

# Arteriovenous Fistula and Pseudoaneurysm: A Rare Complication of Central Venous Catheterization

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**Abstract** Central venous catheterization (CVC) is a commonly performed invasive procedure in pre-operative period and for long-term intravenous access. Image-guided CVC has gained importance as it not only helps in reducing number of attempts but also prevents wrong internal jugular vein (IJV) punctures leading to reduced incidence & severity of CVC complications. Lack of availability of image-guidance related infrastructure and competence are responsible for non-image-guided CVC-related complications in developing countries. This article emphasizes the importance of image-guided CVC by discussing a case of arteriovenous fistula (AVF) between a small branch of external carotid artery and internal jugular vein detected in immediate postoperative period following CVC which was performed without image-guidance.

**Keywords:** arteriovenous, fistula, pseudoaneurysm, catheterization

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## 1. Introduction

A wide-range of immediate and delayed complications predominantly related to vascular injuries, misplacement & dysfunction of device and infective process have been noted during CVC performed in a multitude of clinical conditions. Though arterial injuries occur in less than 1% of CVC but they are responsible for majority of catastrophic events [1]. Advances in image-guidance have resulted in significant decrease in such complications. However, non-image-guided CVC is still being practiced in developing world due to multiple reasons resulting in significant post-procedural morbidity with extended hospital stay and increased medical expenditure. Hence, in this article the authors discuss a case of AVF in immediate, non-image-guided, post-CVC period to emphasize the implementation of National Institute for Clinical Excellence (NICE) guidelines that can have significant impact in reducing complication rates [2].

## 2. Case Report

A 60-year old male with history of CVC during surgical procedure was referred to our department for high-resolution ultrasonography (HRUS) of right anterior cervical swelling that developed in immediate postoperative period following removal of CVC. Clinical examination revealed faint pulsations without significant bruit mimicking pseudoaneurysm.

HRUS revealed a large collection with internal echoes measuring up to 125-135 ml in volume in the

myocutaneous plane of inferior part of right anterior triangle of neck corresponding to clinical palpable swelling lying anterior to right anterior internal jugular vein (IJV) and common carotid artery (CCA) (Figure 1). A small vascular channel showing arterial wave pattern was noted eccentrically located within the lumen of right IJV extending extraluminally in to the above-described collection with minimal color flow in the latter (Figure 2 & Figure 3). Based on these findings diagnosis of an arteriovenous fistula between a small branch of right external carotid artery and IJV was suggested associated with partially-thrombosed pseudoaneurysm.

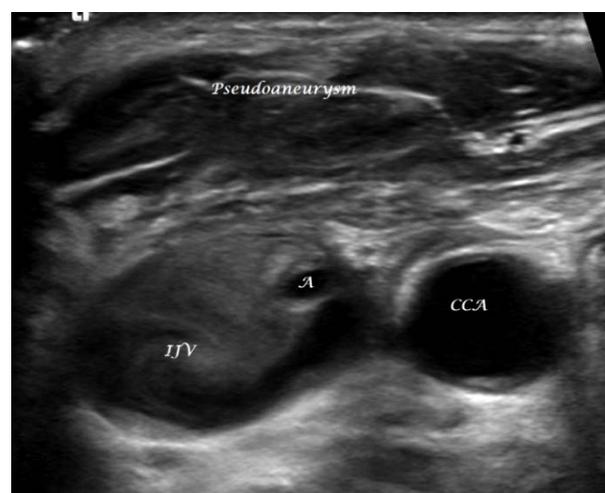


Figure 1.

Fine needle aspiration under image-guidance was performed from the right anterior cervical swelling which confirmed thick hemorrhagic fluid. Compression was then

applied to prevent further enlargement of the pseudoaneurysm and to aid its regression as well as closure of AVF.

This case well demonstrates the fact that though good expertise may prevent major arterial injuries during CVC yet small arteries cannot be surely prevented emphasizing the role of real-time image-guidance during CVC.

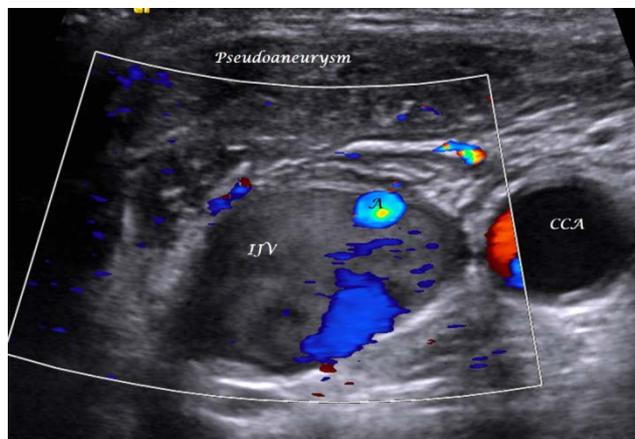


Figure 2.

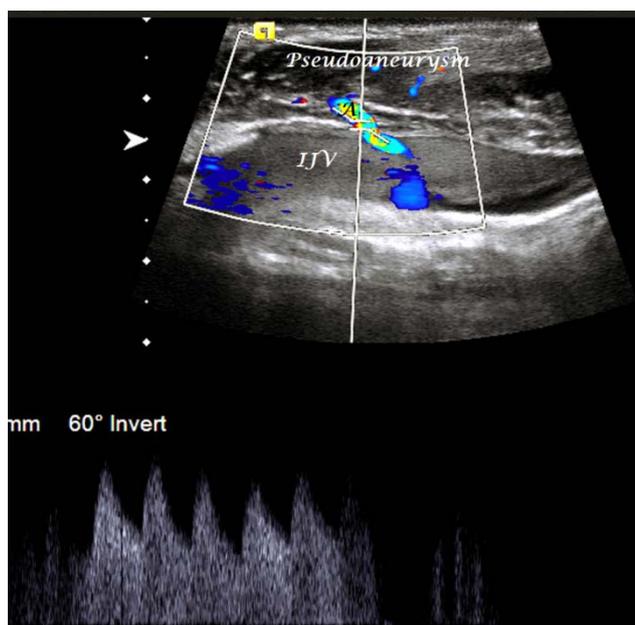


Figure 3.

### 3. Discussion

Complications of CVC can be broadly categorized into mechanical, thrombotic and infections. Arteriovenous fistula, arterial puncture, hematoma & pneumothorax are the most common mechanical complications [3,4]. Real-time ultrasonography (USG) is considered to be superior to conventional landmarking method of catheterization

and is also more successful than pre-procedural USG [5]. AVF can be treated with image-guided coiling while pseudoaneurysm can be treated with compression or image-guided thrombin or coil placement. However, fistula between two large vessels (i.e. carotid artery and internal jugular vein) that are not promptly recognized may grow requiring direct surgical repair instead of coil placement as latter is challenging in high-flow & high-pressure systems and may result in catastrophic coil embolisation [6]. Studies have proved that even pre-procedural ultrasound had higher success rate and safety of CVC as there are more successful attempts as compared to landmarking method (88%:58%) [5]. The same study shows cannulation time was significantly shorter when pre-procedural US was performed. Though, using ultrasound is safer and faster however there is a significant increase in treatment costing and it is operator dependent too [5]. The National Institute for Clinical Excellence (NICE) guidelines of 2002 recommended the use of US for CVC in order to minimize complications associated with central line placement.

### 4. Conclusion

While central venous access is routine in the critically-ill patients, it is not without risk. Physicians should be aware of the immediate and delayed complications related to CVC as early detection and management significantly reduces morbidity and mortality. In CVC, HRUS has an important role as it reduces failure rates & number of unsuccessful attempts and reduces the risk of complications including arterial injuries associated.

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