



# Intraperitoneally Located Tip of Femoral Vein Catheter; Clinical Suspicion for Avoidance of Unnecessary Laparotomy

Hamed Shafiee,<sup>1</sup> Saeid Safari,<sup>2</sup> and Reza Aminnejad<sup>1,\*</sup>

<sup>1</sup>Department of Anesthesiology, Shahid Beheshti Hospital, Qom University of Medical Sciences, Qom, Iran

<sup>2</sup>Department of Anesthesiology, Iran University of Medical Sciences, Tehran, Iran

\*Corresponding author: Reza Aminnejad, M.D., Department of Anesthesiology, Shahid Beheshti Hospital, Qom, Iran. E-mail: r.aminnejad@yahoo.com

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## Abstract

Central venous catheterization is a common procedure in critical care and trauma patients. Complications are not rare and in some studies more than 15% incidence has been reported (1). Femoral vein is one of the commonest site for this purpose yet it carries complications, such as infection and misplacement. The current study reports an unexpected secondary malposition of right femoral CVC in the peritoneal cavity. It was concluded that in any case of acute abdominal issues, following insertion of femoral venous catheter, evaluation of catheter misplacement by the means of contrast injection through it can be helpful for better diagnosis, and may help avoid unnecessary surgical interventions.

## 1. Introduction

Central venous catheterization is a common procedure for anesthesiologists and surgeons. There are a few options for this purpose, such as subclavian and internal jugular veins, each having its benefits and risks. Femoral vein catheterization may be considered, in the case of emergency trauma patients, for rapid and easy access to a large bore centrally located vein to deliver lots of fluids and special drugs. Overall, complication rate can be as high as 15% or more for all locations of catheterization (1). Risk of infection in spite of aseptic insertion of a catheter makes femoral the route unselected as the first choice. There are some other less prevalent complications for femoral vein catheterization, among which misplacement may be the rarest one. Thrombophlebitis, infection, and bleeding are some consequences of femoral central catheter misplacement. Misplacement or malposition of femoral central catheter is very rare and it carries early and late complications. Time of misplacement or the real cause of malposition will determine the time course and kind of consequences. In early phases consequences of extravasation of blood, fluids, and contrasts in the retroperitoneal space or peritoneal cavity can be seen while in the late phases consequences of gradual accumulation of blood, fluids or contrasts, such as abdominal compartment syndrome (ACS) can be hazardous (2).

Ultrasound guided femoral vein catheterization can lead to more accurate and safer placement of the device yet in emergent situations or in unskilled hands, it may

not be helpful.3 In the lack of a sonography machine or for unskilled users, aspiration of blood and retrograde flow of liquid due to pressure difference would be useful in confirmation of proper catheter placement. However, imaging maybe helpful in detection of complications and insurance of accurate placement. In the lack of modern resources, cannulation of central veins even in neonates and children in a skilled hand could usually be performed uneventfully (3).

This report describes a rare case of misplacement of a femoral venous central catheter: a case of intraperitoneally located tip of femoral vein catheter.

## 2. Case Presentation

A 19-year-old male patient with trauma was admitted to our hospital when he was in a shock state due to a motor vehicle accident. The patient had been resuscitated initially by infusion of crystalloids at the emergency department and intra-abdominal complications had been ruled out by physical exam and ultrasound studies.

At the beginning of emergent operation due to bilateral epidural hematoma, the patient was tachycardic with acceptable blood pressure (110/65 mmHg). Premedication with 2 Mcg/Kg of fentanyl was implemented. Induction of anesthesia was carried out by sevoflurane via an endotracheal tube previously fixed at the emergency department and appropriate dose of cisatracurium was used for muscle relaxation.

After an hour of cranial decompressive surgery, both large intravenous lines became malfunctioning. For this reason, preparation of another large bore peripheral intravenous line was planned yet multiple trials of our expert colleagues failed and the medical team was forced to plan for establishment of a centrally inserted intravenous catheter. Surgical conditions and patient dressing forced the selection of the right femoral vein for this purpose. The patient had become hemodynamically unstable at that time and because of that, femoral artery pulsation wasn't palpable in the anatomically expected site. Next, insertion of an introducer catheter next to the weak pulsation of femoral artery and a little below the inguinal ligament was decided. After appropriate preparation, central vein catheterization was performed uneventfully by a single trial and appropriateness of placement was confirmed by aspiration of all three lumens of the catheter and visualization of retrograde flow of liquid due to gravity and pressure difference laws. The catheter was then fixed to the skin and the entire area was dressed appropriately.

During the surgery, infusion of 2 units of packed RBCs and 2 liters of crystalloid were done by the means of a central line. Infusion of norepinephrine was considered too because of diminished blood pressure right before thinking about central catheterization following a large amount of blood lost in the surgical field.

At the end of surgery, the patient was transferred to the intensive care unit while he was intubated and had a stable hemodynamic status.

One day after decompressive craniotomy, laparotomy was planned for the patient because of abdominal distension and ultrasound findings of the presence of a large amount of fluid in the abdominal cavity. It was found that misplacement of the femoral catheter in the abdominal cavity was the main reason for accumulation of fluid. The femoral catheter was then extracted and patient care was continued at the ICU for the following days.

The patient had a right inguinal hernia simultaneously as the surgeon denoted following the second surgery. She also mentioned that the fluid in the abdominal cavity was largely in retroperitoneal space and fortunately there wasn't any evidence of intestinal perforation. As she explained, retroperitoneal blood was in both sides and after removal of the catheter, bleeding of iliac vein perforation site was evident for a short time.

### 3. Discussion

Central venous catheters are widely used in emergency and critical cases, especially for large and rapid volume replacement. Femoral vein is a central vein that is easily accessible specially in emergent situations like in trauma pa-

tients. Femoral venous catheterization is routinely done by the guidance of anatomical landmarks yet the use of ultrasound can facilitate proper placement of the catheter. Use of sonography for this purpose needs skills and knowledge, yet in skilled hands it needs equipment and time also (4). Anesthesiologists have enough skills to rapidly cannulate a femoral vein in an emergent situation.

Insertion-related complications of percutaneous femoral vein catheterization are usually classified as infectious, thrombotic or mechanical issues (2). The local complications of this procedure include hematoma, pseudoaneurysm, arteriovenous fistulas, abscess, arterial obstruction, and lymphoceles (5). Retroperitoneal hemorrhage is one of the major life threatening complications of femoral vein catheterization that could be the result of arterial puncture. Therefore, an inappropriate technique can result in dangerous complications (6). Complications such as thrombophlebitis, bleeding, catheter migration, extravasation, and infection are more prevalent in infants and children yet in the current case, extravasation had occurred in a young man. Because of the importance of complications, it is prudent to recommend central venous catheterization according to clinical necessities (2).

According to the available literature, fluid extravasation is a probable complication of femoral vein catheterization, especially in pediatric patients. This kind of dangerous event could be the result of venous wall rupture by the guide wire or catheter itself at the time of catheter insertion or at a later time because of patient movements and positioning. Non-occlusive mural thrombosis and local phlebitis are other contributing factors for this relatively rare complication. This kind of fluid extravasation could lead to raised intraabdominal pressure, which is called abdominal compartment syndrome (ACS) (2). Severe hemorrhage and retroperitoneal hematoma occurred as a late onset complication in a case presented by Sirvent et al. This kind of late onset complication is very rare and in case reports, it is more prevalent in jugular or subclavian vein-catheterization territories, especially on the left side and with larger catheters (7). In another case report, the same complication occurred in an elderly patient after 3 successful consecutive hemodialysis. In this case, perforation of the iliac vein was the causative mechanism of complication (8).

Extravascular catheter migration to the retroperitoneal space and extravasation of the infusate were seen in a case presented by Sztajn bok et al. and Ram et al. In these cases, extravasation of fluids and nutrients had led to acute abdomen that resolved following removal of the catheter (9, 10). In a similar case presented by Knobel et al. extravasation of parenteral nutrition fluids through a femoral venous catheter into the paraspinus musculature

with extension into the spinal canal had resulted in compression and necrosis of the spinal cord and mortality of a preterm infant (11).

In conclusion, in any case of acute abdomen with a femoral venous catheter in place, evaluation of catheter misplacement by the means of contrast injection through it could be helpful for better diagnosis, and maybe of help in avoiding an unnecessary surgical intervention. Additionally, confirmation of the proper placement of femoral central venous catheter by the use of a simple point-of-care ultrasound (POCUS) is recommended, as it has been mentioned for correct supra-diaphragmatic central venous catheter placement instead of plain film chest radiography (CXR) by Wilson et al. (12) the flush the line and ultrasound the heart (FLUSH) test that was described by Horowitz et al. could accurately confirm the proper placement of femoral venous line as well (13).

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