



Unintentional Common Carotid Artery Cannulation During Attempted Internal Jugular Vein Catheterization: A Case Report

JURIJ JANEŽ^{a,b*}

^a *Department of Abdominal Surgery, University Medical Centre Ljubljana, Zaloška Cesta 7, 1000 Ljubljana, Slovenia.*

^b *Faculty of Medicine, University of Ljubljana, Vrazov trg 2, 1104 Ljubljana, Slovenia.*

Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

Article Information

DOI: <https://doi.org/10.9734/ijmpcr/2025/v18i3434>

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://pr.sdiarticle5.com/review-history/139451>

Case Report

Received: 28/04/2025

Accepted: 02/07/2025

Published: 05/07/2025

ABSTRACT

Central venous catheter placement is a common procedure, performed on a daily basis. It is relatively a safe procedure, with low complication rate. However serious complications can occur, especially in cases of inadvertent artery cannulation. The consequences can be devastating, if the situation is not immediately recognised and managed. The preferred sites for central venous cannulation are the right subclavian or the right internal jugular vein. Arterial puncture is a well-recognized complication, while unintended subclavian or carotid artery cannulation during attempted central venous catheterization are infrequent, but documented complications. Endovascular or surgical treatment can be employed to repair inadvertent arterial cannulations. This paper

*Corresponding author: E-mail: jurij.janez@kclj.si, jurij.janez@gmail.com;

presented a case of a female patient after abdominal surgery, who had an attempt of placement of central venous catheter in the intensive care unit, because the need for optimal delivery of drugs, fluid and parenteral nutrition. During the attempt of the right internal jugular vein cannulation, the carotid artery was cannulated. The situation was immediately recognised and managed by a vascular surgeon. The patient recovered completely without any neurological deficit.

Keywords: *Central venous catheter placement; unintentional artery cannulation; complications; ultrasonographic guidance.*

1. INTRODUCTION

“Central venous catheter (CVC) placement is a common procedure, which is performed by anesthesiologists and other medical professionals almost on a daily basis. It is relatively a safe procedure, but certain complications are possible. Complications during CVC placement have been classified as either infectious, thrombotic or mechanical. The preferred sites for CVC placement are the right subclavian or the right internal jugular vein. The most common mechanical complication during CVC insertion in the internal jugular vein include arterial puncture, hematoma and pneumothorax” (Papastratigakis et al., 2022).

“The carotid artery puncture is a rare, but well-recognized complication associated with jugular venous catheter insertion. Arterial puncture during internal jugular vein cannulation is reported to be between 6.3% and 9.4%. Fortunately, the incidence of arterial cannulation is less than 1%. Despite its low occurrence, it can have serious consequences, if it is not immediately recognised and properly managed” (Pikwer et al., 2009).

“To avoid the incidental artery puncture during CVC placement, the use of ultrasonographic guidance is recommended, that enables higher rates of success on the first attempt and a decrease in the complication rates during CVC placement” (Gunawardena et al., 2021). In this paper we present a case of a female patient after abdominal surgery. She needed a CVC placement for optimal delivery of drugs, fluid and parenteral nutrition. During the attempt of the right jugular vein cannulation, the right common carotid artery was cannulated instead.

2. CASE REPORT

A 62-year-old female patient was referred to our medical centre for an elective surgery due to diagnosed colon cancer. From associated diseases, she had an arterial hypertension and

hyperlipidemia, both on per oral medications. She had a laparoscopic cholecystectomy and gynecological surgery in the past. The preparation for surgery by anesthesiology team was performed according to standard protocol. The planned surgery was a right hemicolectomy due to coecal cancer. By agreement with the anesthesiologist, we did not decide for CVC placement before surgery. The surgery went well, a right hemicolectomy with anastomosis was performed. After the surgery, she was transferred to the intensive care unit (ICU). Because of poor peripheral venous access and the need for optimal delivery of drugs, fluid and parenteral nutrition, we decided for CVC placement.

An attempt of CVC placement in to the right internal jugular vein was performed without ultrasound guidance. During cannulation, dilatation and insertion of the CVC in to the right internal jugular vein, the pulsatile flow of blood was obtained through the CVC and it was suspected, that the carotid artery has been punctured. The blood sample was obtained for gas analysis and the arterial blood was confirmed. The procedure was performed under local anesthesia, the patient was awake and fortunately she did not show any neurological deficit. The CVC was left in place on the right side and the vascular surgeon was consulted immediately. The vascular surgeon and anesthesiologist then decided together, that surgical exploration of the right carotid artery would be the best option. At surgical exploration it was found, that the internal jugular vein was not punctured nor damaged, the common carotid artery was cannulated. The vascular surgeon removed the central venous catheter from the carotid artery and sutured the defect in the arterial wall. During the whole surgery, the neurological monitoring was performed and no neurological deficit was noticed. The patient fully recovered and the rest of the postoperative course was uneventful. The patient had no neurological symptoms during and after the surgery.

3. DISCUSSION

Central venous catheter (CVC) placement is a common procedure, which is performed on a daily basis, mainly because of the need for optimal drug and fluid delivery. The procedure is relatively safe, but some complications can occur. One of possible complications is accidental arterial puncture. In the attempt of CVC placement in to the internal jugular vein, accidental carotid artery puncture and cannulation can occur. If not recognised and managed immediately, it can have serious consequences. "Iatrogenic trauma to the carotid arteries may provoke severe bleeding, arterial dissection, emboli, thrombosis or brain stroke" (Gunawardena et al., 2021). In anesthetized patients, inadvertent arterial cannulation that is not promptly recognized and managed can lead to debilitating irreversible complications. Thrombembolism can occur after up to 48 hours after trauma of the carotid artery and it is not necessarily, that neurological symptoms are evident immediately after the arterial catheterization. Close neurological monitoring for up to 48 hours is suggested in those cases (Maietta, 2012, Guilbert et al., 2008).

In our case, we attempted to place CVC in to the right internal jugular vein without ultrasonographic guidance. After puncturing the vein, we obtained a dark, non-pulsatile blood, so we thought, that the right vein was punctured. Then we dilated the vein and inserted a CVC. However, immediately after the insertion of the catheter, a pulsatile blood flow in to the catheter was noticed. We suspected, that the carotid artery has been punctured. The blood gas analysis confirmed, that the artery has been cannulated.

"Physical findings of arterial puncture include the following: enlarging hematoma or ecchymosis in the region, which can obstruct the airway, diminished distal pulses, tracheal deviation, vocal-chord palsy, or a palpable thrill or bruit. In some cases the classic signs of arterial puncture may be absent, and therefore dilatation and cannulation of the artery may occur. Confirmation of venous blood prior to dilatation and cannulation is critical also in patients with chronic pulmonary obstructive disease, who normally have lower arterial oxygenation and/or in patients with hypotension" (Kayashima, 2013). "To avoid incidental puncture of the carotid artery instead of internal jugular vein, many published guidelines and recommendations support the

clinical utility of ultrasound-guided internal jugular vein puncture. The use of appropriate cannulation techniques involving real-time ultrasonographic guidance for avoiding puncturing of the common carotid artery has been widely reported in the literature" (Kayashima, 2013). "Classic teaching of looking for dark non-pulsatile blood can be inaccurate in hypotensive, hypoxic patients and patient with kidney failure. Also when a collapsible vein overlies the carotid artery, a through puncture can occur" (Gunawardena et al., 2021, Janež & Janež, 2018). In our case, the vascular surgeon confirmed, that the internal jugular vein was in front of the common carotid artery, but interestingly the vein was not punctured through nor damaged. It is recommended, that a vascular surgeon is consulted in case of inadvertent carotid artery cannulation. Surgical or endovascular repair of the artery is the best management of inadvertent carotid artery cannulation with minimum complications (Papastratigakis et al., 2022).

Some authors (Guilbert et al. 2018) report, that in cases of removal of the catheter from the artery and manual compression, complications may occur in up to 47% of patients. No complications were reported in patients, treated with surgical exploration and surgical repair of the damaged artery wall (Guilbert et al., 2008).

"Ultrasound-guided insertion has consistently been demonstrated to reduce the risk of a range of CVC complications. However, apart from the ASA guideline, most guidelines do not state how to use the technology for maximum benefit. Use may range from static, to merely identifying the location and depth of the vessel, to dynamic real-time, locating the vessels, the needle and then the wire in the vessel, prior to inserting a dilator and the catheter. With respect to arterial cannulation, for maximum safety, the wire should be confirmed to be in the correct vessel prior to passing the dilator. More importantly, the presence of the wire in an incorrect position should be excluded. Once a CVC has been passed, the catheter position needs to be checked again immediately—this can be done in a variety of ways. Training needs to focus on developing the above skills to confidently interpret ultrasound images for each of the above stages of the procedure. If the dilator or catheter are found to be intra-arterial, the message is clear: this is an emergency and requires immediate evaluation and management. It should not be removed ('pull/pressure' is associated with

an unacceptably high incidence of serious morbidity or mortality) until repair is performed—this may be by open surgical repair or endovascular repair, in as timely a manner as possible” (Lamperti et al., 2012, Boulet et al., 2023, Wierstra et al., 2020).

4. CONCLUSION

Complications after catheter-related carotid arterial trauma can be devastating, if not immediately recognised and managed. Ultrasound guidance should be utilized, when performing a central venous catheter insertion in the internal jugular vein. If inadvertent carotid artery cannulation occurs, the central venous catheter should be left in place and the vascular surgeon should be consulted.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT), have been used for this manuscript.

CONSENT

The consent to participate has been obtained from the patient.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

Boulet, N., Muller, L., Rickard, C. M., et al. (2023). How to improve the efficiency and the safety of real-time ultrasound-guided central venous catheterization in 2023: A narrative review. *Annals of Intensive Care*, 13, 46. <https://doi.org/10.1186/s13613-023-01141-w>

Guilbert, M. C., Elkouri, S., Bracco, D., et al. (2008). Arterial trauma during central venous catheter insertion: Case series, review and proposed algorithm. *Journal of Vascular Surgery*, 48(4), 918–925.

Gunawardena, T., Cassim, R., & Wijeyarante, M. (2021). Accidental carotid artery cannulation during internal jugular vein access for hemodialysis. *Indian Journal of Vascular and Endovascular Surgery*, 8, 111–113.

Janež, J., & Janež, D. M. (2018). Unintentional common carotid artery cannulation during attempted internal jugular venous catheter insertion. *Acta Medico-Biotechnica*, 11(2), 57–60.

Kayashima, K. (2013). Inadvertent arterial trauma during internal jugular vein catheterization. *Scientific Reports*, 2(3), 1–4.

Lamperti, M., Bodenham, A. R., Pittiruti, M., et al. (2012). International evidence-based recommendations on ultrasound-guided vascular access. *Intensive Care Medicine*, 38, 1105–1117.

Maietta, P. M. (2012). Accidental carotid artery catheterization during attempted central venous catheter placement: A case report. *AANA Journal*, 80(4), 251–255.

Papastratigakis, G., Marouli, D., Proklou, A., & Nasis. (2022). Management of inadvertent arterial catheterization during central venous catheter placement: A case series. *Journal of Personalized Medicine*, 12, 1537.

Pikwer, A., Acosta, S., Kölbel, T., et al. (2009). Management of inadvertent arterial catheterisation associated with central venous access procedures. *European Journal of Vascular and Endovascular Surgery*, 38, 707–714.

Wierstra, B. T., Rommens, K. L., Cattle, P. M., et al. (2020). Arterial placement of central venous catheters: Beyond prevention to management. *Canadian Journal of General Internal Medicine*, 15(3), 45–48.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2025): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<https://pr.sdiarticle5.com/review-history/139451>