

Timely Identified Early Migration of Peripherally Inserted Central Catheter by Focused Ultrasound

Chang-Chih Shih¹, Sy-Jou Chen¹, Yuan-Pin Hsu^{2,3,4*}

¹Department of Emergency Medicine, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan, ²Department of Emergency, Wan Fang Hospital, Taipei Medical University, Taipei, Taiwan, ³Graduate Institute of Clinical Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan, ⁴Department of Emergency, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Abstract

A peripherally inserted central venous catheter (PICC) has been widely applied to central venous access. There were some known complications such as phlebitis, leakage, blockage, dislodgment, breakage, or malposition of PICC. Catheter migration was assessed by using chest radiograph or administering contrast medium. Herein, we report a 77-year-old woman presenting to emergency department with odynophagia and left neck swelling of 3 days duration. The initial impression was deep neck infection. Focused ultrasound identified a hyperechoic tube with thrombosis in left jugular vein, which indicated migration of PICC. Clinical symptoms immediately resolved after removal of PICC and anticoagulation therapy.

Keywords: Catheter migration, peripherally inserted central catheter, vascular access

INTRODUCTION

Peripherally inserted central venous catheters (PICCs) are widely used to provide central venous access in patients who require administration of chemotherapy, parenteral nutrition, and treatments considered vesicants or irritating.^[1] Comparing with the central venous catheter; it had relative lower complication rate and few contraindications. The catheter is inserted by an interventional radiologist in the radiology suite, doctor, or specialty nurse-lead insertion teams at the bedside.^[2] Nevertheless, some adverse events are described, the most frequent being infection, phlebitis, occlusion, and thrombosis, tip catheter malposition and spontaneous late migration with relatively low incidence.^[3] Catheter migration has been associated with catheters of which initial tip end was in the upper third of the superior vena cava.^[4] Catheter migration can be caused by coughing, vomiting, high-frequency ventilation, extreme physical activity, and high-pressure infusion.^[5] Catheter migration resulted in failing to withdraw the blood, and it was assessed using chest radiograph or administering contrast medium. Here, we reported a case presented with neck swelling initially masquerading as deep neck infection

and further confirmed as PICC migration which was early detected by focus ultrasound.

CASE REPORT

A 77-year-old woman with a history of hypertension and neuroendocrine tumor, Grade II (intermediate grade) of the mediastinum, pT2N0M0, stage II presented to our emergency department with a 3-day history of progressive odynophagia, swelling, and pain over her left neck. She also reported nasal obstruction and throat pain. On arrival, her blood pressure was 136/77 mmHg, heart rate was 120 beats/min, respiratory rate was 18 breaths/min, oxygen saturation was 99% on room air, and body temperature was 36.8°C. On examination, diffuse swelling of the left neck from level II-V with local tenderness was noted. A blood test showed white blood cell count of 7770/ μ l, and C-reactive protein of 5.68 mg/dl. Deep neck infection was impressed at first. We performed a focused ultrasound of neck for her, which revealed a folded hyperechoic reflexive tubular-like lesion with thrombosis in the left jugular

Address for correspondence: Dr. Yuan-Pin Hsu,
No. 111, Section 3, Xinglong Road, Wenshan Dist., Taipei 116, Taiwan.
E-mail: koakoahsu@gmail.com

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vein [Figure 1]. Contrast-enhanced computed tomography of neck confirmed a migratory and folded PICC in the left jugular vein with thrombosis formation [Figure 2]. Tracing her history, she had undergone PICC insertion via sono-guidance and fluorou-guidance into the left basilic vein with tip catheter at superior vena cava 2 weeks before. She occasionally slept with her flexed elbow, which may introduce migration of catheter. We removed the PICC and administered anticoagulation therapy for her. Her symptoms resolved rapidly, and she was discharged uneventfully 4 days later.

DISCUSSION

PICCs have been widely used due to many benefits, such as venous access, for total parental nutrition, for chemotherapy, easy, and safe insertion.^[6] Nonetheless, there have been some adverse events associated with PICC, including phlebitis (4%–21%), line malfunction (7%–11.5%), malposition (6%–10%), catheter-related infection (3%–5.7%), and late tip migration (1.5%).^[7–9] The average PICC dwell time was about 72 days. Therefore, early migration of PICC with venous thrombosis was not common. It was assessed using chest radiograph or administering contrast medium. Timely identification and proper treatment prevent a potential risk of serious consequences.^[10] In our case, the cause of PICC migration may come from the improper use of flexed upper extremity while sleeping. The etiology was recognized by using focus ultrasound.

The anatomy of neck contains limited structures that are exceptionally intolerant to infection, inflammation, and injury. Acute pathologic processes result in significant suffering, or life endangerment if the diagnosis is missed or treatment is delayed. Many emergent processes within the cervical region should consider possible impacts came from the head and chest.

Neck emergencies included a wide variety of conditions such as Ludwig’s angina, acute epiglottitis, peritonsillar abscesses, retropharyngeal abscesses, or other deep neck infection, such as descending necrotizing mediastinitis and neck trauma. The most common clinical manifestations are pain, odynophagia, hoarseness, facial, or neck swelling. Computed tomography is a noninvasive, easy to acquire, and most common using modality offering excellent detail in identifying site and nature of the lesion. However, it needs to expose to contrast medium and radiation. Focused ultrasound has been widely used in the emergency department as a robust screening and diagnostic tool. The advantages of using focused ultrasound as the primary modality to assess the patients were non-radiation, movability, approachability, and repetitive real-time non-invasive method.^[11] Ultrasound is a useful adjunct for the clinical evaluation of neck emergencies as clinical findings can be misleading, such as cellulitis with an underlying abscess. In the present case, we found a thrombosis [asterisks in Figure 1] that blocked the blood flow in the left internal jugular vein. Besides, we also identified a folded hyperechoic tubular-like lesion [arrowheads in Figure 1] which indicated a migrated PICC. The vortex of blood flow might cause the formed thrombosis in the left internal jugular vein due to folded PICC. No patent blood flow in Doppler ultrasound was also a red flag sign. We found neither cobblestone lesions nor subcutaneous abscess in the soft-tissue layer. It was a rapid and easy method by using ultrasound to find the vessel issue rather than an infectious problem.

We highlighted the importance of focused ultrasound to help physicians to make a proper diagnosis of PICC migration with an initial impression of deep neck infection in the emergency department. Besides, ultrasound is also a valuable tool used for localization and therapeutic management. Even though, it had some limitations. The accuracy and effectiveness are depended on operator experience, patient’s body habitus, and cooperation. PICC has been commonly used to provide central

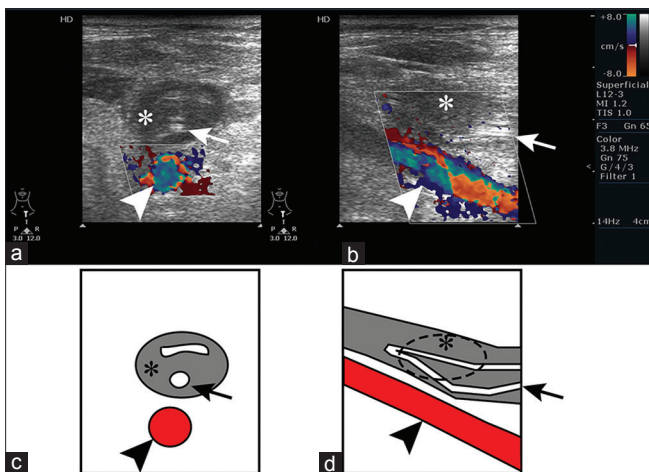


Figure 1: Doppler ultrasound examination of the neck showed patent left internal carotid artery (arrowheads) and a folded hyperechoic tubular-like lesion (arrows) with an occluding thrombosis (asterisks) in the position of the left internal jugular vein without patent blood flow. (a) Short axis view; (b) Long axis view; (c) Short axis view in the sketch; (d) Long axis view in the sketch



Figure 2: Contrast-enhanced computed tomography of the neck and upper thorax (coronal view) showed the tip of peripherally inserted central catheter (arrow) and thrombosis in the left internal jugular vein (arrowhead) complicating with fatty stranding in the left lower neck and supraclavicular region

venous access. With the widespread use, there were some crucial complications related to both insertion and maintenance of PICC. Emergency physicians should keep alerted to these complications. Focused ultrasound is a rapid and useful adjunct to differentiate underlying etiology of neck emergency, especially in the setting of the emergency department.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Johnston J, Armes S, Barringer E, Dickieson P, D'Onofrio L, Giff C, *et al.* Assessment and Device Selection for Vascular Access. Toronto, Canada: Registered Nurses Association of Ontario; 2004.
2. Di Giacomo M. Comparison of three peripherally-inserted central catheters: Pilot study. *Br J Nurs* 2009;18:8-16.
3. Seckold T, Walker S, Dwyer T. A comparison of silicone and polyurethane PICC lines and postinsertion complication rates: A systematic review. *J Vasc Access* 2015;16:167-77.
4. Wise M, Richardson D, Lum P. Catheter tip position: A sign of things to come! *J Vasc Access Devices* 2001;6:18-27.
5. Beccaria P, Silvetti S, Mucci M, Battini I, Brambilla P, Zangrillo A, *et al.* Contributing factors for a late spontaneous peripherally inserted central catheter migration: A case report and review of literature. *J Vasc Access* 2015;16:178-82.
6. Kim HJ, Yun J, Kim HJ, Kim KH, Kim SH, Lee SC, *et al.* Safety and effectiveness of central venous catheterization in patients with cancer: Prospective observational study. *J Korean Med Sci* 2010;25:1748-53.
7. Cardella JF, Fox PS, Lawler JB. Interventional radiologic placement of peripherally inserted central catheters. *J Vasc Interv Radiol* 1993;4:653-60.
8. Loewenthal MR, Dobson PM, Starkey RE, Dagg SA, Petersen A, Boyle MJ, *et al.* The peripherally inserted central catheter (PICC): A prospective study of its natural history after cubital fossa insertion. *Anaesth Intensive Care* 2002;30:21-4.
9. Amerasekera SS, Jones CM, Patel R, Cleasby MJ. Imaging of the complications of peripherally inserted central venous catheters. *Clin Radiol* 2009;64:832-40.
10. Orme RM, McSwiney MM, Chamberlain-Webber RF. Fatal cardiac tamponade as a result of a peripherally inserted central venous catheter: A case report and review of the literature. *Br J Anaesth* 2007;99:384-8.
11. Nicola R, Dogra V. Ultrasound: The triage tool in the emergency department: Using ultrasound first. *Br J Radiol* 2016;89:20150790.