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## CLINICAL INFORMATION

# Lost guide wire – lessons learned



Daniel Rodrigues Alves\*, Cláudia Carvalho

Centro Hospitalar de Lisboa Ocidental, Lisbon, Portugal

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### KEYWORDS

Central venous catheter;  
Complication;  
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**Abstract** Central venous catheter placement is a relatively common procedure in current practice, but it is not devoid of risks. Utmost care must be taken to follow a correct technique, and only appropriately trained and/or supervised medical professionals should perform this invasive act. One of the possible complications, completely avoidable by appropriate care, is the intravascular loss of the guide wire during insertion, which is a potentially serious complication. We describe one such case.

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### PALAVRAS-CHAVE

Cateter venoso central;  
Complicação;  
Avaliação no pré-operatório

### Fio-guia perdido – lições aprendidas

**Resumo** A colocação de cateter venoso central é um procedimento relativamente comum na prática atual, mas não é isenta de riscos. O máximo de cuidado deve ser tomado para seguir a técnica correta, e somente profissionais da área médica devidamente treinados e/ou supervisionados devem realizar esse ato invasivo. Uma das muitas complicações possíveis, totalmente evitável com os cuidados adequados, é a perda intravascular do fio-guia durante a inserção, o que é uma complicação potencialmente grave. Descrevemos um desses casos.

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## Introduction

There are many sound indications for inserting a central venous catheter (CVC) but one fact is indisputable: the deci-

sion is not to be taken lightly, as it carries a risk of potentially serious complications,<sup>1–6</sup> be them mechanical, thrombotic or infectious in nature. Nevertheless, millions of patients undergo CVC insertion every year,<sup>2,3</sup> and it is fundamental that this be performed only by appropriately trained and/or supervised medical professionals,<sup>3–8</sup> following strict codes of conduct to prevent mishaps. While some of the complications are difficult to avert, others are due to human error and thus amenable to intervention – which led some

\* Corresponding author.

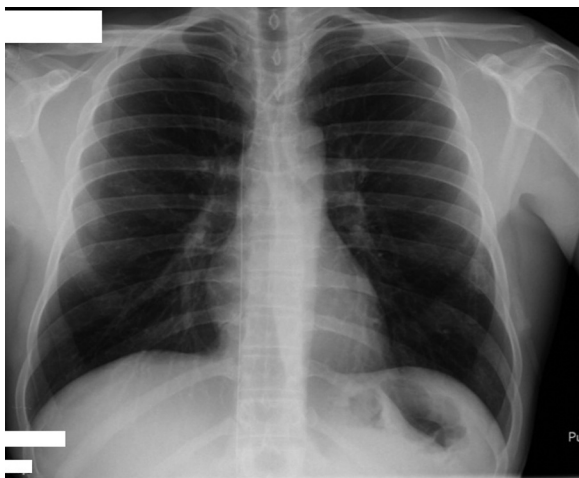
E-mail: [daniel\\_r\\_alves@sapo.pt](mailto:daniel_r_alves@sapo.pt) (D.R. Alves).

institutions to establish checklists<sup>3</sup> for CVC insertion as a way of improving the safety profile of the procedure. One of the possible complications, most likely under-reported for fear of litigation,<sup>2</sup> is intravascular loss of the guide wire during insertion. It is preventable by railroading the catheter through the guide wire, firmly grasping the latter with one hand while the catheter is introduced with the other. However, in settings like emergency insertion, lack of experience and/or supervision of the operator, and lack of attention in overworked, fatigued doctors it has been reported to occur.<sup>3-8</sup>

## Case report

We present the case of a 40 year-old burn victim to the right upper limb, who underwent central venous catheter insertion via the left subclavian vein for need of intravenous medication and poor peripheral venous access (former drug addict). The procedure was performed in the morning, and a post-insertion chest radiograph was ordered. The insertion was performed by a second year surgical resident and reported as uneventful, with the patient verbalizing no complaints and evidencing no arrhythmia.

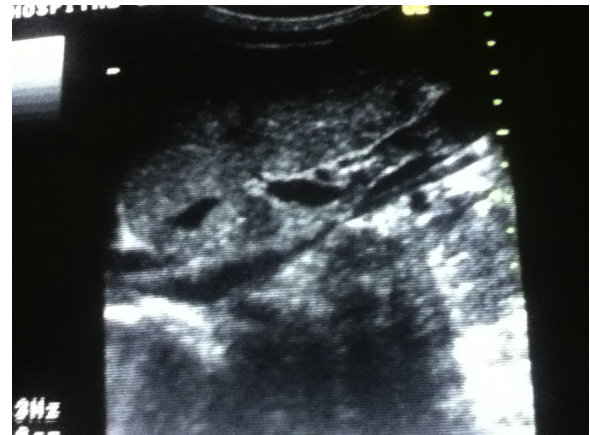
Later in the afternoon of that same day the patient had a pre-anesthetic consultation. History and physical examination were performed, but no post-insertion chest radiograph was found on the informatics system. The patient, however, confirmed to having made the exam, and so the radiology department was contacted. There was an informatics problem preventing the appropriate display of the pictures, and when they did become available it was clear that a radiopaque line extended throughout the right cardiac silhouette, distal to the central venous catheter tip (Fig. 1). The possibility of a retained guide wire was immediately raised and a repeat chest radiograph obtained, this time with a left lateral view (Fig. 2), which confirmed the finding suggesting a retained guide wire lodged in part of the superior vena cava, traversing the right atrium and extending throughout the inferior vena cava. The surgical fellow on-call was contacted, and with the availability of an echograph (without cardiac probes) the anesthesiologist obtained an



**Figure 1** Posteroanterior chest radiograph depicting a radiopaque line to the right of the sternum.



**Figure 2** Left lateral chest radiograph, depicting the same radiopaque line, clearly distal to the catheter tip and consistent with an intravascular position.



**Figure 3** Still of the abdominal echography, where we can see a partially collapsed inferior vena cava with an echoreflexive structure inside (corresponding to the guidewire).

inferior vena cava (IVC) view, which once again confirmed the presence of an echoreflexive linear image inside the IVC (Fig. 3, Film 1). The case was then presented by the surgical fellow to interventional cardiology, and the guidewire was removed percutaneously via a right femoral vein approach, uneventfully.

## Discussion

The occurrence of this complication led to a reflection on the several steps of the process of CVC insertion, analyzing what went wrong and what should be made differently henceforth. The lessons to be learned are pretty straightforward:

- 1 Utmost care is necessary when placing a central line. The complications at the top of the list when performing the procedure are usually the possibility of haemothorax

or pneumothorax (namely with a subclavian approach) along with embolism or infectious complications. However, guide wire migration is also a rare but important complication – completely preventable and of which one must be aware. It is mandatory to hold the guide wire firmly while the catheter is “rail-roaded” through it, and never to insert both simultaneously.<sup>7–10</sup>

- 2 The procedure must be performed by experienced physicians and/or supervised by someone with the appropriate expertise.<sup>3–8</sup>
- 3 After insertion, it is important to check that the guide wire is accounted for in the instruments tray (and that it is whole).<sup>3,5–8,10</sup> Some institutions have designed checklists that address this particular point, and it is strongly encouraged that everyone adheres to a local protocol where such is reinforced.
- 4 While physical examination of the patient after the procedure may suggest some problems, it is insufficient to discard all complications or confirm correct catheter placement. Therefore it is essential to order a post-insertion chest radiograph, which must always be reviewed thoroughly.<sup>3,5,10</sup>
- 5 Whereas responsibility for reviewing the chest radiograph is commonly attributed to the doctor performing the procedure, it is good practice for other members of the medical team caring for the patient to examine it. In fact, there are several reports in the literature where the guide wire was not identified in the first post-procedural radiograph – although it was already visible at a second look.<sup>2,3,6,10,11,13</sup> If more members of the team (as occurred in this case) do analyze it, the probability of error is reduced. In other words, never assume everything was already checked. That way it is possible to prevent cases like those reported in the literature, where patients unknowingly carried the guide wire for months or longer, with the possibility of migration and complications.
- 6 It is important not to hastily discard compatible images as representing wires at the surface of the patient<sup>3</sup>; if there is doubt, a lateral view may be particularly helpful. In our case, considering the presence of the catheter partly in the IVC, echography was also helpful.
- 7 When a guide wire is identified, percutaneous removal is the preferred method.<sup>6,7,12</sup> If there is a need to postpone the procedure, patients should be anticoagulated<sup>2,9</sup> to prevent embolic complications, but the guide wire should be removed as soon as possible.<sup>6,7</sup> There are reports in the literature mentioning that stable guide wires left in place eventually fractured, causing complications such as hemopericardium.<sup>11</sup>
- 8 Removal of a lost guide wire is not enough: it is fundamental to understand what went wrong, raise local awareness onto the problem and promote conducts to prevent it in the future. One such strategy would be to develop an appropriate checklist for CVC insertion, as already mentioned, to be completed by physician and nurse.

## Conclusion

The aim of this report was to raise awareness onto a rare, preventable complication of CVC insertion, as well as to promote the development of local policies designed to decrease its incidence and improve standards of care. Prevention is the desired approach, but early recognition of complications is equally important and should be actively pursued by every clinician.

## Conflicts of interest

The authors declare no conflicts of interest.

## Appendix. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.bjane.2015.03.013](https://doi.org/10.1016/j.bjane.2015.03.013).

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