BJMS
www.batnajms.net

Batna Journal of Medical Sciences 2025;12(3):28
https://doi.org/10.48087/BJMScr.2025.12328

CASE REPORT

Thrombosis associated with implantable catheter chamber in cancer patients: report of 3 cases

Ndéye Marième DIAGNE[1], Elimane Seydi BOUSSO[1], Djibril Salam DIOUF[1], Marie Monique TINE[1], Mame Diarra NDAW[2], Ibrahima SALL[3]

ABSTRACT

Implantable port-associated thrombosis in cancer patients is the most common non-infectious complication of implantable venous access devices. Their incidence is 1.2 to 13 % in cancer patients. Their use of chemotherapy has significantly improved the quality of life of patients. The authors report on the occurrence of venous thrombosis associated with the implantable port-associated catheter in cancer patients. The mean age of the patients was 44 years. The time to diagnosis was 2, 6, and 8 months after catheter placement. All patients were women undergoing palliative chemotherapy. They presented with superior vena cava compression syndrome, a syndrome of altered general condition associated with a systemic inflammatory response syndrome. The diagnosis of implantable central venous catheter thrombosis was confirmed by cervical Doppler ultrasound, which is the gold standard, and by chest computed tomography. Removal of the implantable device was performed in all patients. The outcome was favorable under treatment.

Keywords: Venous thrombosis, implantable catheter, cancers, superior vena cava syndrome

1. Department of Medical Oncology and Clinical Hematology 2. Department of Radiology 3. Department of Visceral Surgery, Hôpital principal de Dakar, Senegal.

Received: 22 Apr 2025
Accepted: 08 Jun 2025

Correspondance to: Ndéye Marième DIAGNE
E-mail : yamaismael@yahoo.fr

1. INTRODUCTION

The implantable port catheter is used in cancer patients to facilitate chemotherapy, transfusions, the administration of nutrition and parenteral therapy, but also to provide readily available venous access for laboratory tests. Their use has improved the quality of life of cancer patients. Deep vein thrombosis of the implantable port catheter is the most common non-infectious complication of implantable venous access devices. Their incidence is 1.2 to 13% in cancer patients. Many factors contribute to the occurrence of venous catheter thrombosis. During catheter insertion, vascular lesions are created; this aggression of the venous wall is at the origin of the thrombus, which can reabsorb or organize under the influence of local or systemic thrombogenic factors. It is associated with venous stasis caused by long-term catheter insertion. Finally, the tumor process induces hypercoagulability and an inflammatory state responsible for a pro-thrombotic phenotype. The consequences are catheter dysfunction and a risk of pulmonary embolism. The duration of hospitalization of patients is longer, greater than that of deep thrombosis of the lower limbs, and the replacement of the venous catheter has an economic impact due to its cost (1,2).

2. METHODS

This is a descriptive study, carried out in the medical oncology and clinical hematology department of Hôpital Principal de Dakar for over 2 years, from January 2023 to January 2025. The inclusion criterion was cancer patients who had venous thrombosis on the

implantable venous catheter chamber placed in the upper part of the thorax, one end of which projected from the vena cava and confirmed by an imaging examination. Participation in this study was free and voluntary, with informed consent from the participants. No harm or benefit was derived from participation or non-participation in this study. Data was collected anonymously and confidentially.

3. RESULTS

Thus, 3 files were collected. The average age of the patients was 44 years (52 years, 40 years, 39 years). The time to diagnosis was 2, 6, and 8 months after the insertion of the implantable catheter. All patients were women undergoing palliative chemotherapy. They presented with non-specific invasive breast carcinoma in one case, ovarian adenocarcinoma with peritoneal and cerebral metastases, and Lieberkuhnian adenocarcinoma of the colon with peritoneal and hepatic metastases. The clinical symptoms consisted of a general deterioration of stage 3 according to the WHO classification in all patients associated with superior vena cava compression syndrome with pilgrim edema, acute chest pain and systemic inflammatory response syndrome. Biologically, microcytic inflammatory anemia was noted with a mean hemoglobin level of 10.5 g/dl, ferritin levels were high with a mean level of 400 ng /ml, leukocyte and platelet levels were normal. C-reactive protein was high in all patients. Cervical Doppler ultrasound performed on a patient revealed thrombosis of the left internal and external jugular vein extending to the superior vena cava. Chest computed tomography (CT) scans revealed extensive venous thrombosis from the superior vena cava to the brachiocephalic and left jugular veins in two patients. All patients had their implantable port removed. The evolution was favorable under anticoagulant treatment with low molecular weight heparin, then relayed by oral anticoagulation.

4. DISCUSSION

Venous thrombosis on the implantable catheter port inserted for chemotherapy in cancer patients is increasingly common. This is explained by the high prevalence of cancers whose treatment requires chemotherapy. The administration of chemotherapy requires the placement of an implantable catheter port, which is a subcutaneous venous access reservoir, inserted under local anesthesia in the anterior aspect of the thorax. The tip of the catheter is introduced through a vein in the arm or neck to the vena cava. This device has the advantage of making punctures and releasing the injected treatment into a large-caliber vein. It therefore does not damage the walls of peripheral veins by repeated injections of irritants or vesicants. The most common complications after device placement are infection of the implantable catheter port, catheter rupture or detachment, catheter thrombosis, which can be complicated by pulmonary embolism, recurrent deep vein thrombosis, and post-thrombotic syndrome. Their incidence in cancer patients varies from 1.2% to 13%. The incidence of complications such as pulmonary embolism is 15 to 25%.

In our series, we observed three cases of venous thrombosis following the placement of an implantable venous catheter for chemotherapy in cancer patients out of 80 catheters placed in the medical oncology and clinical hematology department during the same period, which represents a prevalence of 3.75%. This low prevalence is also reported in many studies. Venous thrombosis results from a combination of several factors. During device placement, a fibrin sleeve forms at the tip of the catheters. Vascular damage caused by catheter insertion and long-term catheter placement leads to venous stasis, followed by irritation of the vascular endothelium caused by frictional movements of the catheter in the vein. Cancer causes hypercoagulability, which contributes to the development of mural thrombus leading to occlusive thrombosis (1,2). In our series, all patients presented with clinical manifestations of chest pain associated with superior vena cava compression syndrome (Figure 1).

Figure 1. facial photo of a 40-year-old female patient with superior vena cava syndrome associated with catheter thrombosis with turgor of the face, neck and filling of the supraclavicular hollows.

Clinical symptoms occurred after many courses of chemotherapy in all patients. This is explained by partial thrombosis, with the formation of a collateral venous network that allows patients to be asymptomatic for a long time. This collateral network can develop rapidly with increasing obstruction of the superior vena cava. Thrombosis is symptomatic in 0.3% to 28.3% of cases. It is a rapid and complete obstruction of the superior vena cava leading to clinical manifestations. In case of obstruction of the superior vena cava, there is an increase in venous pressure in the collateral vessels and the development of a collateral blood network with dilation of the azygos, intercostal, mediastinal, paravertebral, thoracoepigastric, internal mammary, thoracoacromioclavicular and anterior veins of the chest wall (3,4,5). All patients in our series presented with superior vena cava compression syndrome. Superior vena cava compression syndrome is related to increased venous pressure. Clinical symptoms include dyspnea in 50 to 83% of cases. It is associated with inflammatory swelling of the cervical region, thorax, upper limbs, and face in 40 to 100% cases. Jugular vein swelling is noted in 25% of cases. Other symptoms are associated: chest pain, dysphagia, dysphonia, and collateral venous circulation in 40% of cases. Headaches, confusion, and impaired consciousness suggest cerebral edema are less common. Asymptomatic venous thromboses have a non-specific clinical translation associated to varying degrees of pain and edema of the upper limb or neck, collateral circulation (6). Cervical B-mode or color Doppler ultrasound is the gold standard for diagnosing central venous catheter-related thrombosis. In our series, it was performed in a patient, which revealed thrombosis of the left internal and external jugular vein extending to the superior vena cava. During this examination, other parameters are assessed in cases of occlusive thrombosis: absence of spontaneous flow, absence of phase between respiration and the cardiac cycle, venous incompressibility, increased collateral venous circulation with abnormal flow patterns within the vein or distal end. In cases of partial proximal venous thrombosis, phlebography is a more sensitive examination in 30 to 60% for screening and diagnosis because these are often asymptomatic forms (3,7). Ultrasound is the most sensitive examination for detecting thrombosis of the upper end of the superior vena cava. It allows direct identification of a thrombus by visualizing the echogenic material in the vein with the absence of compression of the venous walls (Figure 2) (8). Computed tomography is performed in case of doubt (9).

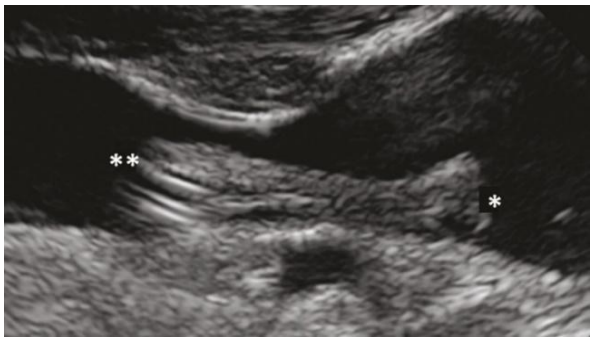

Figure 2. Incomplete thrombosis of the internal jugular vein on cervical Doppler ultrasound

Figure 3. photo of the same patient after 3 weeks of treatment showing a regression of the edema and supraclavicular filling

In our series, the diagnosis of thrombosis was made on chest CT scan in two patients; it revealed superior jugulo -caval thrombosis in one case and venous thrombosis extending to the superior vena cava and left brachiocephalic veins in one patient. Therapeutically, the goals of treatment are to treat thrombosis, prevent the occurrence of complications, reduce long-term morbidity, prevent recurrent thrombosis and post-thrombotic syndrome. Medical means are unfractionated heparin, low molecular weight heparin, and warfarin or other vitamin K antagonists. Their administration has limitations: effective and uncomplicated doses are difficult to achieve, sensitivity to treatment depends on the patient, and regular biological monitoring is necessary. There are drug interactions when using warfarin. New oral anticoagulants have been approved for the treatment of venous thrombosis in the implantable catheter port in adults. These are Rivaroxaban, Apixaban, Edoxaban and Dabigatran. Their administration does not require biological monitoring, their action is not modified by diet, they have few drug interactions, and they can be administered as a first-line treatment in cases of catheter-related venous thrombosis. Rivaroxaban directly inhibits factor Xa. It is administered as two doses of 15 mg twice daily for 21 days followed by 20 mg daily for 3, 6, or 12 months, depending on the indication. This treatment will consider contraindications (10.11.12).

Catheter-based thrombolysis and surgical thrombectomy have become rare in cases of failure of anticoagulant therapy. Preventive treatment of catheter-associated central venous thrombosis is not recommended. In our series, two patients started treatment with low molecular weight heparins, followed by a switch to Rivaroxaban. Rivaroxaban treatment was initially started in one patient. This

treatment continued for 6 months in all patients. Removal of the implantable chamber was performed in all patients. Catheter removal is not systematic; it is performed in cases of severe superior vena cava compression syndrome and when it is not functional (13). The outcome was favorable with regression of clinical symptoms (Figure 3). The resumption of chemotherapy was carried out on the peripheral veins for all patients who did not want the insertion of a new catheter for fear of a recurrence of thrombosis and its expensive cost. The limits of our series are that it is a study on 3 cases; a long-term prospective study taking into account venous thromboembolic diseases in cancer patients would make it possible to have more objective data.

5. CONCLUSION

Venous thrombosis from implantable venous catheters is a serious condition requiring urgent treatment. It is becoming more common due to the increasing incidence of cancer and its use in chemotherapy. The diagnosis of venous thrombosis from implantable catheters is made by ultrasound coupled with Doppler. The outcome is favorable under treatment with low molecular weight heparins and oral anticoagulants for a duration of at least three to six months. Prevention lies in their use only when necessary and their removal as soon as it is no longer required.

Competing interests: The authors declare that they have no competing interest.

Funding: This research received no external funding.

REFERENCES

1. Morriello F, Brown A, Granton G, Bonta M. Syndrome de compression de la veine cave supérieur associé au cathéter. CMAJ. 2023;195(1):E72–E75. doi:10.1503/cmaj.220669
2. Kreuziger LB, Jaffray J, Carrier M. Epidemiology, diagnosis, prevention and treatment of catheter-related thrombosis in children and adults. Thromb Res. 2017;157:64–71. doi:10.1016/j.thromres.2017.07.002
3. Elias A, Debourdeau P, Espitia O, Sevestre MA, et al. Central venous catheter associated upper extremity deep vein thrombosis in cancer patients: Diagnosis and therapeutic management. Arch Cardiovasc Dis. 2024;117(1):72–83. doi:10.1016/j.acvd.2023.11.011
4. Debourdeau P, Sevestre M, Bertoletti L, Mayeur D, Girarde P, et al. Treatment of cancer-associated venous thromboembolism in patients under palliative care. Arch Cardiovasc Dis. 2024;117:94–100. doi:10.1016/j.acvd.2023.11.008
5. Verso M, Agnelli G. Thromboembolie veineuse associée à l'utilisation à long terme de cathéters veineux centraux chez les patients atteints de cancer. J Clin Oncol. 2003;21(19):3665–75. doi:10.1200/JCO.2003.04.163
6. Straka C, Ying J, Kong FM, Willey CD, et al. Review of evolving etiologies, implications and treatment strategies for the superior vena cava syndrome. Springerplus. 2016;5:229. doi:10.1186/s40064-016-1900-7
7. Gaitini D, Beck-Razi N, Haim N, Brenner B. Prevalence of upper extremity deep venous thrombosis diagnosed by color Doppler duplex sonography in cancer patients with central venous catheters. J Ultrasound Med. 2006;25(10):1297–303. doi:10.7863/jum.2006.25.10.1297
8. Desjardins B, Hanley M, Steigner ML, Aghayev A, et al. ACR Appropriateness Criteria suspected upper extremity deep vein thrombosis. J Am Coll Radiol. 2020;17(5S):S315–22. doi:10.1016/j.jacr.2020.01.020
9. Kim HC, Chung JW, Park JH, Yin YH, et al. Role of CT venography in the diagnosis and treatment of benign thoracic central venous obstruction. Korean J Radiol. 2003;4(3):146–52. doi:10.3348/kjr.2003.4.3.146
10. Davies GA, Lazo-Langner A, Gandara E, Rodger M, et al. Prospective study of rivaroxaban for central venous catheter associated upper extremity deep vein thrombosis in cancer patients (Catheter 2). Thromb Res. 2018;162:88–92. doi:10.1016/j.thromres.2017.04.003
11. Pernod G, Elias A, Gouin I, Gaillard C, et al. Questions-réponses sur l'utilisation du rivaroxaban pour le traitement de la maladie thromboembolique veineuse. J Mal Vasc. 2012;37(6):300–10. doi:10.1016/j.jmv.2012.09.003
12. Agnelli G, Gallus A, Goldhaber SZ, Haas S, Hulsman MV, et al. Treatment of proximal deep-vein thrombosis with the oral direct factor Xa inhibitor rivaroxaban (BAY 59-7939): the ODIXa-DVT study. Circulation. 2007;116(2):180–7. doi:10.1161/CIRCULATIONAHA.106.668020
13. Rajasekhar A, Streiff MB. Etiology and management of upper-extremity catheter-related thrombosis in cancer patients. Cancer Treat Res. 2019;179:117–37. doi:10.1007/978-3-030-20315-3_8