

Radiological Case Report / Caso Clínico

Catheter Tip Migration of Totally Implantable Venous Access Device to Ipsilateral Internal Jugular Vein

Migração de Ponta de Cateter Venoso Central Totalmente Implantado para Veia Jugular Interna Ipsilateral

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Abstract

Introduction: Totally implantable venous access devices (TIVAD) are crucial in the treatment of patients undergoing long-term chemotherapy. Various complications have been documented, including catheter tip migration.

Case Description: A TIVAD was introduced to perform chemotherapy on a 64-year-old male with a diagnosis of sigmoid colon cancer. 17 months after the introduction of TIVAD, our patient had complaints of pain in the right cervical region, extending from the clavicle to the mandibular area, during a chemotherapy session. Chest X-ray was required to confirm the position of TIVAD, demonstrating catheter tip migration to the ipsilateral internal jugular vein. Increased intrathoracic pressure due to cough and vomiting remains a possible cause for catheter tip migration.

Conclusion: the correct position of TIVAD, meaning the tip of the catheter located 1-2 cm below the carina in chest X-ray, is crucial to prevent migration. Chest X-ray could be performed to detect migration. Measures to prevent increased intrathoracic pressure should be taken.

Keywords

Catheter tip migration; Internal jugular vein; Totally implantable venous access device.

Resumo

Introdução: Dispositivos médicos como o cateter venoso central totalmente implantado (TIVAD) são cruciais no tratamento de pacientes submetidos a quimioterapia de longo prazo. Várias complicações foram documentadas, incluindo a migração da ponta do cateter.

Caso Clínico: Foi introduzido um TIVAD para realização de quimioterapia num paciente de 64 anos de idade com diagnóstico de cancro do colon sigmoide. 17 meses após a introdução do TIVAD, o doente apresentou queixas de dor na região cervical direita, desde a clavícula à área mentoneana, durante uma sessão de quimioterapia. Foi realizado radiografia de tórax para confirmar a posição do TIVAD, demonstrando a migração da ponta do cateter para a veia jugular interna ipsilateral. O aumento da pressão intratorácica devido à tosse e vômito podem ser causas possíveis da migração da ponta do cateter.

Conclusão: A posição correta do TIVAD, que equivale à ponta do cateter localizado a 1 - 2 cm abaixo da carina na radiografia de tórax, é crucial para prevenir a migração. A radiografia de tórax pode ser realizada para detetar a migração. Devem ser tomadas medidas para prevenir o aumento da pressão intratorácica.

Palavras-chave

Migração da ponta do cateter; Veia jugular interna; Cateter venoso central totalmente implantado

Introduction

Venous access is crucial in the treatment of patients undergoing long-term therapy, such as chemotherapy, prolonged antibiotic therapy and during prolonged use of parenteral nutrition.¹⁻³ Totally implantable venous access devices (TIVAD) are a good option as they improve the quality of life in these patients.⁴ Although the use of TIVAD has many advantages, various complications have been documented, including catheter tip migration, which occurs in about 0% to 4,3%.^{1,4-6} In more than 50% of the cases, the catheter tip migrates to the internal jugular vein.²

Mechanisms generating traction forces on the catheter are pointed out to be the main causes for migration.^{1,2} Complications might be of devastating outcome. It is therefore important to adopt preventive measures and cautious monitoring, to avoid

and detect catheter tip migration, such as performing chest X-ray confirming a correct position of the catheter after its introduction, as well as avoiding increased intrathoracic pressure.^{2,3} Preventive measures can be used early to avoid situations like cough and vomiting. Potentially treatable causes should be investigated and treated as soon as possible.

We report a case of spontaneous catheter tip migration of TIVAD to the ipsilateral internal jugular vein in an oncologic patient.

Case Description

A 64-year-old male with a diagnosis of sigmoid colon cancer underwent left hemicolectomy in June 2015 (pT4aN2bM1b

R0). After surgery, a TIVAD was introduced to perform palliative chemotherapy (FOLFOX 6 regimen) (Fig. 1A). The patient performed six sessions of FOLFOX 6 chemotherapy, being the last session in March 2016. In September 2016, cancer progression is verified by the presence of metastases in the liver and peritoneal carcinomatosis. Thereafter, chemotherapy was resumed, this time under FOLFIRI regimen. During the periods in which TIVAD was not used, routine clinical practice guidelines were followed to ensure patency of the catheter lumen.⁷ They included aspiration, yielding blood contents, as well as locking with sterile heparinized saline solution by pulsatile and positive pressure flushing every four weeks.⁷ In March 2017, and after completing 10 sessions of FOLFIRI chemotherapy regimen, by decision of Oncology department, regimen was changed to FOLFOX 6. There was no pause between the two chemotherapy regimens. During the first session, in April 2017, our patient had complaints of pain in the right cervical region, extending from the clavicle to the mental area, during the first chemotherapy cycle. Neither edema nor other inflammatory signs were present. Prior to its use, catheter function was verified and demonstrated by aspirating blood without any resistance, confirming its patency. Chest X-ray was required to confirm the position of TIVAD, and in this case, presented catheter tip migration to the ipsilateral internal jugular vein (Fig. 1C). Additionally, thrombosis of the vein was confirmed by doppler-ultrasound.

Literature differs about the presence of symptoms in catheter tip migration. According to studies performed by Wu et al.,² 100% of the patients were shown to be asymptomatic in association with catheter tip migration; the aberrant position was rather verified in routine chest X-ray at follow-up visits.

On the contrary, Fan et al.,¹ showed that the occurrence of a distal TIVAD portion located in a smaller caliber vein can cause complications such as neck pain, phlebitis or thrombosis.

After reviewing the current clinical file, we found that our patient had visited the emergency room twice, due to cough, nausea and vomiting. Chest X-ray was performed, demonstrating an incorrect position of the distal portion of TIVAD, yet without total migration to the ipsilateral internal jugular vein (Fig. 1B). Nothing was recorded about the incorrect position of the distal portion of TIVAD, wherefore it is assumed that it was not observed. Thus, this demonstrates that regular follow-ups including chest X-ray, for as long as the TIVAD resides in a patient, might be an option.⁸ There is very scant literature addressing this

matter, therefore cost-effectiveness studies are required to support the use of chest X-ray as a follow-up exam, as well as to determine the interval of its use. We suggest chest X-ray when there is malfunctioning of the TIVAD or when the patient presents related symptomatology.

Risk factors for catheter tip migration include an incorrect position of TIVAD, changing from supine to erect position which may move the catheter approximately 20 mm, increased intrathoracic pressure, “jet effect” caused by a high perfusion flow, and/or heart dysfunction.^{1,2,9} Wu et al.² did not find any association between gender and catheter tip migration after performing studies using a multivariable logistic regression analysis, involving factors like age, gender, cancer type, position of the catheter and type of port.

Heart dysfunction can be a risk factor for catheter tip migration.² Our patient did have cardiac surgery when undergoing a coronary artery bypass grafting in 2009, which could have been an explanation for the catheter tip migration, however an echocardiogram performed in 2017, demonstrated normal structure and function of the right heart.

The correct position of TIVAD is still disputed. Some authors support it to be in the border between superior vena cava - right atrium, which would coincide with the tip of the catheter being positioned 1 – 2 cm below the carina in chest X-ray (Fig. 2A).² An incorrect position of TIVAD, when the distal portion is located above the carina, therefore, increases risk of migration.² Wang et al.⁶ also demonstrates that an incorrect tip position is an independent risk factor for premature catheter extraction after adjustment for gender, cancer type and implantation position. Regarding our patient, it is demonstrated in figure 1A that the catheter has a correct position and is therefore unlikely to be the cause for migration. In our institution, we routinely perform chest X-ray after introducing a TIVAD. Hence, as mentioned above, chest X-ray is an effective method for confirming the position, and potentially verify and correct possible acute complications such as pneumothorax and hemothorax.⁷

Wu et al.² also studied the association between diseases and catheter migration and found one with lung cancer. This may be due to cough associated with lung cancer, which in turn increases intrathoracic pressure.^{1,2,10} When there is an increased intrathoracic pressure, a force is exerted on the horizontal portion of the catheter, causing migration of the medial portion (Fig. 2B).² In our patient, cough and vomiting, as they increase intrathoracic pressure, remain a possible cause for catheter tip migration.

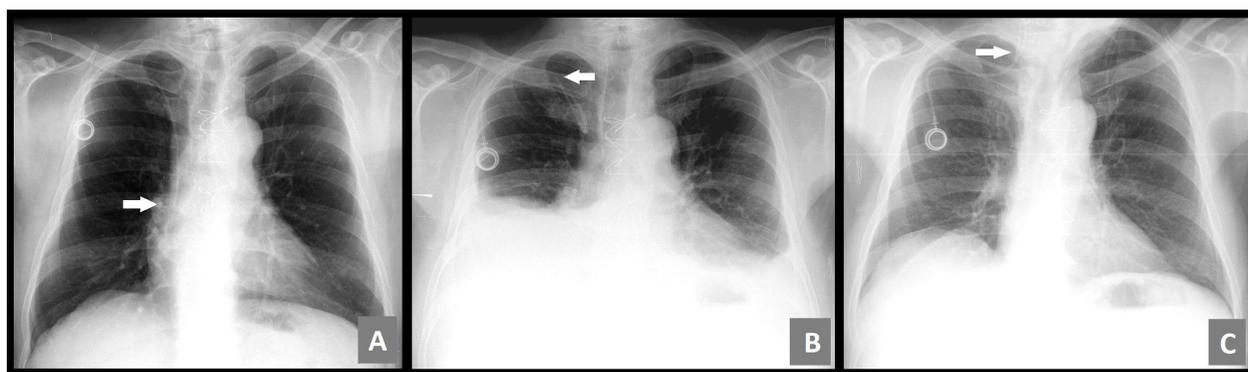


Figure 1 – Chest X-ray: A (September 2015) – confirming the correct position, after TIVAD was introduced; B (August 2016) – during emergency room, due to cough, nausea and vomiting; C (April 2017) – after patient presented symptoms during a chemotherapy session; → : catheter tip position.

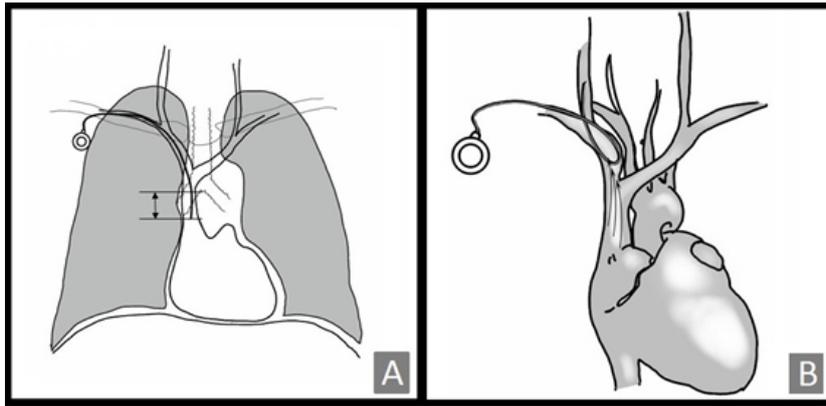


Figure 2 – A – illustration of the correct position of the tip of catheter; B - illustration of the force exerted on the horizontal portion of the catheter with increased intrathoracic pressure.

In our patient, after catheter tip migration and thrombosis of the vein were confirmed, TIVAD was extracted and a new one was placed through the contralateral internal jugular vein and treatment with new oral anticoagulants was implemented.

Conclusions

After introducing a TIVAD, its position should be evaluated using chest X-ray. Major attention should be paid to the placement of the distal portion of the catheter and potential acute complications, such as pneumothorax and hemothorax, should be assessed.

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We suggest performing a chest X-ray to detect migration, when there is malfunctioning of the TIVAD or when the patient presents related symptomatology.

All strategies should be taken to avoid an increased intrathoracic pressure. Preventive measures can be used early to avoid situations like cough and vomiting. Potentially treatable causes should be investigated and treated as soon as possible.

It is important to fully assess the patient in any situation, yet specifically, in patients with a TIVAD, it is important to locate the position of the catheter. This should be conducted every time a chest x-ray is warranted for any other investigation.

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