
Wire Lost During Central Venous Catheterization Insertion: A Case Report

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Abstract:

Central venous catheterization (CVC) is a common procedure, yet it carries a risk of rare, preventable, and serious complications, such as guidewire loss, which can lead to severe morbidity and mortality. This case report aims to describe the occurrence, multidisciplinary management, and successful retrieval of a lost guidewire during an emergency CVC insertion. We report the case of a 63-year-old male with a subarachnoid hemorrhage. During CVC placement via the right femoral vein under ultrasound guidance, the guidewire was accidentally advanced into the central circulation and lost. A multidisciplinary team decided on endovascular retrieval. The retained guidewire was successfully retrieved three days later in the catheterization lab using a snaring technique, without any procedural complications. Unfortunately, the patient later died due to the progression of his primary neurological injury, underscoring that while the iatrogenic complication was resolved, the outcome was determined by the underlying critical illness. Guidewire loss is a preventable complication. Strict adherence to procedural protocols, especially in emergencies, early recognition, and prompt multidisciplinary coordination are crucial. Endovascular intervention is a safe and effective therapeutic option for managing this serious iatrogenic event.

Keywords: Central venous catheterization; wire retrieval; Cathlab.

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INTRODUCTION

Central venous catheterization (CVC) is a common and essential procedure in emergency departments and intensive care settings, used for administering fluids, medications, and parenteral nutrition, as well as for hemodynamic monitoring. Central venous catheters provide reliable access to blood flow, enabling rapid fluid administration, vasoactive drug titration, and the safe supply of nutrients. It is performed more than 3 million times annually in the United States and roughly 250,000 times in the United Kingdom (Adrian et al., 2022). Despite being a routine procedure, CVC insertion carries a risk of complications, with mechanical complications occurring in up to 15% of cases (Odendaal et al., 2017).

These complications range from minor events such as self-limited bleeding to major complications, including transient arrhythmias, arterial puncture, catheter malposition, pneumothorax, or even guidewire loss (Adrian et al., 2022). These complications are often classified as direct: cardiac, vascular, pulmonary, and catheter placement complications, usually caused by procedural errors during insertion (Odendaal et al., 2017). The loss of a guidewire into circulation during the procedure is a rare and preventable complication (Sethi et al., 2023). Cases have been reported where lost wires became entangled with intravascular devices such as IVC filters. A systematic review of 34 studies involving 104 patients with guidewire retention found that the internal jugular vein (47%), femoral vein (35%), and

subclavian vein (21%) were the most common sites (Safari et al., 2025). In the previous study, the major mechanical complication rate was only 0.4%, underscoring the need for procedural precision and early recognition (Safari et al., 2025). We report a case of accidental loss of a guidewire.

Despite the rarity of guidewire loss, its clinical significance cannot be understated. This complication can result in life-threatening consequences including cardiac arrhythmias, vascular perforation, thromboembolism, and sepsis (Fan & Song, 2016; Kajendran, 2022). The potential for mortality, particularly when the entire guidewire is retained, necessitates immediate recognition and intervention. Furthermore, guidewire retention often requires specialized retrieval techniques, typically involving interventional radiology or cardiovascular surgery, which may not be readily available in all healthcare settings (Alves & Carvalho, 2018; Deep et al., 2022; Najari et al., 2018; Tomar et al., 2017; Van Doninck et al., 2015; Zhao et al., 2019).

Previous case reports have documented various scenarios of guidewire loss. Srivastav et al. (2013) reported a case where guidewire loss was detected immediately and successfully retrieved via an endovascular approach (Srivastav et al., 2013). Deep et al. (2022) described a similar incident emphasizing the importance of maintaining constant control of the guidewire throughout the procedure (Deep et al., 2022). Ghatak et al. (2013) reported two life-threatening cases where delayed recognition led to significant morbidity. However, most published reports focus on isolated technical aspects of retrieval rather than the comprehensive multidisciplinary management approach.

The novelty of this case lies in several aspects: first, it demonstrates successful endovascular retrieval in the context of a critically ill neurosurgical patient requiring emergent EVD, a clinical scenario that presents unique challenges in terms of patient positioning, timing of intervention, and risk-benefit assessment. Second, it illustrates the effectiveness of early multidisciplinary coordination involving anesthesiology, neurosurgery, cardiovascular surgery, and interventional radiology teams in achieving optimal patient outcomes. Third, it provides practical insights into the decision-making process when guidewire loss occurs in an emergency setting, including the rationale for delaying retrieval to prioritize life-saving neurosurgical intervention. Finally, this case emphasizes preventive strategies and systematic approaches to minimize such complications in high-acuity situations.

This case report aims to illustrate the clinical management and preventive strategies of guidewire loss during CVC insertion, emphasizing the importance of procedural precision, immediate recognition, and multidisciplinary teamwork. By sharing this experience, we hope to contribute to the body of knowledge on managing this rare but serious complication, potentially improving patient safety in critical care settings. The significance of this report extends beyond the individual case, offering valuable lessons for practitioners performing CVC insertions, particularly in emergency and high-pressure situations where the risk of procedural errors may be elevated.

RESEARCH METHOD

This study employed a qualitative, descriptive case report design to provide an in-depth analysis of a single, rare clinical event: the accidental loss and subsequent retrieval of a

guidewire during central venous catheterization. The research population was defined as all patients undergoing CVC procedures; from this population, the data sample was purposively selected as a single 63-year-old male patient who experienced this specific complication. The sampling technique was therefore a purposive (or judgmental) sampling method, as the case was chosen specifically for its uniqueness and its value in illustrating a preventable medical error and a successful management pathway.

The primary research instrument was the patient's medical record, which provided comprehensive and retrospective data on the patient's clinical presentation, the CVC procedure, the complication event, and the multidisciplinary management. Supplementary instruments included operative notes, consultation reports, and imaging studies, such as ultrasound and cathlab fluoroscopy. Data analysis was conducted using a descriptive analytical technique. The data from the medical records were systematically extracted, organized chronologically, and then analyzed to reconstruct the timeline of events, identify the root cause of the complication, and evaluate the effectiveness of the clinical decision-making and intervention that led to the successful resolution of the incident.

RESULTS AND DISCUSSION

Case Presentation

This case report was prepared following the CARE (CAse REport) guidelines for standardized reporting of clinical cases. Written informed consent was obtained from the patient's family for publication of this case report and any accompanying images, with explicit permission to use de-identified clinical information for educational and research purposes. The study protocol was reviewed and approved by the institutional ethics committee, and all procedures were conducted in accordance with the ethical standards of the Declaration of Helsinki.

Patient Information and Clinical Presentation

A 63-year-old male patient presented to the emergency department with chief complaints of decreased consciousness and blurred vision for six hours prior to admission. Physical examination revealed hemiparesis, dysarthria, and altered mental status. Initial assessment showed the following vital signs: blood pressure 160/90 mmHg, heart rate 100 beats/minute, respiratory rate 20 breaths/minute, oxygen saturation 99% on supplemental oxygen, temperature 36.8°C, and Glasgow Coma Scale (GCS) score of E2M3V5. General physical examination revealed no conjunctival anemia, no scleral icterus, jugular venous pressure of 5+2 cmH₂O, vesicular breath sounds bilaterally without rhonchi or wheezing, regular heart sounds, unremarkable abdominal examination, warm extremities, and good capillary refill time.

Computed tomography (CT) scan of the brain revealed subarachnoid hemorrhage. Based on clinical and radiological findings, the patient was diagnosed with subarachnoid hemorrhage, emergency hypertension, and bilateral pneumonia. The patient had a medical history of hypertension (poorly controlled, non-compliant with medications) and allergic asthma, with no documented history of coronary artery disease or prior surgical interventions. Given the severity of the subarachnoid hemorrhage and the need for intracranial pressure

monitoring and cerebrospinal fluid drainage, the patient was classified as American Society of Anesthesiologists (ASA) physical status III and scheduled for emergency external ventricular drainage (EVD) procedure.

Anesthetic Management and CVC Insertion

The patient was transferred to the operating room for emergency EVD under general anesthesia. Anesthetic induction was initiated with premedication and induction agents administered intravenously: fentanyl 100 mcg (approximately 1.5 mcg/kg), propofol 100 mg (approximately 1.5 mg/kg), rocuronium 50 mg (0.6 mg/kg for neuromuscular blockade), thiopental 5 mg/kg, and lidocaine 1.5 mg/kg. Following adequate depth of anesthesia and neuromuscular blockade, endotracheal intubation was successfully performed using a 7.5 mm cuffed endotracheal tube, secured at 20 cm depth at the teeth.

Subsequently, central venous access was deemed necessary for hemodynamic monitoring, administration of vasoactive medications, and fluid resuscitation. CVC insertion was performed via the right femoral vein under real-time ultrasound guidance using the Seldinger technique. The femoral site was specifically chosen as the access site for several strategic reasons: to avoid interference with the neurosurgical operative field in the head and neck region, to maintain sterility of the cranial surgical area, and to expedite central line placement in a patient with acute intracranial hemorrhage requiring emergent EVD without delay.

Complication and Immediate Management

During the CVC insertion procedure, an inadvertent complication occurred. As the operator prepared to remove the guidewire after catheter insertion, it was discovered that the catheter had been advanced over the guidewire while the lumen clamp was closed, inadvertently pushing the guidewire further into the vasculature. Upon recognition of this error, immediate confirmation was performed using bedside ultrasound, which initially localized the guidewire in the superficial femoral vein. An attempt was made to carefully retrieve the guidewire by slowly withdrawing the catheter; however, the guidewire could not be retrieved and had migrated into the central circulation.

This incident was attributed to multiple factors related to the emergency nature of the procedure: high-acuity clinical situation requiring rapid intervention, inadvertent catheter advancement during a change of operator while the guidewire remained in situ, and potential breach of standard procedural protocols under time pressure. This event highlights the critical importance of maintaining strict adherence to safety protocols, particularly the fundamental principle of maintaining continuous manual control of the guidewire throughout the entire insertion process, especially during high-stress emergency situations.

Multidisciplinary Decision-Making

An immediate emergency consultation was initiated with the thoracic and cardiovascular surgery department. After clinical evaluation and review of the situation, the surgical team advised that open surgical retrieval was not necessary and recommended endovascular wire retrieval via cathlab using snaring technique as the preferred approach.

Subsequently, a small subcutaneous incision was made at the femoral insertion site to confirm the presence of the guidewire subcutaneously; however, no wire was palpable or visualized, confirming complete intravascular migration. Given the urgent need to proceed with the life-saving EVD procedure, the decision was made to establish alternative central venous access via the contralateral left femoral vein for immediate surgical requirements, with planned endovascular guidewire retrieval to be performed within 72 hours once the patient was stabilized.

A comprehensive multidisciplinary clinical conference was convened involving key stakeholders: the attending physicians (DPJP), case manager, medical service team, neurology consultant, anesthesiology team, and thoracic and cardiovascular surgery team. The multidisciplinary team reached consensus on the following management plan: (1) complete the emergent EVD procedure without delay to address the life-threatening intracranial hemorrhage; (2) conduct joint family education session explaining the complication, planned management, and associated risks; (3) proceed with early tracheostomy given the anticipated prolonged mechanical ventilation; and (4) perform endovascular guidewire retrieval via cathlab using snaring technique within 72 hours of ICU admission.

Postoperative Management and Wire Retrieval

Following completion of the EVD procedure, the patient was transferred to the intensive care unit (ICU) for postoperative monitoring and continued critical care management. To minimize the risk of guidewire migration and potential complications such as cardiac perforation or vascular injury, the patient was positioned with leg elevation and maintained in a 35-degree head-up tilt position. Continuous cardiac monitoring was instituted to detect any arrhythmias, and serial chest radiographs were obtained to track the position of the retained guidewire.

On the third day of ICU care, the patient underwent cathlab procedure for endovascular guidewire retrieval. Under fluoroscopic guidance and using interventional radiology techniques, the retained guidewire was successfully retrieved via snaring approach without any procedural complications. Post-retrieval evaluation confirmed complete removal of the foreign body, with no evidence of vascular injury, thrombosis, or cardiac complications. The patient tolerated the interventional procedure well and remained hemodynamically stable throughout.

Clinical Outcome

Following successful guidewire retrieval, the patient remained free from any complications directly attributable to the guidewire retention or its removal, including absence of arrhythmias, thromboembolism, vascular perforation, or infection. However, despite optimal management of the iatrogenic complication, the patient's neurological status did not show improvement due to the severity of the primary brain injury. Progressive neurological deterioration occurred secondary to the extensive subarachnoid hemorrhage and associated cerebral edema. The patient ultimately succumbed to the progression of severe neurological injury and multiorgan dysfunction on ICU day 12. This outcome underscores the principle that while prompt recognition and appropriate management of procedural complications can prevent additional morbidity, the overall prognosis in critically ill patients remains

predominantly determined by the severity and natural history of the primary underlying disease process.

Discussion

Pathophysiology and Risk Factors

Guidewire retention during CVC insertion represents a rare but serious iatrogenic complication with potentially fatal consequences. Adrian et al., in a large prospective multicenter cohort study, reported that the incidence of major mechanical complications of central venous catheterization ranged from 0.2% to 0.4%, with guidewire loss being among the rarest events (Adrian et al., 2022). Despite its low incidence, this complication carries significant clinical implications. Central venous catheterization is associated with various complications including infection, catheter placement failure, arterial puncture, malposition, pneumothorax, and hematoma (Odendaal et al., 2017). However, guidewire loss remains one of the most preventable complications when appropriate procedural techniques and safety measures are consistently applied.

Several mechanisms can lead to guidewire retention. The most common scenario involves inadvertent advancement of the catheter over the guidewire without maintaining manual control of the proximal end, as occurred in this case. Other reported mechanisms include guidewire entrapment by intravascular devices such as inferior vena cava (IVC) filters, entanglement with pre-existing catheters in patients with multiple central lines, and inadvertent inclusion of the guidewire during surgical suturing in cardiothoracic procedures (Sethi et al., 2023; Safari et al., 2025), (Bream et al., 2008). In contrast to our case, where the retained guidewire was detected intraoperatively and retrieved within three days, several reports describe patients in whom the wire remained undetected for months or even years (Srivastav et al., 2013; Ghatak et al., 2013), (Deep et al., 2022). In such delayed presentations, diagnosis was often incidental on routine imaging or occurred only after complications such as thrombosis, arrhythmia, embolism, or catheter-related bloodstream infection developed, making retrieval substantially more challenging and occasionally necessitating open surgical intervention (Ghatak et al., 2013; Deep et al., 2022).

Risk factors for guidewire loss include operator inexperience, lack of direct supervision particularly for trainees, emergency situations with time pressure, distraction or interruption during the procedure, inadequate procedural training, and deviation from standard protocols (Bream et al., 2008; Srivastav et al., 2013), (Deep et al., 2022). In our case, the emergency context of a patient with life-threatening subarachnoid hemorrhage requiring urgent EVD, combined with a change of operator during the procedure while the guidewire remained in place, created a high-risk scenario for this complication. This underscores the critical importance of heightened vigilance and strict adherence to safety protocols, especially in urgent and emergent clinical situations where the pressure to proceed quickly may inadvertently compromise procedural safety.

Clinical Consequences and Complications

Guidewire loss, while potentially remaining asymptomatic initially, carries substantial long-term risks. Complete retention of a guidewire in the central circulation can lead to serious

sequelae including cardiac arrhythmias (particularly when the wire reaches the right atrium or ventricle), thrombosis formation around the foreign body, thromboembolic complications including pulmonary embolism, vascular perforation with potential hemothorax or hemopericardium, catheter-related bloodstream infections with increased risk of endocarditis, and cardiac tamponade in severe cases (Sethi et al., 2023; Safari et al., 2025; Bream et al., 2008; Srivastav et al., 2013). Reported mortality rates associated with complete guidewire loss range from 20% to as high as 60% in some series when complications develop and the wire remains unretrieved (Ghatak et al., 2013; Deep et al., 2022). This significant mortality risk mandates immediate recognition and prompt intervention when guidewire loss is identified.

Management Strategies and Retrieval Techniques

When guidewire retention is recognized, immediate action is essential. The first priority is to assess the location and extent of wire migration using imaging modalities such as fluoroscopy, chest radiography, or echocardiography. Once the position is confirmed, retrieval should be planned urgently, ideally within 24 to 72 hours to minimize the risk of complications (Safari et al., 2025; Bream et al., 2008).

Endovascular retrieval via catheterization laboratory has emerged as the preferred approach for managing intravascular foreign bodies, including retained guidewires. This technique offers several advantages over open surgical retrieval: it is minimally invasive, carries lower risk of surgical site infection, requires shorter recovery time, can be performed under local anesthesia with conscious sedation in many cases, and has reported success rates exceeding 90% in experienced hands (Adrian et al., 2022; Sethi et al., 2023), (Safari et al., 2025; Bream et al., 2008). Common endovascular techniques include snaring (using various loop snares such as gooseneck snares), basket retrieval devices, and forceps-based extraction systems. The choice of technique depends on the wire configuration, location, and the expertise of the interventional team (Safari et al., 2025; Bream et al., 2008).

Unlike previous reports such as those by Srivastav et al. (2013) and Deep et al. (2022), which primarily focused on the technical aspects of guidewire retrieval in relatively stable patients (Srivastav et al., 2013; Deep et al., 2022), this case demonstrates the effectiveness of early detection and multidisciplinary coordination in achieving complication-free retrieval in a critically ill patient with competing clinical priorities. The decision to delay retrieval for 72 hours while prioritizing the life-saving EVD procedure, combined with careful patient positioning to minimize wire migration risk, represents a pragmatic approach to managing guidewire loss in the context of a neurosurgical emergency. This case illustrates that while immediate retrieval is ideal, a brief planned delay may be acceptable when more urgent life-threatening conditions require immediate attention, provided the patient is closely monitored and retrieval is performed as soon as clinically feasible.

Open surgical retrieval is reserved for specific scenarios including failure of endovascular retrieval attempts, contraindications to endovascular procedures, guidewire entanglement with intracardiac structures that cannot be safely manipulated percutaneously, and cases complicated by vascular perforation or significant hemodynamic instability (Safari et al., 2025; Ghatak et al., 2013). In our patient, the endovascular approach via cathlab using snaring technique was successful, with complete wire retrieval accomplished without any

associated complications. The patient remained free from any sequelae related to the guidewire or its removal, including absence of arrhythmias, thrombosis, or infection.

Preventive Strategies and Lessons Learned

Prevention of guidewire loss is paramount and relies on strict adherence to fundamental procedural principles. Key preventive measures include: (1) maintaining continuous manual control of the guidewire at all times throughout the procedure—the proximal end should never be released; (2) using mechanical adjuncts such as mosquito forceps or small artery forceps to secure the non-J end of the guidewire, particularly during dilator insertion and catheter advancement (Bream et al., 2008; Srivastav et al., 2013); (3) ensuring adequate supervision and assistance, especially for less experienced operators; (4) following standardized procedural checklists that include verification steps before guidewire removal; (5) minimizing distractions and interruptions during the procedure; (6) conducting systematic pre-procedure briefings and post-procedure debriefings to identify and address potential safety concerns; and (7) implementing a culture of safety that encourages speaking up when deviations from protocol are observed, particularly during high-acuity situations (Srivastav et al., 2013; Deep et al., 2022).

The principle "never let go of the guidewire" should be ingrained in the training of all practitioners performing central venous catheterization. This single rule, if universally followed, would eliminate the vast majority of guidewire loss incidents. Additionally, the use of safety-enhanced CVC kits that include guidewire retention mechanisms or visual alerts can provide an additional layer of protection against this complication (Bream et al., 2008; Deep et al., 2022).

Limitations and Future Directions

This case report has inherent limitations as a single-patient observation. While it provides valuable clinical insights, generalizability is limited. Future research should focus on systematic analysis of guidewire loss incidents through prospective registries, development and validation of standardized prevention protocols, comparative effectiveness studies of different retrieval techniques, and assessment of long-term outcomes in patients who experience guidewire retention and successful retrieval.

CONCLUSION

Guidewire loss during central venous catheterization is a rare but preventable complication that can lead to serious consequences if not promptly recognized and managed. This case highlights that early detection, multidisciplinary coordination, and timely endovascular retrieval can effectively resolve guidewire retention without added morbidity. Strict adherence to continuous manual control of the guidewire throughout the procedure is essential and must be consistently reinforced through rigorous training and standardized safety protocols. Healthcare institutions should emphasize comprehensive education, supervision, and a culture of transparency to minimize such risks. Future research should focus on evaluating the effectiveness of these preventive strategies and developing innovative

technologies or procedural aids to reduce guidewire loss further, ultimately improving patient safety during CVC insertions.

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