Pulse-spray Treatment of Total Occlusive Jugular Venous Suppurative Thrombophlebitis

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Abstract

A 63-year-old man was diagnosed with jugular venous suppurative thrombophlebitis after undergoing strangulation ileus surgery. His condition was not stabilized by therapy with antibiotics, heparin or other supportive treatments. Pulse-spray treatment (PST) was administered, following which, the patient was afebrile without symptoms and the laboratory data improved. There were no complications such as sustained sepsis, septic embolisms or pulmonary embolisms. This is a unique case report of the use of a pulse-spray catheter in the treatment of total occlusive jugular venous suppurative thrombophlebitis following the failure of medical therapy.

Key words: pulse-spray treatment, jugular venous suppurative thrombophlebitis, interventional radiology

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Introduction

Thrombosis and infection are well-recognized complications of central venous catheter use (1). The mortality rate of catheter-related septicemia is high at approximately 20%, and the disease has long been a serious problem in emergency and critical care medicine (2). There are many complications associated with catheter-related septicemia, such as septic shock, sustained sepsis, suppurative thrombophlebitis, metastatic infection, endocarditis and arteritis. Furthermore, suppurative thrombophlebitis is a potentially lethal disease associated with the use of central venous devices and intravenous (IV) therapy (3-5). Patients with central venous suppurative thrombophlebitis can be successfully treated with prompt catheter removal, intravenous antibiotics and anticoagulation therapy. However, in some cases, a more aggressive approach, such as resection of the affected vein (4, 6-9) or thrombectomy (10) is needed. We herein report the successful use of pulse-spray treatment (PST) with a pulse-spray catheter for total occlusive jugular venous suppurative thrombophlebitis of methicillin-resistant *Staphylococcus aureus* (MRSA) that medical therapy failed to treat successfully.

Case Report

A 63-year-old man was admitted to our intensive care unit for shock and strangulation ileus. On day 1, he underwent emergency surgery. Thereafter, a central venous catheter was inserted via the right internal jugular vein. The patient’s clinical course was very good after surgery. He had chronic kidney disease caused by untreated myeloma, and his creatinine clearance was 38.6 mL/min. We administered antibiotics (flomoxef sodium (FMOX): 1 g every 12 hours). On day 10, the general condition of the patient worsened dramatically. He presented with a high fever (39°C) and chills, accompanied by severe prostration, tachycardia and respiratory distress. Slight redness, swelling and tenderness appeared around the intravascular device. The white blood cell (WBC) count rose to 23,100 elements/mm³ and the C-reactive protein (CRP) level was 13.3 mg/dL. Clinical and microbiological investigations did not reveal an alternative source for the bloodstream infection. We diagnosed the patient with catheter-related septicemia. The central venous catheter was removed and the catheter tip was cultured to confirm the source of the infection. A cervical computed tomography scan (CT scan) revealed a thrombus in the right internal jugular vein surrounded by a dirty fat sign (Fig. 1).
We initiated a course of panipenem/betamipron (PAPM/BP: 0.5 g every 12 hours) and vancomycin (VCM: 0.5 g every 24 hours) on the same day. The patient was diagnosed with MRSA (minimum inhibitory concentration (MIC) of VCM <1) suppurative thrombophlebitis based on the results of two sets of blood cultures and the catheter tip culture. Neither antibiotics, heparin nor other supportive measures stabilized the patient’s condition. Despite these treatments, the high fever, leukocytosis and high CRP level persisted. On day 16, a cervical CT scan showed thickness and enhancement of the right internal jugular vein wall (Fig. 2). These findings indicated that the right internal jugular vein was completely occluded. Then we selected interventional radiology (IVR) to treat the suppurative thrombophlebitis because IVR is less invasive than a surgical approach. A 6-French 90-cm brite tip sheath (Cordis Corporation) was inserted from the right femoral vein to the right internal jugular vein. Venography of the right internal jugular vein revealed that the internal jugular vein had been fully blocked by the thrombus with collateral pathways (Fig. 3). First, a 0.035-inch angled guide wire was passed through the thrombus. Second, the pulse-spray catheter (Cragg-McNamara valved infusion catheter, 4-French, 10 cm) was inserted along the guide wire. The patient received an initial bolus of 720,000 international units (IU) of urokinase from the pulse-spray catheter. After administering urokinase, a normal blood flow returned. The pulse-spray catheter was left in place for two days, and urokinase (240,000 IU/day), heparin (12,000 units/day) and VCM (0.5 g/day) were administered from the pulse-spray catheter into the infectious thrombosis. After three days of PST, angiography showed that the thrombus and collateral pathways had fully disappeared (Fig. 4). The patient was afebrile without symptoms and the laboratory data improved. There were no complications, such as sustained sepsis, septic embolisms or pulmonary embolisms. In addition, no side effects of VCM were evident, although we did not measure the therapeutic drug monitoring levels of VCM. The patient left our hospital without relapsing.

Discussion

We successfully treated a case of total occlusive jugular
venous suppurative thrombophlebitis using PST with antibiotics, thrombolytic agents and anticoagulants.

A previous report showed suppurative thrombophlebitis to be a major complication (6.8%) of intravascular catheter sepsis (11). The diagnosis is made based on culture findings together with radiographic evidence of thrombosis (12). This case was diagnosed based on CT findings and the detection of the same organism in two sets of blood cultures and a catheter tip culture. We removed the central venous catheter and started the patient on appropriate antibiotics. However, the high fever and high CRP level persisted. Then, we checked the CT scan again, which showed that the right internal jugular vein was completely occluded. We believed that appropriate antibiotic therapy and systemic anticoagulation would not reach the focus of the infectious thrombosis. Vein resection and surgical thrombectomy are invasive and associated with high rates of complications (13). Recently, it was reported that IVR was performed to treat suppurative thrombophlebitis (14, 15). Krauthamer et al. administered combination treatment with thrombectomy devices, balloon angioplasty and a pulse-spray catheter (15). We considered this regimen to be more expensive than the application of a pulse-spray catheter alone. Therefore, we selected to administer thrombolytic therapy using a pulse-spray catheter only. The use of the pulse-spray catheter was reported by Bookstein et al. (16). There is an end hole and many side holes in the catheter tip. The pulse-spray catheter is available for performing pharmacomechanical thrombolysis by administering drugs into the thrombus. This case highlights a unique technique making use of the pulse-spray catheter not only to treat thrombolysis, but also to directly administer the appropriate antibiotics into the infectious focus. Garcia et al. reported that few data exist concerning the best strategy for treating suppurative thrombophlebitis, especially when medical therapy fails (17). It is difficult and invasive to perform surgical techniques on great vessels such as the internal jugular vein. In addition, the usual thrombolytic technique is ineffective in treating complete infectious thrombotic occlusion because drugs do not reach the infectious focus. However, our technique made it possible to treat a complete infectious thrombotic occlusion in a short period. If the PST had failed it would have been necessary to consider other IVR techniques such as other thrombectomy devices, balloon angioplasty or surgery. We did not find any complications such as sustained sepsis, septic embolisms or pulmonary embolisms. Some reports have stated that small pulmonary embolisms occurred during pulse-spray thrombolysis of hemodialysis access grafts. However, the pulmonary embolisms caused by mechanical techniques in these cases were not clinically important. The authors further argued that pulmonary embolisms also occur with pulse-spray pharmacomechanical thrombolysis (18-20). Filters with a fine net, not the usual temporary filters, may be needed to confirm the presence of small pulmonary embolisms. We also administered VCM using bolus injection from the pulse-spray catheter. Although it is important to be aware that a rapid infusion of VCM may cause serious adverse events such as hypotension, cardiac arrest and red man syndrome (21-23), we did not experience in this case. Furthermore, no relapses were observed. This is our first case of using pulse-spray treatment. We believe that accumulating more cases in the future is warranted.

Our PST with antibiotics, thrombolytic agents and anticoagulants is an effective maneuver for the treatment of total occlusive jugular venous suppurative thrombophlebitis when medical therapy fails. Based on our findings, the accumulation of further cases is therefore warranted.

The authors state that they have no Conflict of Interest (COI).

References
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http://www.naika.or.jp/imonline/index.html