Ultrasound Guidance for Internal Jugular Vein Catheterization: Don’t Forget the Basics

Mélanie Fromentin¹,², Maxime Barat³, Jean-Damien Ricard²,⁴, Damien Roux⁴,⁵

¹Department of Anesthesiology and Intensive Care Unit, AP-HP, Cochin University Hospital, Paris, France
²Université Paris Cité, UMR1137 IAME, INSERM, F-75018 Paris, France
³Radiology Unit, AP-HP, Cochin University Hospital, Paris, France
⁴AP-HP, Hôpital Louis Mourier, DMU ESPRIT, Service de Médecine Intensive Réanimation, F-92700 Colombes, France
⁵Université Paris Cité, Institut Necker-Enfants Malades, INSERM U1151, CNRS UMR 8253, 75015 Paris, France

Internal jugular vein (IJV) cannulation is a standard procedure for critically ill patients that should be performed under ultrasound (US) guidance. The use of two-dimensional US was found to decrease the risk of total adverse events by 71% in a recent review that included 35 studies and 5,108 participants. Major complications such as hemothorax, mediastinal hematoma, cardiac tamponade, or chylothorax. Accidental arterial puncture and hematoma are the two most reduced complications by pre-procedure US location of vessels.

Several techniques with their specific complications are described. Common carotid artery puncture is the most frequent one. Tracheal puncture and pneumothorax have already been described with the lateral approach in which the puncture is made from the apex of the Sedillot’s triangle. The posterior way (e.g., the “low lateral” approach) requires a puncture perpendicular to the IJV and a catheterization toward the mediastinum.

Herein, we report an exceptional complication after using a low lateral approach and pre-procedure US examination. Figure 1 represents a post-procedural chest X-ray performed after IJV cannulation and displays the nasogastric (NG) tube clearly coursing below the diaphragm and a left-sided central line coursing towards the midline with the tip just behind the NG. Figure 2 shows the tip of the central venous catheter below the upper esophageal sphincter seen during the esophagus endoscopy performed for upper gastrointestinal bleeding after the guidewire traversed the backwall of the IJV and pierced an esophageal varicose vein.

The patient was a 63-year-old female patient, weighted 47.8 kg with a height of 162.56 cm, who presented a severe denutrition because of persistent delayed gastric emptying after a left hepatectomy.
Fromentini et al.

for intrahepatic cholangiocarcinoma. The IJV catheterization was performed for hemorrhagic shock complicating mesenteric ischemia secondary to portal vein thrombosis. The physician reported an initial resistance to the insertion of the guidewire which was solved after redirecting the guidewire. She had the same low blood pressure and tachycardia with a heart rate of 127/min before and during the procedure. After the procedure, despite blood transfusion via the misplaced central venous catheter, the lack of improvement in the clinical condition and the secondary haematemesis led to an esophagus fibroscopy.

This case report highlights some “key concepts” of IJV cannulation. First, performing safe catheterization requires not only technical proficiency but also knowledge of the anatomy of the puncture site. Then, US guidance for IJV cannulation should not exempt physicians from respecting all the other precautions such as: (1) correct basic Trendelenburg position for puncturing the IJV to avoid air embolism, (2) careful interpretation of a post-procedural chest X-ray in case of technical difficulties, and (3) blood aspiration test from the line after the procedure.

Supplementary cautions should be taken in case of patient specific risks including obesity, low body weight (body mass index < 20),4 pacemaker,4 radiation therapy,2 and coagulopathy.2,4 Finally, providers should visualize the guidewire in the target vein prior to vessel dilatation and should control correct catheter position in the vein with US after the procedure.3

Author Contributions

MF reviewed the data found in the literature, drafted the manuscript, and approved the final version.

MB appraised and analyzed the data found in the literature, helped optimize the resolution of images, and approved the final version.

JDR and DR revised the article critically for important intellectual content and approved the final version.

Conflict of Interest

On behalf of the authors, the corresponding author states that there is no conflict of interest.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References


Figure 2. Esogastroduodenal Endoscopy After Internal Jugular Vein Cannulation
The tip of the central venous catheter (CVC) and the CVC eyelet are labeled with a white arrow.