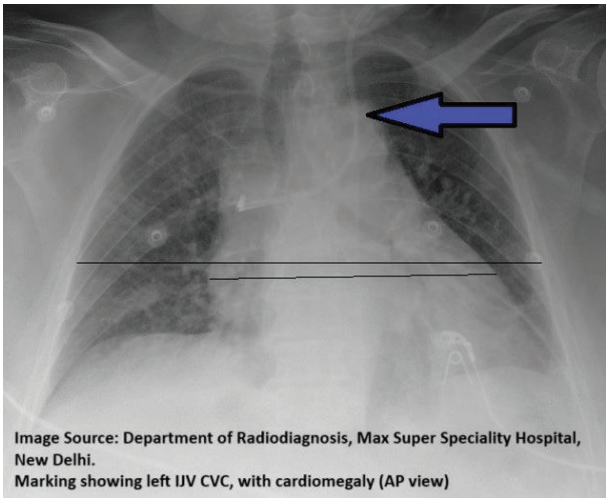
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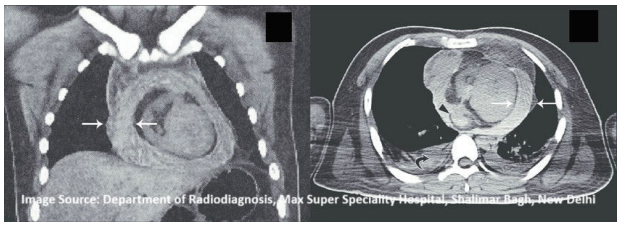
from minutes to several days following catheter placement.[3] Contributing risk factors include mal-positioning of the catheter tip most commonly when it lies within the right atrium or ventricle and the administration of hyperosmolar solutions. It is essential to verify catheter tip placement before initiating therapy and necessitates the imaging confirmation of their position prior to initiation of therapy through the CVC line. In this case report, we discuss a fatal complicated case of misplaced CVC line, the prompt diagnosis and its immediate management in the ED, helping in spontaneous resolution of patient symptoms and improving the clinical outcome.

CASE

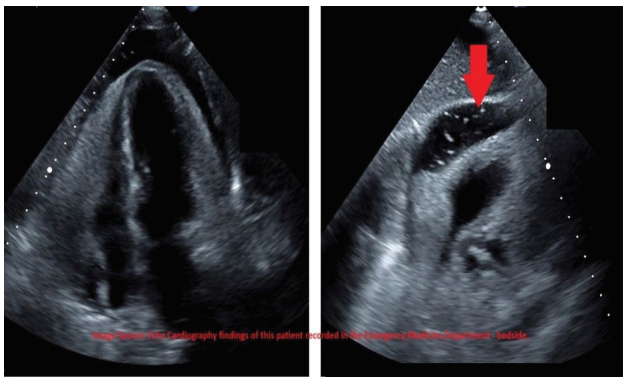
A 24-year-old female patient was brought to the emergency department (ED) of our hospital in critical state on oxygen support in an ACLS ambulance. Owing to the toxic look and critical condition of the patient, she was immediately wheeled to the red triage bed (resuscitation bed). Patient had blood transfusion on-going through a central line place in the left internal jugular vein. An immediate differential diagnosis of blood transfusion related acute lung injury was made and resuscitation was started. Her initial vitals in the ED (pulse rate – 146/min, BP – 80/40 mmHg, RR – 24/min, Spo2 – 90% on high flow oxygen, Temperature – 101 * F, RBS – 157mg/dL). Her electrocardiogram showed low voltage complexes, her arterial blood gas showed severe respiratory acidosis (pH – 7.12, pCO_2 – 63, pO_2- 88, Lac – 3.3, HCO_3- 17). Patient primary survey was done and treatment as per protocol was initiated. On history taking from her father – patient had history of fever with anemia 20 days back, she was admitted in a private nursing home in her locality. She was treated there for 3 days and when her condition did not improve, she was referred to a nearby private hospital. As per the records, she was diagnosed with "sepsis with septic shock with sever iron deficiency anaemia", she was admitted in ICU there for almost 15 days. Initially she was placed on antibiotics and IV fluids with supportive care, CVP line in the right internal jugular vein (IJV). As when condition didn't improve, she was changed on higher antibiotics for the last 8 days. On the 15thday of admission there (total – 18th day), her right IJV CVC line stopped working and she was placed on left internal jugular vein for further medications and blood transfusion. Due to technical error, post procedure was not done and it was scheduled for later that day but medications were initiated.

1 day before arrival to our hospital, patient was started on blood transfusion in the night late hours. Post blood transfusion completion, patient started having respiratory distress in the morning (on the day of transfer) with deterioration in her vitals (tachycardia with hypotension). The patient was immediately referred to our centre for further management. Based on this history, immediately chest x-ray was planned. Simultaneously, patient was shifted for HRCT chest (image), which shows pericardial effusion with hydrothorax.





Post review of chest X-ray and HRCT chest, an urgent echocardiography (2D bedside) was done which showed massive pericardial effusion (image).



The left IJV central line was removed cautiously and urgent pericardiocentesis was performed under the guidance of cardiologist in the ED and around 120-150ml of drain was collected.

The patient was shifted to CTVS ICU under cardio-vascular-thoracic surgeon team. The patient underwent urgent sternotomy, the site of puncture was identified and repaired. Post-operatively, the patient was hospitalised for 7 days (4 days in ICU and 3 days in ward). All symptomatic management was done. Her fever resolved; she was discharged home symptoms-free in stable condition on the 8th day of hospitalization. The follow-ups were uneventful and patient continued to be in stable condition.

DISCUSSION

Cardiac tamponade due to central venous catheterisation line misplacement is a rare but document complication.[4] Cardiac tamponade is a rare but potentially fatal complication arising from central venous catheter (CVC) insertion. Though limited reports are been available online, the actual incidence is likely higher due to under diagnosis and under reporting. Estimates vary widely, ranging from 0.0001% to 1.4% of catheter placements.[5] The risk is significantly increased when catheter tips are incorrectly positioned most commonly in the right atrium or ventricle or when hyperosmolar solutions like total parenteral nutrition (TPN) are infused.[3] Additional risk factors include catheter migration due to patient movement, poor skin fixation, and the angle at which the catheter tip lies against the vessel or cardiac wall, which can contribute to erosion and perforation over time.[3,6]

The clinical presentation of cardiac tamponade can range from subtle to rapidly progressive.[3] Symptoms may develop within minutes or be delayed for days or weeks after catheter insertion. Patients may experience hypotension, tachycardia, shortness of breath, chest pain, cyanosis, jugular venous distension, and pulsusparadoxus.[3,6] In many cases especially in sedated or ventilated patients symptoms are non-specific or masked, making early recognition challenging. Some patients deteriorate suddenly with minimal warning signs, highlighting the need for high clinical suspicion when a patient with a central line shows unexpected cardiovascular compromise.[6]

Diagnosis of tamponade is often delayed due to the non-specific nature of early signs. Routine methods like chest radiographs and ECG may not reveal abnormalities until a large volume of fluid accumulates in the pericardial space. Low-voltage QRS complexes or electrical alternans may appear on ECG, but are not consistently present. Transthoracic or transoesophageal echocardiography remains the most reliable diagnostic tool, offering clear visualization of pericardial effusion and cardiac compression.[7]

Immediate intervention is essential to prevent fatality. The first step is to stop all infusions through the suspected catheter, followed by attempts to aspirate any pericardial fluid. If unsuccessful, the catheter should be promptly removed. Persistent tamponade requires urgent pericardiocentesis, and in cases where this fails, surgical management such as thoracotomy may be necessary. Preventive measures include confirming catheter tip placement with imaging, using flexible tipped catheters, and avoiding the administration of hyperosmolar fluids through distal ports unless tip position is clearly verified.

CONCLUSION

Our case report highlights the importance of imaging service post central venous line placement. It is essential to carry out radiological investigation like chest X-ray always after placement of internal jugular vein central lines (right or left, both) before initiating the use of the CVC line. Other dreaded complications missed without an Xray includes pneumothorax, misplacement of the CVP line *etc.* Through knowledge of the anatomy, the skill required in securing a CVP line and prompt response in handling any complication due to procedure failure is required to achieve in an emergency physician to prevent fatal life complications.

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