

# KNOTED GUIDEWIRE IN PERIPHERALLY INSERTED CENTRAL CATHETERS (PICC): A RARE COMPLICATION

*Enovelamento do fio guia em cateter central de inserção periférica (PICC): rara complicação*  
*Enredado del alambre guía en el catéter central de la inserción periférica (PICC): complicación infrecuente*

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**ABSTRACT: Objective:** To report the experience of a multiprofessional team on the management of an adverse event after the insertion of a peripherally inserted central catheter (PICC) because of the retention of the metallic guidewire. **Method:** An experience report concerning an occurrence at a general hospital in the city of Guarulhos, São Paulo, Brazil, in November 2015. **Results:** Description of the case of a 1-year-old infant, with hemophilia and neuropathy, who had its guidewire held after the insertion of a PICC 3F in the forearm without incidents, which made its removal impossible. Radioscopy revealed that the guidewire was curled up and had to be surgically removed. **Conclusion:** The surgical procedure was successful. There was no blood loss in the operating field. The infant recovered well, without any consequences detected because of the complication. The manufacturer was notified of the event. This case served as a learning experience for the multiprofessional team.

**Keywords:** Catheters. Complications. Surgical procedures, operative. Patient care team.

**RESUMO: Objetivo:** Relatar a experiência vivenciada por uma equipe multiprofissional referente ao gerenciamento de um evento adverso após a passagem de cateter central de inserção periférica (PICC) por retenção do fio guia metálico. **Método:** Relato de experiência ocorrida em hospital geral no município de Guarulhos, São Paulo, em novembro de 2015. **Resultado:** Descreve-se o caso de lactente de um ano de idade, hemofílico e neuropata, que, após a passagem de PICC 3F no antebraço sem incidentes, teve seu fio guia retido, impossibilitando sua retirada. A radioscopia revelou enovelamento do fio guia, com necessidade de remoção cirúrgica. **Conclusão:** O procedimento cirúrgico foi realizado com sucesso. Não houve perda sanguínea de monta no campo operatório. A criança se recuperou bem, sem consequências detectáveis pela intercorrência. Notificou-se o fabricante sobre o evento ocorrido. Este caso serviu como um aprendizado para a equipe multiprofissional. **Palavras-chave:** Cateteres. Complicações. Procedimentos cirúrgicos operatórios. Equipe de assistência ao paciente.

**RESUMEN: Objetivo:** Reportar la experiencia pasada por un equipo multiprofesional en referencia al manejo de un evento adverso luego del paso del catéter central de la inserción periférica (PICC) por retención del alambre metálico. **Método:** Relato de una experiencia sucedida en un hospital general del municipio de Guarulhos (San Pablo, Brasil), en noviembre de 2015. **Resultado:** Se describe el caso de un lactante de un año, hemofílico y portador de neuropatía, lo cual, luego del paso de un PICC 3F por su antebrazo sin incidencias, sufrió una retención del alambre, que imposibilitaba retirarlo. La radioscopia mostró un enredado del alambre guía, que debió retirarse por vía quirúrgica. **Conclusión:** El procedimiento quirúrgico se llevó a cabo con éxito. No hubo pérdida sanguínea relevante en el acto quirúrgico. El niño se recuperó bien, sin consecuencias detectables que fueron motivadas por el evento. Se notificó al fabricante sobre el inconveniente acaecido. Este caso sirve como un aprendizaje para el equipo multiprofesional.

**Palabras clave:** Catéteres. Complicaciones. Procedimientos quirúrgicos operativos. Grupo de atención al paciente.

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## INTRODUCTION

The use of durable venous access in children has had great progress with the institution of the passage of catheters through percutaneous puncture using the Seldinger technique in caliber veins in the neck, thigh root, or subclavian region, instead of the traditional dissection.

The state of the art was achieved with the development of thinner catheters, which can be inserted into any peripheral vein, the peripherally inserted central catheter (PICC). These catheters can remain for a long time, being easy to maintain. They are associated with low incidence of bloodstream infections as long as they undergo a very strict insertion protocol<sup>1</sup>.

The use of PICC has been recommended in patients requiring prolonged intravascular therapy, such as the administration of drugs and chemotherapy, blood transfusions, and parenteral nutrition, and it also enables hemodynamic monitoring<sup>2</sup>.

Usually, PICCs are inserted at the bedside by nurses and doctors who are trained and qualified to perform the procedure. Although it is a safe procedure, studies show that complications may occur, whether they are related to the passage, presence, or removal of the catheter. The following were described: sepsis, obstruction, accidental removal, infiltration, edema, phlebitis, pleural effusion, pericardial effusion, catheter fracture, catheter migration, thrombosis, leakage, poor positioning of the catheter tip, difficulty of removal, and embolism<sup>1,3-5</sup>. However, the description of guidewire locking in its withdrawal after the passage of this type of catheter was not found in the literature.

## OBJECTIVE

To report the experience of a multidisciplinary team in the management of an adverse event after the passage of PICC due to the retention of the guidewire.

## METHOD

This is the report of an experience by nurses and doctors during the passage of a PICC in an accredited general hospital in the municipality of Guarulhos, São Paulo, which occurred in November 2015. The report concerns a rare case

of complication in the passing of a PICC through the basilic vein in an infant, in which, after an uneventful access, the guidewire did not come out, getting stuck, twisted over itself, requiring surgical intervention for its extraction.

## RESULTS

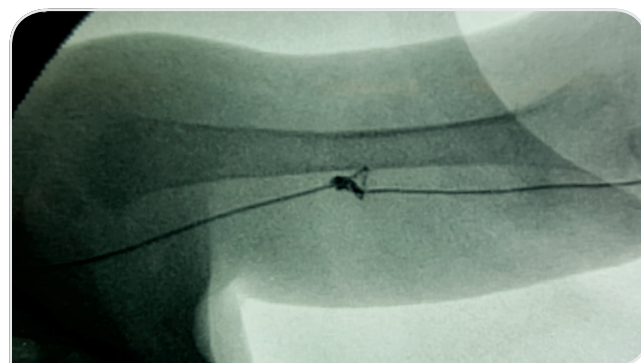
One-year-old male infant had been hospitalized for five months in the Neonatal and Pediatric Intensive Care Unit (ICU). The child was diagnosed with hemophilia and neurological sequelae of intracranial bleeding and he needed a new central access for the infusion of Factor VIII three times a week, as well as parenteral maintenance and antibiotics.

The nurse who was qualified to perform the procedure chose, according to the hospital's standard protocol, a 3F valved PICC, using the Seldinger technique due to its recognized benefits, such as long-term access<sup>6</sup>.

After aseptic care and surgical scrub, the puncture was performed in the left basilic vein with good blood flow. During insertion of the catheter, there was no resistance, thereby allowing its adequate advance, until it reached a central position, as confirmed by radioscopy.

When performing the maneuver for the removal of the guidewire, it showed resistance, and its withdrawal was not possible. Limb positioning changes were performed, pulling the guidewire to a few centimeters; however, the team was still not able to remove the guidewire. The intensive care pediatrician was called on, and also made several attempts to pull the guidewire, to no avail.

Radioscopy showed one folding of the catheter, making it impossible to remove the catheter and the guidewire (Figure 1). The pediatric surgeon was called on for the removal of the catheter through surgical access.

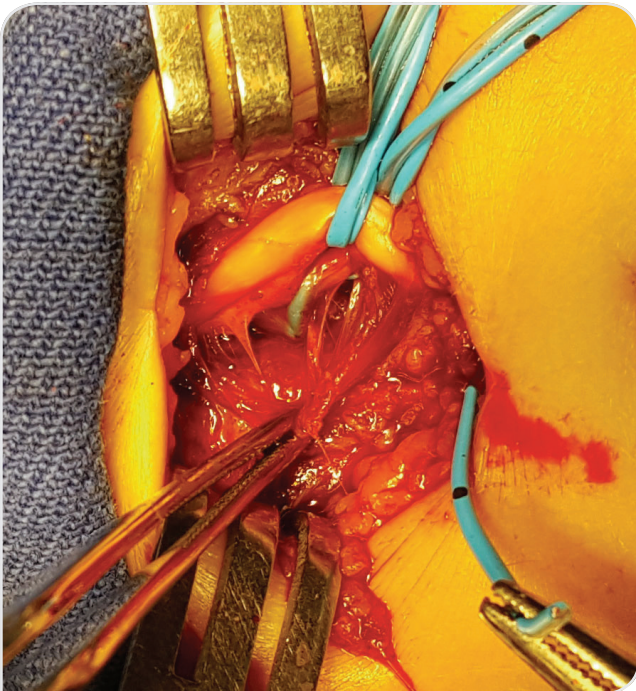


**Figure 1.** Radiography of the catheter folding at the middle third of the arm.

The pediatric surgeon located the position of the folding of the catheter, as suggested by the X-ray, at approximately the middle third of the left arm. Under local anesthesia, a longitudinal incision of approximately three centimeters was made on the medial side of the arm, and the brachial aponeurosis was open, the median nerve and the humeral artery were dissected and set apart proceeding then to locate the humeral vein with the blocked catheter. This was facilitated by the identification of the section of the exteriorized portion of the catheter against the skin and its mobilization (Figure 2).

Once the humeral vein with the catheter inside was identified, it was sectioned and the catheter was extracted by unregulated traction. The catheter was tangled, twisted over itself (Figure 3).

The same vein stump was used for the passing of a new catheter, which was uneventful, with the tip in a central position. The neurovascular structures were released and the incision was closed. Although the patient was a hemophiliac, there was no significant blood loss on the surgical site. The infant recovered well, without detectable consequences due to the complications. The manufacturer was notified of the event.



**Figure 2.** Dissection of the humeral vein. Median nerve and humeral artery identified with vessel loop. The peripherally inserted central catheter is stuck to the Halsted forceps.

## DISCUSSION

Many cases of retention of the guidewire in the passage of non-PICC catheters in veins of large caliber are described in the literature. These veins have potential space for the twisting of the catheter, causing knots in both arteries used for hemodialysis<sup>7</sup> and veins<sup>8,9</sup>.

In a search in PubMed, no case of guidewire retention in the passage of a PICC was found, although one study<sup>10</sup> conducted in 19 ICUs in Japan reported problems with 975 cases related to PICC, one for “difficulty in catheter removal.” This study did not describe the problem in detail, or its relation to the guidewire. Another study<sup>1</sup>, conducted with 2,574 passed PICCs in 1,807 children, reported complications requiring catheter removal in 20.8% (11.6 complications per thousand catheters/day), but no case was similar to that described in this study.

In a literature review to determine the PICC-related complications, there was no mention of guidewire retention during the passage of a catheter<sup>5</sup>. One study<sup>11</sup> reported a knot formed in the PICC catheter passed in the neonatal period, not mentioning the guidewire.

Thus, an explanation suggested for the occurrence of the event reported is the inadequate slip of the metallic wire at the time of removal of the guidewire, which was trapped in the catheter, deforming, and degloving it. Subsequent removal attempts by advancing and pulling the guidewire probably caused permanent folds in the metal, making it impossible to remove without causing further trauma to the vessel. Fortunately, the trapping of the guidewire occurred in the arm, which is more easily accessed by surgical procedure, which was performed easily and without major trauma to the artery and nerve structures there.



**Figure 3.** Image of the extracted guidewire.

After the procedure, the necessary care to the patient were prescribed and performed. In addition, the support staff prepared a report of the event, prompting the institution's management to notify the manufacturer, so that they could institute a quality control of the catheters made available to the institutions.

This report demonstrates the use of PICC as an advanced, specialized, and highly complex care practice, subject to risks for complications<sup>12</sup>.

## CONCLUSION

An unusual complication related to PICC was presented — the folding of the guidewire in the passage of the catheter —, requiring surgical intervention for their extraction.

It also shows the commitment of the team of nurses, intensive care physicians and pediatric surgeon, X-ray technicians and administrators, pooling efforts to resolve an unexpected complication and reduce any consequences to the patient.

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