Mediastinal Hematoma Caused by Central Venous Catheterization: A Rare Cause of Obscure Blood Loss

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Gastrointestinal hemorrhage, internal bleeding beyond the gastrointestinal tract and hemolysis are common causes of blood loss in intensive care unit patients. However, mediastinal hematoma is a rare cause of blood loss and is not usually detected. Here, we report a patient who developed a mediastinal hematoma resulting from central venous catheterization who presented with obscure blood loss refractory to blood transfusion. A mediastinal hematoma should be considered in the presence of obscure blood loss in patients with catheter placement.

Key Words: blood loss, central venous catheterization, mediastinal hematoma
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Causes of acute blood loss that lead to intensive care unit (ICU) admission include gastrointestinal hemorrhage, internal bleeding beyond the gastrointestinal tract and hemolysis [1–3]. Mediastinal hematoma, an unusual complication of central venous catheterization (CVC), is a rare cause of blood loss [4–6]. Here, we report a case who presented with obscure blood loss because of a huge mediastinal hematoma that resulted from CVC.

Case Presentation

An 82-year-old male with history of chronic renal failure, hypertension, coronary artery disease and fusiform aneurysm at the aortic arch and descending aorta after endovascular aortic reconstruction was transferred to the emergency department with dyspnea and consciousness change. On arrival, his blood pressure was 95/39 mmHg with tachycardia (pulse rate, 109 beats/min), and his body temperature was normal. Physical examination revealed a mild pallor. Electrocardiogram showed sinus tachycardia and no evidence of myocardial ischemia. Blood investigations revealed a white cell count of 16.86×10^9/L (83.3% neutrophils, 14.6% lymphocytes), hemoglobin level of 8.2 g/dL (compared with a previously recorded baseline of 10.8 g/dL), platelet count of 120×10^9/L and elevated serum blood urea nitrogen and creatinine levels of 76.3 mg/dL and 3.22 mg/dL (compared with a previously recorded baseline of 3.1 mg/dL), respectively. A chest radiograph showed bilateral pneumonia and a metallic stent within the aortic arch and descending aorta.

Emergency intubation and ventilatory support were initiated because of inadequate airway maintenance. Under the impression of septic shock, he was managed with intravenous fluids resuscitation and empirical antibiotics. The right internal jugular venous

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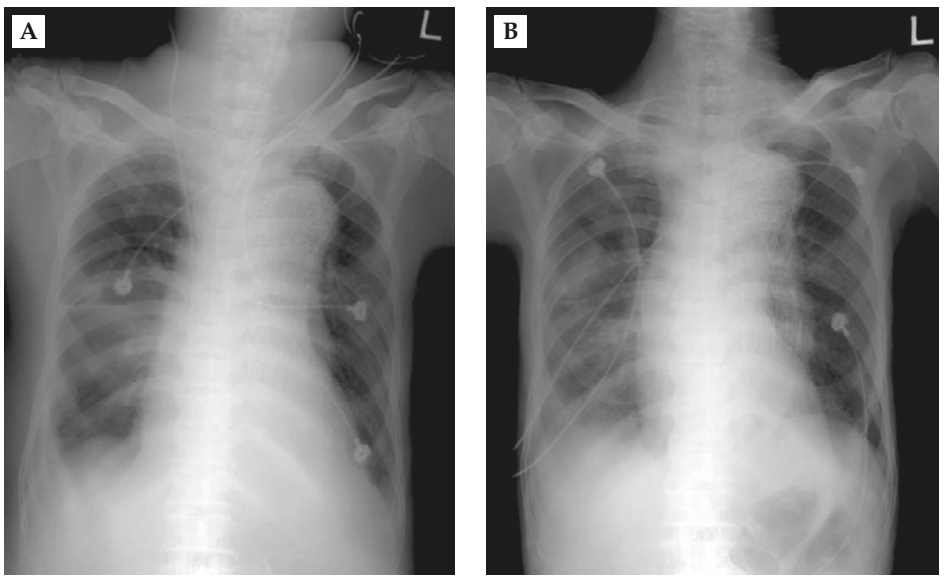

Figure 1. *Chest radiographs revealed no change in mediastinal width after: (A) insertion of the right jugular venous catheter, compared with (B) the chest radiograph before the procedure.*

catheter was successfully inserted on the first attempt and he was then admitted to our medical ICU. During hospitalization, the pneumonia improved with resolution of chest radiograph signs and stabilization of vital signs. However, the patient's blood pressure unexpectedly decreased to 84/40 mmHg, and his heart rate increased to 140 beats per minute on the same day after CVC insertion. Meanwhile, his serum hemoglobin had decreased to 6 mg/dL. However, no increment in hemoglobin level was found even after multiple blood transfusions were performed because of unstable vital signs. There was no evidence of bleeding wounds or petechia over the body, except for mild subcutaneous edema at the right neck CVC puncture site. The chest radiograph did not show a change in mediastinal width after CVC (Figure 1A) compared with the chest radiograph before the procedure (Figure 1B). His conscious level was clear and neurologic examination revealed no obvious focal sign. A coagulation screen, which included bleeding time, prothrombin time and partial thromboplastin time, was within the normal range. Therefore, no evidence of hemolysis was found. Sonography showed no ascites apart from bilateral loculated pleural effusion and thoracentesis did not reveal blood content. Stool occult blood examination was negative and the esophagogastroduodenal scope examination did not reveal any active bleeding. We failed to smoothly perform nasogastric tube insertion for feeding because of severe edema of the posterior pharynx, as noted on the esophagogastroduodenal scope. Thus, enhanced computed tomography (CT) was performed from the neck to the chest and showed a huge hematoma extending from the right parapharyngeal space to the middle mediastinum without evidence of aneurysm rupture and extravasation (Figure 2). The catheter was removed immediately and direct compression of the puncture site was completed. The ongoing bleeding was halted using parenteral desmopressin acetate without surgical intervention.

Discussion

CVC is an essential component in ICU [7,8]. Most patients admitted to the ICU undergo CVC placement to monitor hemodynamic variables and provide access for administration of medication, intravenous fluids, and parenteral nutrition. Despite its utility, the use of CVC is associated with a number of potential complications including infection, local hematoma, caval thrombosis and pneumothorax [9].

Mediastinal hematomas caused by CVC are rare in a review of literature [4–6,10,11]. Tamura and Park reported a thrombocytopenic patient who developed a mediastinal hematoma after insertion of a left subclavian central catheter for chemotherapy [6]. Ashraf and Sharif reported a 55-year-old male who developed

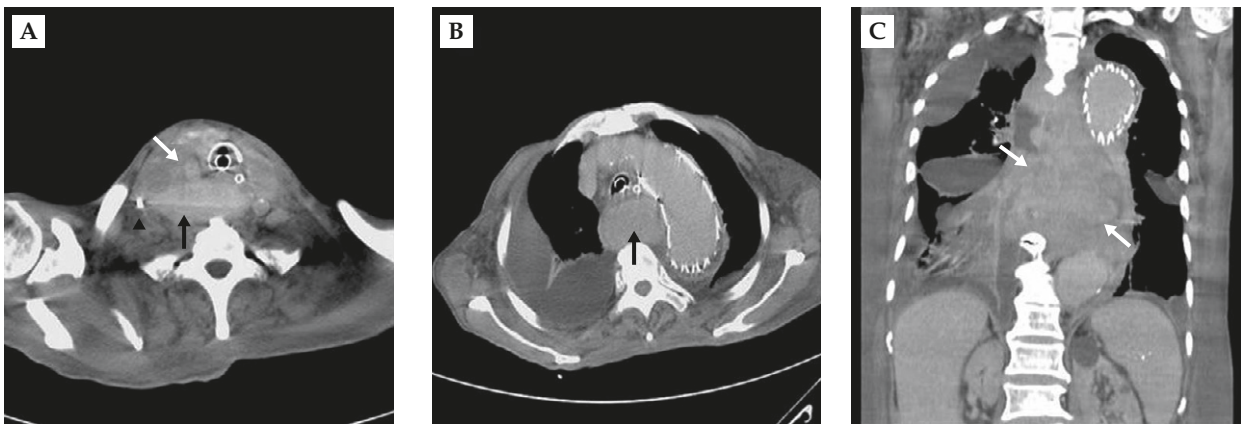

Figure 2. *(A) Non-contrast computed tomography revealed a right parapharyngeal (white arrow) and upper mediastinal hematoma (black arrow) with central venous catheter in situ (arrowhead). The trachea and esophagus were displaced to the contralateral side. (B) Horizontal and (C) coronary contrast computed tomography showed a huge middle mediastinal hematoma (arrows) without evidence of extravasation of aortic aneurysm with metallic stent.*

sudden respiratory distress after insertion of CVC for hemodialysis. A huge mediastinal hematoma was revealed on chest CT and was compressing the trachea [4]. In addition, Ko et al reported two cases who presented with acute pain after insertion of a left jugular central catheter with anterior mediastinal hematoma formation [11]. A 6-month-old girl was reported to develop a mediastinal hematoma caused by extravascular infusion via a left subclavian CVC. Worsening symptoms, including hypovolemia and ventilation problems, prompted transesophageal echocardiography, revealing a large mediastinal hematoma [10]. In the present case, we describe a critically ill patient who developed a huge mediastinal hematoma after CVC insertion and who presented with obscure blood loss refractory to blood transfusion. Vascular perforation by the guide wire used during catheterization is one possible cause. Another mechanism might be extravasation of blood over the catheter puncture site. The bleeding diatheses in this case, because of chronic renal failure related to functional impairment of platelets, also contributed to the formation of the hematoma [12].

Although stress-associated gastrointestinal hemorrhage constitutes a significant cause of blood loss in the ICU [13], there are many other causes of blood loss in critically ill patients. In the present case, the patient had an aneurysm at the aortic arch and in the descending aorta post operation. We first suspected a complication of aortic aneurysm rupture because of the blood loss. However, mediastinal hematomas are not necessarily associated with aortic rupture. Non-aortic sources include fractures of the sternum, ribs and spine, and rarely, as in our case, injury to the internal jugular vein resulting from CVC [14]. Contrast CT is useful in evaluating aortic and mediastinal vessels for causes of a mediastinal hematoma. In our patient, CT did not show blood leakage from the aortic aneurysm, but revealed a hematoma from right parapharyngeal space to the mediastinum caudally. It is an unusual complication of CVC.

In conclusion, CVC might confer a potential risk for mediastinal hematoma resulting in blood loss. Physicians should be alert when a patient with a CVC develops obscure blood loss, particularly in a bleeding diathesis condition such as chronic renal failure, as in our case.

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因中央靜脈插管導致縱膈腔血腫：一少見出血原因

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消化道出血，除了消化道以外的內出血及溶血為加護病房常見出血原因。縱膈腔血腫是其中少見原因且很難偵察到。本篇文章我們報告一位因中央靜脈插管導致縱膈腔血腫而以難以矯正的貧血來表現。當病人使用中央靜脈插管而發生不明顯的出血原因時需考慮縱膈腔血腫的可能性。

關鍵詞：出血，中央靜脈插管，縱膈腔血腫

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