



Case Report

Forgotten guidewire: A case report



Paulo Inácio Alves Ramos Diniz^{a,b,c,*}, Juan Eduardo Rios Rodriguez^c,
João Pedro Salgado Pio Oliveira^d, Mirella Cruz Lira^d, Renan Danilo Lima da Rocha^a,
Priscilla Ribeiro dos Santos Campelo^{a,b}, Juliana da Costa Matos^{e,f},
Leonardo Pessoa Cavalcante^{a,b,d,f}

^a Federal University of Amazonas, Getúlio Vargas University Hospital, Vascular Surgery Division. Manaus-AM, Brazil

^b Fundacao Hospital Do Coração Francisca Mendes, Vascular and Endovascular Surgery Division. Manaus-AM, Brazil

^c Federal University of Amazonas, Getúlio Vargas University Hospital, General Surgery Division. Manaus-AM, Brazil

^d Federal University of Amazonas, Medical School. Manaus-AM, Brazil

^e Amazonas State University, Internal Medicine Department, Nephrology Discipline. Manaus-AM, Brazil

^f Federal University of Amazonas, Postgraduate Program in Surgery (PPGRACL-UFAM). Manaus-AM, Brazil

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ABSTRACT

Introduction: The Seldinger technique for implanting central venous catheters is the most used in the world. A metallic guidewire is employed in it, introduced through the lumen of a venipuncture needle, which serves as a path for the introduction of the central venous catheter. Complications directly related to this technique are of several types, such as an insertion of a long-winded segment of the guidewire, which can lead to venous perforation, cardiac perforation, arrhythmias or even guidewire retention/embolization.

Presentation of the case: We report the case of a patient with a late diagnosis of a guidewire retained in her venous system. The distal end of the guidewire pierced the pulmonary artery, crossed the chest wall and remained in the left breast tissue. It was removed by laparotomy, through an extra-peritoneal access to the right common iliac vein.

Discussion: Different factors have been identified as responsible for the increase in the number of guidewires retained after central venous catheterizations. Lack of supervision, in procedures performed by training physicians, has been identified as one of the most important risk factor in the cases reported in the literature.

Conclusion: The present report demonstrates that central venous catheterization, despite being a relatively straight forward procedure, should not be underestimated and should be performed by properly trained physicians or by training physicians under supervision.

1. Introduction

The predisposition of critically ill patients admitted to Intensive Care Units (ICUs) to develop acute kidney injury (AKI), especially those undergoing mechanical ventilation, has been long documented [1]. Costa et al. [2], in a retrospective cohort study with 102 patients admitted to an ICU due to COVID-19 infection, detected AKI in 55.9% of the patients, with approximately 40% of them requiring renal replacement therapy through hemodialysis.

Seldinger technique [3] for central venous catheterization is the most widespread technique used worldwide, both for the implantation of

central venous catheters for hemodialysis and for the implantation of central venous catheters for other purposes. Through this technique, after a venipuncture, a metallic guidewire is introduced through the lumen of the needle, which serves as a “rail” for the introduction of the central venous catheter. Complications directly related to this technique are diverse, the most frequent ones being: pneumothorax, hemothorax, and insertion of a long-winded segment of the guidewire, which can lead to venous perforation, cardiac perforation, arrhythmias or even loss (embolization/retention) of the guidewire [4].

The case reported is related to a patient who underwent insertion of a femoral vein dialysis catheter for AKI, whose guidewire was accidentally

* Corresponding author. Federal University of Amazonas, Getúlio Vargas University Hospital, Vascular Surgery Division. Manaus-AM, Brazil.

E-mail addresses: paulo.alves.diniz@yahoo.com.br (P.I. Alves Ramos Diniz), edu-rios2011@hotmail.com (J.E. Rios Rodriguez), jl.oliveira2612@gmail.com (J.P. Salgado Pio Oliveira), mirellalira2797@gmail.com (M. Cruz Lira), dr.renanrocha.vascular@gmail.com (R.D. Lima da Rocha), pri_santoss@hotmail.com (P. Ribeiro dos Santos Campelo), juliana_matos@hotmail.com (J. da Costa Matos), leocavalcante@ufam.edu.br (L. Pessoa Cavalcante).

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left in her venous system, then perforated the pulmonary artery, the chest wall and had its distal end lodged in the left breast tissue. This case follows 2020 SCARE guidelines for reporting cases in surgery [5].

2. Presentation of case

Female patient, 51 years old, was hospitalized for severe treatment of COVID-19. During hospitalization she underwent mechanical ventilation and developed AKI, requiring renal replacement therapy through hemodialysis. Therefore, she underwent insertion of a non-tunneled, double-lumen central venous catheter in the right common femoral vein. The procedure was performed at the ICU bedside.

Approximately three weeks after hospital discharge, the patient showed intermittent stabbing pain in the left hemithorax and discomfort in the left breast. The patient returned to the hospital where, after having ruled out acute coronary syndrome, she underwent chest/abdomen radiography (Figs. 1 and 2) and tomography of the chest and abdomen. These screenings detected a foreign body (guidewire) in the patient's right iliac venous axis/inferior vena cava with its distal end crossing the pulmonary artery, the chest wall and located in the left breast tissue (Fig. 3A and B). Initially, we opted for an endovascular retrieval of the foreign body, during which we tried to trap the metallic guidewire with a snare catheter. We had no success in capturing the end of the guidewire that was in the right venous iliac axis. We also attempted to capture/remove the guide wire using a pigtail angiographic catheter, wrapping it around the shaft of the guide wire, but no success was achieved. The procedure was then converted to an open surgery via laparotomy, using a Gibson incision with an extra-peritoneal access in the lower right quadrant. After proximal and distal vascular control, a transverse venotomy of the right common iliac vein was performed, with identification and removal of the metallic guidewire, which was in the midst of an old-looking thrombus, adhered to the venous wall.

The patient evolved uneventfully in the postoperative period, being discharged on the 4th postoperative day, with prescription of oral anticoagulation, due to the thrombosis evidenced in the right iliac venous axis. The patient referred complete remission of discomfort in the left hemithorax/breast. After one year of follow-up, the patient evolved without complaints in outpatient consultations, with the surgical wound already healed, without changes in the incision site.

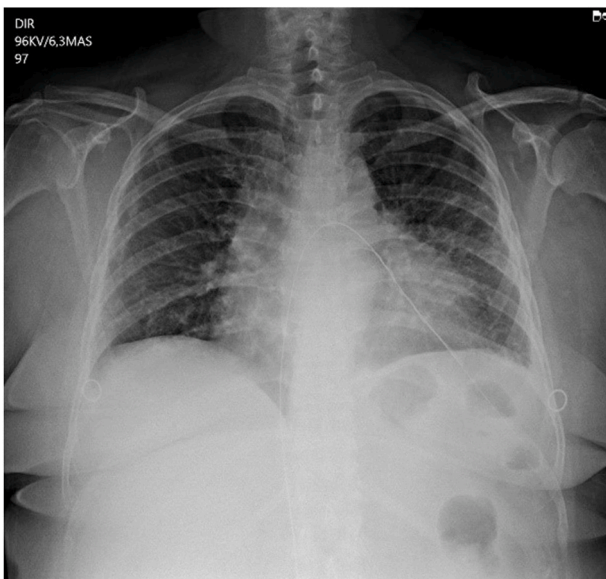


Fig. 1. Chest X-ray showing a guidewire shaft in inferior vena cava topography and distal extremity in the left hemithorax.

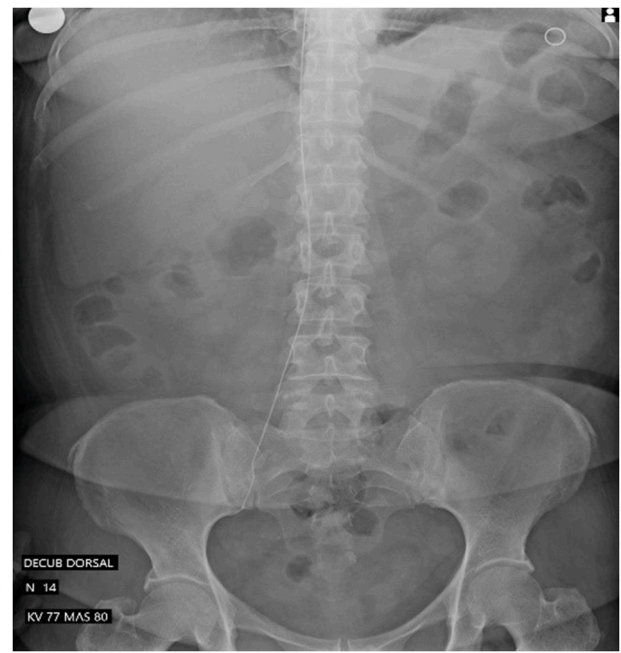


Fig. 2. Abdominal X-ray showing a guidewire with proximal end in the topography of the right iliac venous axis, and shaft ascending in the topography of the inferior vena cava.

3. Discussion

The most frequent form of vascular access for hemodialysis in patients with AKI is the implantation of a non-tunneled double lumen central venous catheter, usually performed at the bedside by nephrologists or intensivists [6].

Many factors have been identified as responsible for the increase in the number of guidewires retained after central venous catheterization, including distraction during the procedure; physician's level of experience; work overload; or lack of supervision, in the case of training physicians. Lack of supervision has been identified as the most commonly found risk factor in cases reported in the literature [7].

Usually, final positioning of venous intravascular foreign bodies occurs in larger vessels, such as the innominate vein, superior/inferior vena cava, and pulmonary arteries, or in cardiac chambers, such as the right atrium and ventricle [8].

The majority of retained guidewires are discovered during or shortly after the procedure for central venous access [7]. Nevertheless, in some cases, as in the one presented in this report, they are discovered late [9, 10].

Retention of the guidewire may be totally asymptomatic, but it can also result in some potentially fatal clinical complications, such as: cardiac arrhythmias, perforation of blood vessels or cardiac chambers [11]. In this report, in addition to the perforation of the pulmonary artery, the guide wire crossed the chest wall and ended up with its distal end in the patient's left breast tissue.

Regarding the endovascular approach for the removal of the intravascular foreign bodies, it is considered a minimally invasive and first-choice technique due to its high success rate (above 90%) and its low morbidity [12]. In this case, after iliac venotomy, we noticed that it was impossible to capture the distal end of the retained guide wire because it was in the midst of a thrombus that had already adhered to the vessel wall. In cases of unsuccessful capture, a pigtail angiographic catheter can be used to mobilize the retained guide wire, forcing it to move to a more suitable location to be captured [12]; this maneuver was also tried in this case, but without success, perhaps due to the time the catheter was retained in place and the fact that the distal end was adhered to the breast tissue and the chest wall musculature.

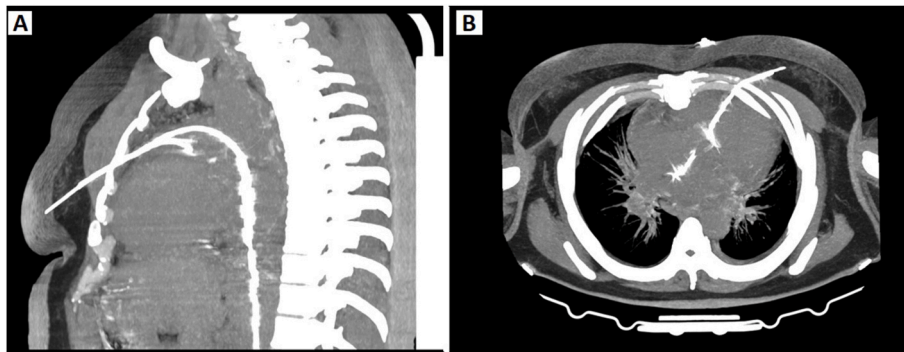


Fig. 3. A: Chest tomography with sum of sagittal slices showing the guidewire crossing the pulmonary artery and chest wall, with the distal end in the left breast tissue. B: Abdominal tomography with sum of axial slices showing the guidewire crossing the pulmonary artery and chest wall, with the distal end in the left breast tissue.

4. Conclusion

The present report is yet another demonstration that central venous catheterization, despite being a relatively straight-forward and minimally invasive procedure, should not be underestimated, and should be performed by properly trained physicians or by training physicians under close supervision.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Ethical approval

As the manuscript is not a research study, we only have the patient consent for writing and others forms of publication. Also, the ethical approval for this case reports has been exempted by our institution.

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Author contribution

Paulo Diniz, Mirella Lira, Juan Rodriguez and João Oliveira contributions to conception, design, collected the patient details and wrote the paper. Paulo Diniz, Renan Danilo and Leonardo Cavalcante made contributions to patient management. Leonardo Cavalcante, Priscilla Campelo and Juliana Matos critically revised the article. All authors read and approved the final manuscript.

Trail registry number

The manuscript is a case report, not considered a formal research involving participants.

Guarantor

Paulo Inácio Alves Ramos Diniz.

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The following information is required for submission. Please note that failure to respond to these questions/statements will mean your submission will be returned. If you have nothing to declare in any of these categories, then this should be stated.

Consent

Studies on patients or volunteers require ethics committee approval and fully informed written consent which should be documented in the paper.

Authors must obtain written and signed consent to publish a case report from the patient (or, where applicable, the patient's guardian or next of kin) prior to submission. We ask Authors to confirm as part of the submission process that such consent has been obtained, and the manuscript must include a statement to this effect in a consent section at the end of the manuscript, as follows: "Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request".

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Even where consent has been given, identifying details should be omitted if they are not essential. If identifying characteristics are altered to protect anonymity, such as in genetic pedigrees, authors should provide assurance that alterations do not distort scientific meaning and editors should so note.

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Declaration of competing interest

We do not have any conflicts of interests.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2022.103867>.

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