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Intravascular Catheter Accidentally Placed into the Right Lumbar Vein from the Right Femoral Vein: A Case Report

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Patient: Male, 58-year-old
Final Diagnosis: Hypothermia
Symptoms: Loss of consciousness
Medication: —
Clinical Procedure: —
Specialty: Critical Care Medicine

Objective: Unusual clinical course

Background: Severe hypothermia has a high mortality rate and necessitates aggressive warming to save lives. One of the most effective treatments for severe hypothermia is intravascular rewarming. Intravascular recuperative warming can be delivered by inserting a catheter through the cervical or femoral veins. Catheter insertion through the femoral vein is a commonly performed procedure with fewer complications than catheter insertion through the internal jugular vein. This procedure is commonly conducted by inserting a central venous catheter through the femoral vein. When a catheter is inserted through the femoral vein, a frontal abdominal radiograph is often used to confirm the position of the catheter tip.

Case Report: We present the case of a 58-year-old Japanese man who had severe hypothermia. Under ultrasound guidance, a catheter was inserted through the femoral vein into the inferior vena cava for active rewarming. A frontal abdominal radiograph showed that a catheter tip appeared to be in the inferior vena cava. However, a subsequent computed tomography scan revealed that the catheter tip had been misplaced into the right ascending lumbar vein.

Conclusions: Catheters may stray into the right ascending lumbar vein if they are placed through the right femoral vein. Frontal abdominal radiographs may be insufficient to confirm catheter placement.

Keywords: Catheterization • Femoral Vein • Radiography, Abdominal

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/936275

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Background

Hypothermia occurs when the body temperature falls below 35°C. It is a high-risk fatal condition with a mortality rate of 25.4% in Japan [1], necessitating prompt intervention. Severe hypothermia, particularly at temperatures below 28°C, can cause severe symptoms, such as impaired consciousness, respiratory depression, and cardiac arrest, necessitating urgent warming to save lives [2]. There are 2 types of rewarming methods: passive and active [3]. Active rewarming includes forced-air warming, airway rewarming, heated irrigation, extracorporeal blood rewarming, and intravascular rewarming [3]. Intravascular rewarming has recently been reported to be an effective treatment for acute hypothermia [4]. Intravascular rewarming is a transvenous method of raising body temperature using an indwelling central venous percutaneous thermoregulatory device. A catheter with a balloon attached is inserted into the vein, and warm water circulates inside the balloon to warm the blood. It is possible to heat and circulate water inside the balloon by connecting the catheter to an indwelling central venous percutaneous thermoregulator system [3,4]. The catheter must be percutaneously implanted intravenously.

In terms of complications, inserting a central venous catheter through the internal jugular vein or femoral vein is often preferred over insertion through the subclavian vein [5]. Despite the higher risk of infection with femoral cannulation, it is more common than internal jugular vein cannulation because the risk of hematoma is lower and the procedure is less complex. Although the position of the catheter tip inserted through the femoral vein is often confirmed on a frontal abdominal radiograph, complications can arise if the catheter is misplaced into branching veins that are not identified by radiographs. Catheters inserted from the left femoral vein have been reported to stray into the left lumbar vein, whereas catheters inserted from the right femoral vein are less frequently misplaced into the right lumbar vein [6]. In this report, we present a case in which a catheter tip accidentally strayed into the right ascending lumbar vein during catheter insertion from the right femoral vein, and this misplacement was not detected on a frontal abdominal radiograph.

Case Report

A 58-year-old male patient was admitted to the Emergency Department with impaired consciousness and difficulty moving his body. The patient had a history of alcoholism and alcoholic liver disease, as well as heavy drinking the day before. A rapid blood glucose test revealed a low blood glucose level of 31 mg/dL. Moreover, the rectal temperature was 25.0°C. Severe hypothermia and symptomatic hypoglycemia were diagnosed, and active rewarming and correction of hypoglycemia were conducted. Active rewarming was started immediately with an electric blanket, and an ultrasound-guided insertion of the Quattro 9.3Fr catheter (ZOLL Circulation, Inc., San Jose, CA, USA; product code 8700-0783-03) was conducted. Following needle insertion and confirmation of reversed blood flow, a J tip-type guidewire was inserted, without encountering any resistance. Implantation of the guidewire in the right femoral vein was confirmed by ultrasonography. After dilatation, the catheter was inserted without resistance, and once reversed blood flow was confirmed, the catheter was fixed. To confirm the catheter's position, a frontal abdominal radiograph was used and revealed that the catheter appeared to be in the inferior vena cava (**Figure 1**). Shortly after catheter insertion, an abdominal computed tomography (CT) scan was performed to determine the etiology of hypothermia and revealed that the catheter tip had been misplaced into the right ascending lumbar vein (**Figure 2**). The catheter was immediately withdrawn, and its misplacement did not result in any complications. The CT scan findings were inconclusive as to the etiology of hypothermia. However, alcoholic hypoglycemia was suspected to be the cause of hypothermia in this case due to heavy alcohol drinking, based on the patient's medical history. Consequently, normalizing the blood glucose level and restoring the body temperature improved the patient's consciousness.

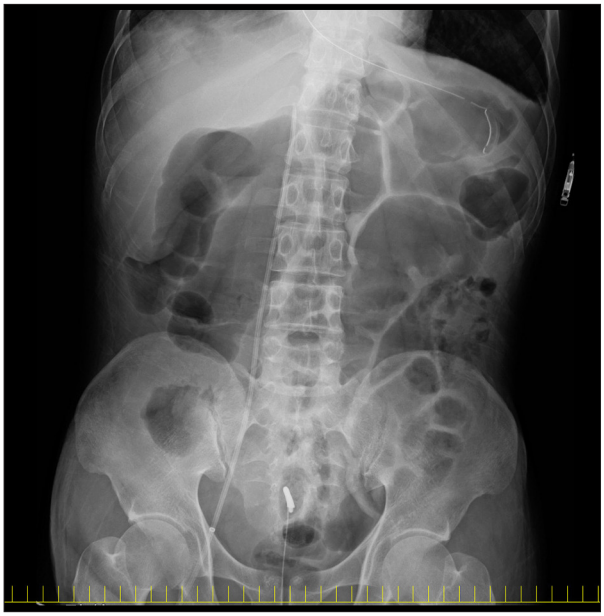

Figure 1. Abdominal radiograph following catheter placement through the right femoral vein. There were no findings that indicated catheter misplacement.

Discussion

Frontal abdominal radiographs are frequently used to confirm the position of a catheter inserted through the femoral vein.

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However, detecting misplacement into the ascending lumbar vein is difficult because the ascending lumbar vein runs along the right and left sides of the vertebral body, close to the inferior vena cava [7]. In the present case, the inferior vena cava and right ascending lumbar vein were nearly overlapping in the frontal view (**Figure 2B**). Therefore, the catheter tip was not displaced to the right side and a positional abnormality was not detected. However, when a catheter strays into the right ascending lumbar vein, the catheter tip is displaced posteriorly on a lateral abdominal plain radiograph [8]. This positional abnormality can be identified on a lateral abdominal plain radiograph, which was not conducted in the present case.

Although the patient did not have any serious complications due to catheter misplacement into the ascending lumbar vein, the administration of drugs or hyperosmotic agents might have resulted in mechanical or inflammatory perforation. Mechanical or inflammatory perforation causes neurological symptoms such as back pain as well as paralysis and spasm due to retroperitoneal hematoma [9,10]. Furthermore, the catheter tip can stray into the subarachnoid or epidural spaces, which is fatal [11]. Therefore, it is critical to detect any misplacement or complications as soon as possible when a catheter is inserted through the femoral vein and strays into the ascending lumbar vein. In general, many complications might develop with inserting a catheter through the femoral vein, including improper insertion into an artery, infection, and thrombosis [9,12]. These complications may be influenced by the patient's experience, dexterity, and disease severity.

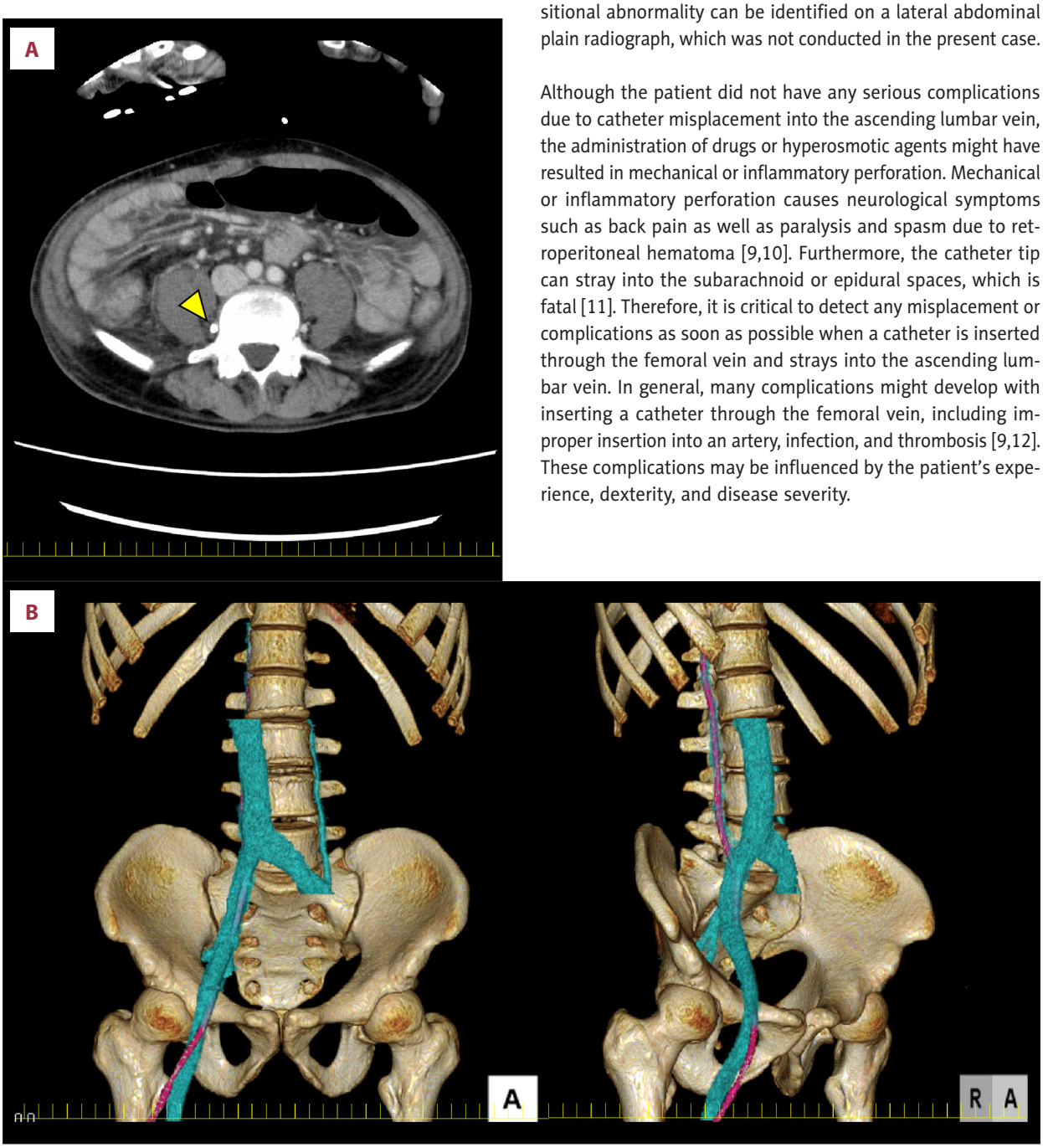

Figure 2. Abdominal computed tomography following catheter placement through the right femoral vein. (**A**) Contrast-enhanced computed tomography of the abdomen. The inserted catheter (yellow arrowhead) is placed into the right ascending lumbar vein. (**B**) Three-dimensional reconstruction of computed tomography showing the common iliac vein and inferior vena cava (blue) and an inserted catheter (magenta) misplaced into the right ascending lumber vein. In the frontal view, the catheter and inferior vena cava are overlapping.

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Conclusions

Catheters can stray into the right ascending lumbar vein if they are introduced through the right femoral vein. Since frontal abdominal radiographs might not be able to detect an abnormality with catheter placement, lateral abdominal radiographs or abdominal CT scans can be beneficial.

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Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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