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CASE REPORT

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Cardiac tamponade due to internal jugular catheterization after lung resection: a rare but life-threatening complication (case report)

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Abstract

Introduction Internal jugular venous catheterization is an invasive procedure, and there are life-threatening complications that require urgent intervention. In this study, we present a young patient who developed myocardial injury due to internal jugular catheterization.

Case The patient underwent middle lobectomy for bronchiectasis. Right internal jugular venous catheterization was performed. In the fourth postoperative hour, resuscitation was initiated due to sudden hypotension, tachycardia, and altered consciousness. Bedside echocardiography, performed to evaluate the etiology of the acute presentation, revealed diffuse fluid accumulation in the pericardial cavity. Following fluid drainage, hemodynamic stability was achieved.

Discussion Possible complications can be life-threatening, and rapid diagnosis along with prompt treatment may be life-saving.

Keywords Internal jugular venous catheterization, Pericardial tamponade, Myocardial injury

Introduction

Internal jugular venous catheterization on the preoperative operating table during major lung resections is recommended to ensure surgical safety and to allow rapid vascular access in case of intraoperative bleeding. However, internal jugular venous catheterization is an invasive procedure, and potentially fatal complications requiring urgent intervention may occur. Pneumothorax, hemothorax, hematoma, and arrhythmia are common complications, while cardiac tamponade secondary to cardiac injury may also be observed [1]. Cardiac tamponade can result from hemorrhage caused by damage to anatomical structures. In this study, we present a young patient who developed myocardial injury due to intraoperative internal jugular catheterization and subsequent cardiac tamponade following fluid administration through the catheter after undergoing surgery for bilateral bronchiectasis.

Case

A 30-year-old female patient, with a history of left lower lobectomy due to bronchiectasis and scheduled for surgery for middle lobe bronchiectasis, underwent right internal jugular venous catheterization by the responsible

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Fig. 1 Preoperative thorax CT- bilaterally cystic bronchiectasis image

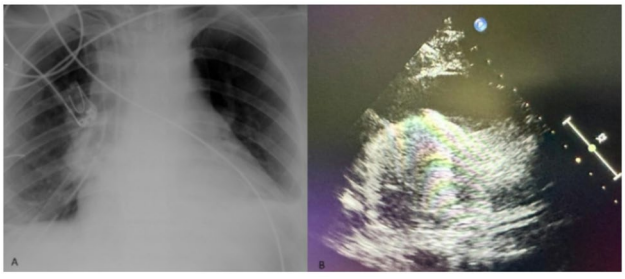


Fig. 2 **2a** Postoperative 4th hour PA chest radiograph of the patient. Postoperative bleeding is not observed; however, there is widening of the mediastinum **2b**:Tamponade view of echocardiography (on-side exemination)

anesthesiologist immediately after the induction of general anesthesia in the operating room to minimize the risk of surgical complications (Fig. 1). The patient underwent video-assisted thoracoscopic middle lobectomy. No mediastinal pathology was observed during the operation, and the patient was extubated and monitored in the intensive care unit without follow-up in the post-anesthesia care unit (PACU).

At the fourth postoperative hour, the patient was urgently intubated due to sudden hypotension, tachycardia, and clinical deterioration. No additional drainage was observed in the pleural drainage system, and no evidence of hemorrhage was seen on the PA chest X-ray. (Fig. 2a). Simultaneous blood tests showed no decrease in hemoglobin, and troponin was elevated at 0.227 ng/mL (reference: 0.00–0.160). Arterial blood gas analysis revealed: pH 7.22, pCO_2 36.2 mmHg, pO_2 57.4 mmHg, sO_2 83.5%, and lactate 5.7 mmol/L (reference: 0.5–1.6).

Bedside echocardiography was performed to rule out pulmonary thromboembolism, and an image consistent with pericardial tamponade was observed. The cardiology clinic was urgently consulted, and pericardiocentesis was performed in the angiography unit under fluoroscopic guidance (Fig. 2b). During the procedure, a total of 400 mL of clear fluid was drained. A dramatic improvement in vital signs was noted, and a pericardial drain was placed to complete the procedure.

Intra-procedural evaluation revealed that the distal end of the catheter had caused myocardial injury and did not extend into the mediastinum. No further drainage was observed during follow-up, and the patient was extubated on postoperative day 1. Upon retrospective evaluation with the responsible anesthesiologist, intensive care physician, and relevant ICU nurse, it was determined that no fluid had been administered intraoperatively via the internal jugular catheter. However, during catheterization, although fluid could be infused through the distal end through the distal lumen, no retrograde blood flow was noted. Due to base deficit in the postoperative period, balanced fluid infusion was initiated at a rate of 100 cc/hour via the distal end of the central catheter.

The patient was transferred to the surgical ward on postoperative day 2, discharged on day 5, and no complications were observed during the 12-month follow-up.

Discussion

Cardiac injury caused by internal jugular catheterization is an acute, life-threatening complication that may result in mortality. Rapid differential diagnosis is essential for timely intervention, particularly in patients who have undergone major surgery. Beck's triad should be considered in the clinical evaluation of the patient [1].

In this patient, the injury was presumed to have resulted from contact between the catheter tip and the myocardium. Despite the accumulation of fluid in the pericardial space, its clear appearance suggested that a full-thickness ventricular perforation had not occurred. This condition was interpreted as a fluid leak secondary to microtrauma at the subepicardial level of the myocardial surface, without direct penetration into the cardiac chamber. The absence of residual drainage during follow-up with a pericardial catheter for one day, along with the dramatic clinical improvement observed during the pericardiocentesis procedure, indicated that no residual fluid remained in the pericardial space.

According to studies in the literature, most injuries resulting from central catheterization have been identified postmortem during autopsy. In a case report published by Booth et al., a 29-year-old patient was diagnosed postmortem with tamponade secondary to nutritional fluid administration following central catheterization. Although catheterization-related cardiac damage is observed in approximately 1.4% of cases, the reported mortality rate ranges from 65% to 100% [2].

Various safety measures have been described for catheterization, among which verifying the catheter lumens and assessing retrograde blood flow are crucial.

If fluid can be infused but blood flow cannot be aspirated through the lumens, incorrect catheter placement should be suspected, and potential complications must be considered.

According to data from the American Society of Anesthesiologists Closed Claims Project Database, 110 complications related to central venous catheterization were reported among 6,400 patients between 1970 and 2004, with cardiac tamponade identified in 16 of these cases [3]. Key strategies to prevent cardiac tamponade during central venous catheterization include the use of silicone catheters, J-tipped guidewires, avoiding excessive advancement of the catheter beyond the recommended length, proper catheter fixation, and imaging confirmation of catheter placement [4]. Risk assessment, including ultrasonography-guided placement in high-risk patients, is also recommended to reduce the likelihood of complications [5].

In the study by Machat et al., the role of imaging methods was emphasized; during catheter insertion and subsequent follow-up, techniques such as radiography, flow confirmation studies, and computed tomography were highlighted as useful for detecting malposition, catheter malfunction, migration, and fracture. Furthermore, the importance of implantation technique, optimal catheter tip positioning, and structured follow-up protocols in preventing complications was underlined [6]. In the study conducted by Andropoulos et al. in pediatric patients, it was demonstrated that the catheter insertion length should always be determined based on the patient's anthropometric measurements [7]. Although cardiac tamponade is generally considered an acute complication, literature reports demonstrate that it may occur even up to 37 days after catheter placement. As highlighted in other case reports, early imaging and timely surgical intervention (such as pericardiocentesis or sternotomy) can be life-saving, and it should be remembered that serious complications may arise even when ultrasound-guided catheterization is performed [8–13].

As with other interventional procedures, minimizing the risk of potential complications through post-procedural lumen verification, confirmatory imaging, and a multidisciplinary approach enhances patient management and saves critical time. In cases where catheter-related injury is suspected, timely and effective bedside radiologic evaluation is essential for the prompt identification and management of life-threatening complications. In this case, which describes an acute complication associated with a high risk of mortality, the inability to record cardiac angiography imaging at the time of the event and to share it in the literature constituted the main limitation of the study.

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

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Data availability
The data and materials are available for use by the publisher. The datasets used and/or analyzed in the present study can be obtained from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
All procedures involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Written and verbal informed consent was obtained from all patients who underwent surgery and were included in the study. Clinical trial number: not applicable.

Consent for publication
All authors provided consent for publication. The consent form was signed by the relevant authors. The patient provided written informed consent for the publication of personal or clinical details, along with any identifying images included in this study.

Competing interests
The authors declare no competing interests.

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