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Surgical Treatment of Central Venous Catheter Related Septic Deep Venous Thrombosis

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WHAT THIS PAPER ADDS

Although conservative management is the first therapy of choice in patients with central venous catheter related infected thrombosis, surgical treatment that removes the septic material can be regarded as a last resort in critically ill patients with septic thrombophlebitis that is refractory to conservative management.

Objective/Background: The aim of this study was to evaluate the clinical features and outcomes of catheter related central venous thrombosis and whether a surgical approach can be an effective treatment modality in selected cases that are refractory to conservative management.

Methods: This was a retrospective review of the 46 consecutive patients who were suspected of having central venous catheter related infected deep venous thrombosis and who met the eligibility criteria.

Results: Conservative management achieved clinical improvement in 26 (56.5%) patients and failed in 20 (43.5%), of whom surgical thrombectomy was performed in 13. The remaining seven patients died before surgery could be performed or their clinical condition was too poor. Apart from one case of wound hematoma (7.7%), post-operative complications that related to the surgical procedure were not observed. Patency of the involved vein was re-established in 12 of the 13 (92.3%) surgically treated patients, and clinical improvement was achieved in 11 (84.6%). In particular, the five patients whose blood cultures revealed *Candida* species exhibited prompt defervescence after surgical thrombectomy.

Conclusion: Although conservative management is the first therapy of choice in patients with central venous catheter related infected thrombosis, surgical treatment that removes the septic material can be regarded as a last resort in critically ill patients with septic thrombophlebitis that is refractory to conservative management.

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INTRODUCTION

Central venous catheters are now used widely in the care of critically ill patients; they deliver total parenteral nutrition and drug therapy, and facilitate hemodynamic monitoring. However, these catheters can cause central venous thrombosis.[1–9] Moreover, the long-term hospitalized critically ill patients who receive central venous catheters have a higher risk of malnutrition, which is associated with immunosuppression, which, in turn, is a risk factor for infection.[6–11] However, the incidence of central venous catheter related infected thrombosis (which affects the internal jugular or subclavian veins and vena cavae) is small. Indeed, suppurative deep venous thrombosis in critically ill patients is sometimes detected only incidentally during diagnostic work up. Conservative management consisting of removing the catheter, antibiotic therapy, and anticoagulation therapy can resolve this condition in the majority of patients. However, occasionally it fails and serious complications, such as persistent bacteremia, shock, and metastatic infection can occur.[3–9] If conservative management fails, the best treatment for symptomatic catheter related thrombosis is unclear. Although some authors believe that a surgical approach that aims to remove the infected clots is a last treatment modality for critically ill patients with septic thrombosis that is refractory to conservative management, others consider venous thrombectomy to be unnecessary.[1–9]

This study was designed to explore two aspects of catheter related infected central venous thrombosis. First, the clinical features and outcomes of catheter related central venous thrombosis were assessed. Second, whether a surgical approach can be an effective treatment modality in selected cases that are refractory to conservative management was also investigated.

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METHODS

This retrospective observational study was based on data that were extracted from patient medical records. The study protocol was approved by the hospital institutional review board. The study population consisted of 50 consecutive patients who were suspected of central venous catheter related septic deep venous thrombosis and who received conservative management at a tertiary care institution (Asan Medical Center) between January 2009 and December 2012 (Fig. 1). The inclusion criteria for the present study were as follows: (1) temperature $\geq$ 38.4 °C, which persisted for $>$ 2 days after the removal or change of the central venous catheter and antibiotic therapy; (2) a central venous catheter was in place prior to and up to the onset of fever; (3) Duplex ultrasonography (DUS) or computed tomographic (CT) scanning revealed the presence of central venous catheter related thrombosis; and (4) there were no other plausible causes of fever or sepsis. Clinical improvement was defined as the continuous abatement of fever without any evidence of sepsis and negative culture results despite discontinuation of antimicrobial therapy.

At the authors' institution, conservative management is the first therapy of choice. When central venous catheter related thrombosis is suspected to be the source of sepsis, the line is either removed directly or changed over a guidewire. A 3 inch segment of catheter just distal to the hub is then sent for culture, and blood for blood culture is obtained via the catheter. After appropriate blood and catheter sample culture, empirical intravenous antimicrobial therapy and anticoagulation therapy are initiated on the basis of clinical clues, the severity of the patient's illness, the underlying disease, and the potential pathogens.

All surgical procedures in the study population were for internal jugular vein thrombosis. Surgical procedures were performed under general anesthesia. The patient was placed in the supine position and the head was slightly extended and turned away from the side of the operation. A vertical skin incision was made along the palpable anterior border of the sternocleidomastoid muscle. After adequate dissection, the internal jugular vein was exposed. The regions that were proximal and distal to the thrombosed vein appeared to be free of disease and vein cross clamping was performed after systemic heparinization. A longitudinal venotomy was made: it extended beyond the proximal and distal end points of the thrombosed vein segment if possible, and open thrombectomy was performed. Primary closure was performed with optical 3.5 $\times$ power magnification and Prolene 6/0 continuous sutures. All patients were anticoagulated and were followed up both clinically and by DUS or CT scanning. Anticoagulant therapy was delivered as a regimen of low molecular weight heparin at a therapeutic dose, except in six patients who received conventional heparin because of poor renal function.

The risk factors of interest and other data, including clinical presentation, management details, and clinical outcomes, were recorded prospectively in an Excel spreadsheet (Microsoft, Redmond, WA, USA) and were analyzed retrospectively. Categorical data are reported as counts and percentages, while continuous data are reported as means $\pm$ SD.

RESULTS

Patient population

Between January 2009 and December 2012, 50 consecutive patients were suspected of having central venous catheter related infected thrombosis. However, four patients failed the eligibility criteria because they had other causes of fever or sepsis (Fig. 1). All were excluded, leaving 46 patients. All patients received conservative management. The demographics and clinical characteristics of these patients are

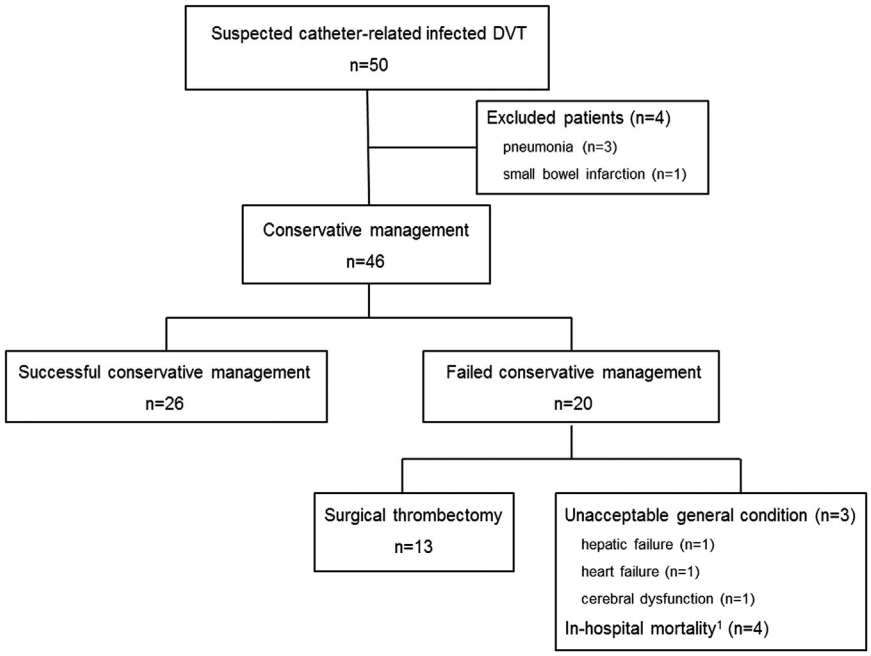

Figure 1. Flow chart of patient inclusion. DVT = deep venous thrombosis. [1]In hospital mortality without surgical thrombectomy.