



INCIDENCE AND RISK FACTORS FOR CATHETER-RELATED THROMBOSIS IN HOSPITALIZED PATIENTS: A CLINICAL PROFILE STUDY

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Conflicts of Interest: Nil

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ABSTRACT

Background: Catheter-related thrombosis (CRT) is a significant complication in patients requiring long-term intravenous access. This study explores the clinical profile, incidence, and associated patient- and device-related risk factors for CRT. Understanding these risk factors can help develop preventive strategies and reduce thrombotic complications.

Objective: To analyze the clinical profile, incidence, and patient- and device-related risk factors for catheter-related thrombosis in hospitalized patients.

Material and Methods: A total of 60 patients requiring intravenous catheterization were enrolled from the Department of Medicine at a tertiary care hospital. Patient characteristics, catheter type, site of insertion, and duration were recorded. Incidence of thrombosis was assessed using clinical and Doppler studies.

Results: Out of the 60 patients, 15 (25%) developed catheter-related thrombosis. Risk factors such as the use of central venous catheters, prolonged catheter duration, and associated co-morbidities significantly increased the risk. The mean duration of catheter use was 10.4 ± 2.3 days in patients with thrombosis. A higher incidence of thrombosis was found in patients with malignancy and hypercoagulable states.

Conclusion: Catheter-related thrombosis is influenced by patient- and device-specific factors, with central venous catheters, prolonged duration, and underlying comorbidities playing a crucial role. Identifying and addressing these risk factors can minimize the occurrence of CRT and improve patient outcomes.

Keywords: Catheter-related thrombosis, Central venous catheter, Thrombosis risk factors, Hypercoagulability, Intravenous catheterization

INTRODUCTION:

Catheter-related thrombosis (CRT) is a serious complication associated with the use of intravenous catheters, particularly in patients needing long-term venous access for treatment (1). The increasing use of catheters, particularly central venous catheters (CVCs), has made thrombotic complications a concern in medical practice. CRT can lead to various complications, including pulmonary embolism, deep vein thrombosis, and the loss of venous access (2). The incidence of CRT varies widely based on the population, catheter type, and underlying medical conditions.

Many factors are associated with the development of CRT, including catheter material, site of insertion, duration of catheterization, and patient-related factors such as malignancy, thrombophilia, and infection (3). Identifying these risk factors early is critical to prevent CRT and improve patient outcomes (4). Recent advances, including Doppler ultrasound, have enhanced the early diagnosis of CRT and contributed to better clinical management (5). This study aims to assess the incidence of catheter-related thrombosis, the associated clinical profile, and the risk factors related to both patients and catheter devices in a tertiary care hospital.

Aim and Objectives

Aim:

To assess the incidence, clinical profile, and risk factors associated with catheter-related thrombosis in hospitalized patients.

Objectives:

1. To determine the incidence of CRT in patients with intravenous catheterization.
2. To analyze patient-specific and device-specific risk factors associated with CRT.

Material and Methods

This prospective observational study was conducted in the Department of Medicine at a tertiary care hospital. A total of 60 patients requiring intravenous catheterization for treatment were included.

Inclusion Criteria:

1. Patients aged ≥ 18 years requiring intravenous catheterization for more than 48 hours.
2. Use of both peripheral and central venous catheters.

Exclusion Criteria:

1. Patients with a known history of thromboembolic events prior to catheterization.
2. Those receiving anticoagulant therapy at the time of admission.

Study Design:

Detailed clinical history, catheter type, site of insertion, and catheter duration were recorded. Routine blood investigations, including coagulation profiles, were performed. Thrombosis was confirmed through Doppler ultrasound for symptomatic cases.

Results

Table 1: Clinical and Demographic Characteristics of Patients

Characteristics	Patients with CRT (n=15)	Patients without CRT (n=45)	Total (n=60)
Mean Age (years)	54.3 \pm 8.5	50.6 \pm 7.2	51.6 \pm 7.8
Male (%)	67%	60%	62%
Central Venous Catheter (%)	80%	42%	52%
Peripheral Catheter (%)	20%	58%	48%
Malignancy (%)	40%	15%	23%
Hypercoagulable State (%)	33%	11%	17%

Table 1 summarizes the demographic characteristics and catheter type among the patients. Out of the 60 patients, 15 developed CRT. A higher proportion of patients with CRT had central venous catheters (80%) compared to those without CRT (42%). The presence of malignancy and hypercoagulable states was also more frequent in patients with CRT.

Table 2: Incidence and Risk Factors of Catheter-Related Thrombosis

Risk Factors	CRT Group (n=15)	Non-CRT Group (n=45)	p-value
Duration of Catheter Use (days)	10.4 \pm 2.3	7.1 \pm 1.8	<0.05
Diabetes Mellitus (%)	33%	27%	0.64
Infection (%)	47%	20%	<0.05
Use of Anticoagulants (%)	13%	22%	0.48

Table 2 highlights the key risk factors associated with CRT. Patients with CRT had a significantly longer duration of catheter use (10.4 \pm 2.3 days) compared to those without thrombosis. Infection was more prevalent

among CRT patients, while the use of anticoagulants was not significantly different between the two groups.

Discussion

Catheter-related thrombosis is a common complication in hospitalized patients requiring intravenous access. Our study found an incidence of 25%, which aligns with previous reports indicating a CRT incidence of 20–30% (6,7). The presence of malignancy and hypercoagulable states were identified as major patient-specific risk factors in our study, consistent with earlier findings (8,9).

The use of central venous catheters was strongly associated with the occurrence of CRT, as observed in 80% of our cases. Central venous catheters pose a higher risk of thrombosis due to their larger diameter and prolonged use (10). Additionally, patients with infections were found to be at higher risk of developing CRT, corroborating existing literature that highlights the role of infections in inducing thrombotic states (11,12).

The mean duration of catheter use was longer in patients with CRT, emphasizing the need for timely removal of catheters to reduce thrombotic complications (13). Despite the benefits of anticoagulant therapy, it did not significantly reduce the incidence of thrombosis in our study, similar to findings from other research (14).

Conclusion

Our study emphasizes the importance of recognizing patient- and device-related risk factors for catheter-related thrombosis. Central venous catheters, prolonged catheterization, malignancy, and infections were identified as key contributors to thrombotic events. Preventive strategies, such as monitoring for early signs of thrombosis and minimizing catheter duration, are essential to improve patient outcomes. Further studies are needed to explore the role of anticoagulant therapy in preventing CRT in different patient populations.

References

1. Mermel LA, Farr BM, Sherertz RJ, et al. Guidelines for the management of intravascular catheter-related infections. *Clin Infect Dis*. 2001;32(3):1249-1262.
2. Kearon C, Akl EA, Ornelas J, et al. Antithrombotic therapy for venous thromboembolism disease: a guideline for the prevention and treatment of venous

- thromboembolism. *Chest*. 2016;149(2):315-352.
3. Geerts WH, Pineo GF, Heit JA, et al. Prevention of venous thromboembolism: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. *Chest*. 2008;133(6):381S-453S.
4. Schönemann HJ, Cushman M, Fink A, et al. Antithrombotic therapy for venous thromboembolism: a clinical practice guideline. *Chest*. 2008;133(6):123S-131S.
5. Verso M, Agnelli G, Barillari G, et al. Risk factors for catheter-related thrombosis in cancer patients. *Thromb Res*. 2010;125(Suppl 2).
6. Prandoni P, Lensing AW, Cogo A, et al. Diagnosis of deep vein thrombosis and pulmonary embolism. *Blood*. 2002;100(10):3484-3488.
7. Kucher N, Koo S, Moser KA, Goldhaber SZ. Clinical management of venous thromboembolism. *Circulation*. 2005; 112(4).
8. Awad SS, et al. The role of catheter management strategies in reducing complications. *Crit Care Med*. 2007;35(6):1651-1657.
9. Lee AY, Kamath D, Wong D, et al. The risk of catheter-related thrombosis in cancer patients. *J Clin Oncol*. 2009;27(25):4194-4200.
10. Young AM, et al. Anticoagulation therapy in the prevention of catheter-related thrombosis. *J Thromb Haemost*. 2010;8(3):643-649.
11. Bernard AC, et al. The relationship between infection and thrombosis. *Ann Surg*. 2001; 233(6):810-820.
12. Weiss SJ, Sussman II, Stoller ML. Catheter-associated urinary tract infections in patients with indwelling catheters. *J Urol*. 1999; 161(1):275-278.
13. Gonzalez-Espinoza L, et al. Intravascular catheter-associated infections: clinical and microbiological findings. *J Vasc Surg*. 2010;51(5):1358-1364.
14. Baddour LM, et al. Infective endocarditis: a review. *Am J Med*. 2005;118(7):735-742.