

Acute laryngeal paralysis induced by the migration of a totally implantable venous access device's catheter tip

S. HERVÉ, M.D., C. CONESSA*, M.D., J. DESRAME, M.D., O. CHOLLET, M.D., S. TALFER, M.D., J. L. PONCET

Abstract

The authors report a case of acute vagus nerve paralysis that appeared during a course of chemotherapy. The drugs had been administered through a totally implantable venous access device (TIVAD), whose catheter tip had migrated into the right internal jugular vein (IJV) and was surrounded by a complete venous thrombosis. The supposed aetiology of this paralysis was a leakage of the cytotoxic drug (5-fluorouracil) from the vessel wall into the surrounding carotid space, because of the stagnation of the chemotherapeutic agent above the thrombosis. Four months after cessation of chemotherapy, the laryngeal paralysis was still evident.

Key words: Central Venous Catheterization; Fluorouracil; Recurrent Laryngeal Nerve; Vocal Cord Paralysis

Introduction

The introduction of large-calibre plastic catheters into the central veins facilitates total parenteral nutrition and drugs administration.¹ TIVADs are preferably used for infusion of cytotoxic chemotherapy.² The complications of central venous catheters are legion. However, distal migration of the catheter, especially in the jugular vein IJV, has rarely been reported.^{3,4,5} Moreover, a catheter's induced occlusion of this large vein is uncommon.⁵ We report here a case of such a distal migration, which was followed by venous occlusion, drug extravasation and homolateral vagus nerve paralysis. We discuss the different aetiological hypotheses and what to do in this situation.

Case report

A 69-year-old man, who had presented no laryngeal disease in the past, was undergoing adjuvant chemotherapy after primary surgery for treatment of a T₃N₁ colorectal adenocarcinoma. He developed sudden dysphonia following an infusion of 5-fluorouracil. Chemotherapy was administered by intermittent continuous infusion through a TIVAD, (POLYSITE®, Perouse), whose catheter had been introduced surgically via the right cephalic vein and whose portal had been implanted in a right prethoracic subcutaneous pocket. During the implantation, the catheter position had been controlled with a brightness amplifier and post-operative chest radiography had confirmed that the catheter tip was lying in the vena cava superior (VCS) approximately 1 cm above the right atrium. The patient had already received nine courses of 5-fluorouracil without any problem. However, after the 10th course, he had complained of right laterocervical pain. Cervical doppler ultrasonography had shown a complete thrombosis of the right IJV, surrounding the tip of the catheter. Anticoagulant treatment (Tinzaparine sodique, INNOHEP®, 14 000 IU anti-Xa/0.7 ml per day) had been started and infusion of chemotherapy had been continued.

After two more courses of chemotherapy the patient complained of acute dysphonia, but not of dyspnoea or dysphagia. Laryngoscopy showed a right hemilaryngeal paralysis with normal laryngeal sensitivity thus suggesting a paralysis of the inferior laryngeal nerve or of the vagus nerve above the inferior laryngeal nerve and below the external laryngeal nerve. Cervical palpation was painful and showed a tumefaction of the right laterocervical basis of the neck. However, there was no fever, no hyperleucocytosis and no biological inflammatory syndrome. Chest radiography showed a malposition of the catheter's tip, which had looped up into the right IJV (Figure 1). Computed tomography (CT) scan showed a complete thrombosis of this vein, associated with a disruption of its posterior wall and a migration of fluid at this point

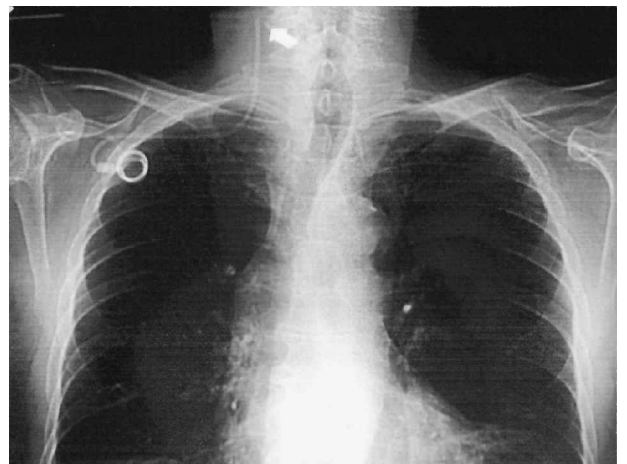


FIG. 1

Chest radiography showing the migration of the catheter's tip into the right internal jugular vein.

From the Departments of Otorhinolaryngology and Head and Neck Surgery and the Department of Medicine*, Hôpital du Val de Grâce, 75005 Paris, France.

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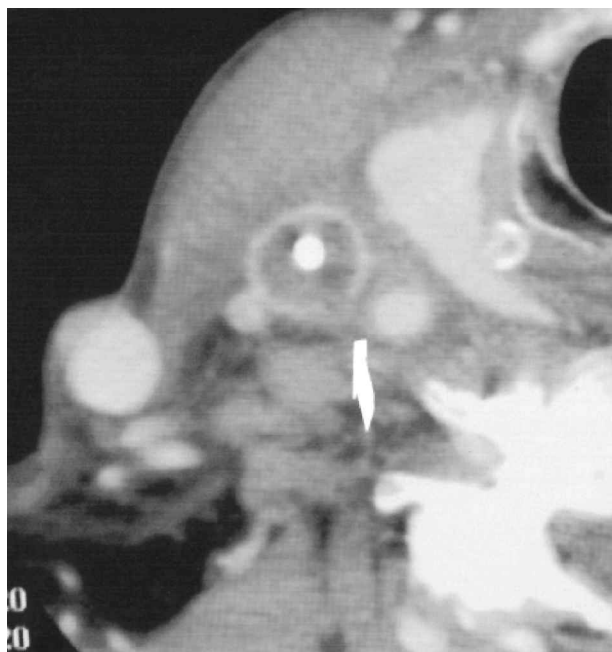


FIG. 2

CT-scan in axial plain showing a disruption of the posterior wall of the right internal jugular vein.

(Figure 2). The removal of the device induced a rapid amelioration of the neck infiltration but four months later, the laryngeal paralysis was still persistent. At this time, CT scan showed a persistent thrombosis of the right IJV but normal perivenous tissues.

- **Central venous catheterization is invasive and is associated with complications**
- **In this case a catheter was inserted to deliver chemotherapy and the tip migrated resulting in thrombosis of the right internal jugular vein and, it is suggested, leaching of the cytotoxic agent into the carotid space. A recurrent laryngeal nerve paralysis ensued**
- **The authors discuss the possible mechanisms of injury and the relative risk of this occurring**

Discussion

The placement of a long-dwelling intravenous access device has become a common requirement for the administration of chemotherapy. TIVADs are now preferred to other approaches.^{1,6}

The reported overall complication rate of TIVADs ranges from 1.8 per cent to 14.4 per cent.^{6,7,8,9} Among post-operative complications, the catheter tip's migration appears to be rare.^{6,10} There is as yet no explanation for this complication. It has not been observed with small-calibre catheters, although these are used more extensively; a large calibre could thus be a risk factor for catheter migration.³ If the catheter stays inside the VCS, there is no risk of complication.³

The reported frequency of symptomatic venous thrombosis differs among centres (from zero to 9.7 per cent).⁶ There is no known factor of risk.¹¹ Most thrombi originate at the point where a catheter enters the vein or at any point where it persistently rubs against the vein wall.⁶

In this case, there were two possible hypotheses for the acute vagus nerve paralysis, either thrombophlebitis or an extravasation of the chemotherapeutic agent. Thrombophlebitis is an uncommon complication of TIVAD. Indeed, infections induced by these systems are more often site infections and bacteraemias or fungal infections.^{6,12} Furthermore, deep vein thrombophlebitis induces clinical and biological signs of infection, which our patient did not present with.

The reported frequency of drug leakage in patients with TIVAD ranges from three to six per cent.^{6,12} Leakage happens more often around the port than distally.⁶ The association of catheter-lumen occlusion with fluid migration can be seen as 'back-tracking' or retrograde flow of infusate along the outside of catheter into the surrounding tissues or port pocket.¹³

Catheter damage or breakage, port-catheter separation, and catheter tip displacement can also induce drug extravasation.¹³ In our case, the complete venous thrombosis around the catheter tip, which was placed against the venous current, probably brought about stagnation of the drug which damaged the venous wall and burst into the surrounding carotid space injuring the vagus nerve. This hypothesis is supported by the absence of infection and the visible disruption of the IJV's posterior wall on CT scan (Figure 2).

Irritant drugs, such as 5-fluorouracil, are supposed to cause only inflammation or pain at the site of extravasation, unlike vesicant agents, such as doxorubicin, which can induce severe soft-tissue necrosis and non-healing ulceration.⁶ This would explain the absence of cervical necrosis in this case. Nevertheless, the vagus nerve might have been injured by direct contact with 5-fluorouracil. There are no published data concerning this incident and we can thus not predict if this paralysis will recover or not. At four-month follow-up, the laryngeal paralysis was still present.

Although the optimum treatment for deep vein thrombosis is not yet clear, most authors advocate anticoagulation¹⁰ with, or without, catheter removal, with or without interruption of perfusion through the device.^{6,9} Device withdrawal is generally recommended only in cases of associated infection or catheter obstruction.^{8,12} In our opinion, several actions are mandatory in case of cervical pain occurring during infusion of chemotherapy through a TIVAD: chest radiography to show the position of the catheter tip, doppler ultrasonography to explore the IJV; in the case of venous thrombosis associated with a migration of the catheter tip, the cytotoxic drug should not be administered through the TIVAD even although it is not occluded. We think also that the device must be removed and that the thrombosis must be treated.

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Address for correspondence:

Dr Stéphane Hervé,
Department of Otorhinolaryngology, Head and Neck Surgery,
Hôpital du Val de Grâce,
74, bd de Port-Royal,
75005 Paris, France.

Fax: 01-40-51-44-40

E-mail: orl.vdg@dial.oleane.com

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