

Congress Abstract

Risk Factors for Catheter-Associated Thrombosis in Patients After Hematopoietic Stem Cell Transplantation: An Analysis from the Perspective of Virchow's Triad

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Introduction: Catheter-associated thrombosis can lead to dysfunction and unplanned removal of the central venous catheter, as well as to re-catheterization. After hematopoietic stem cell transplantation, its development may be determined by the combined action of the components of Virchow's triad: endothelial injury, venous blood flow disturbance, and hypercoagulability. Objective: To assess the incidence of catheter-associated thrombosis and to interpret the associated clinical factors from the perspective of Virchow's triad in patients after hematopoietic stem cell transplantation.

Materials and Methods: A retrospective single-center study was conducted on 91 episodes of central venous catheter placement in 78 patients at the Department of Bone Transplantation. Risk factors were analyzed in 58 completed primary episodes. Transplant type, conditioning regimen, infectious and mechanical complications, number of puncture attempts, parenteral nutrition, and anticoagulant use were assessed. Fisher's exact test was used; differences were considered statistically significant at $p < 0.05$.

Results: Catheter-associated thrombosis occurred in both episodes with catheter-associated bloodstream infection (2 of 2, 100%), compared with 9 of 56 episodes without such infection (16.1%; $p = 0.033$). Thrombosis occurred in 2 of 5 episodes with early mechanical complications (40.0%) and in 9 of 53 episodes without such complications (17.0%; $p = 0.237$). With prophylactic enoxaparin use, no thrombosis was observed in 12 episodes; without prophylaxis, thrombosis occurred in 11 of 46 episodes (23.9%; $p = 0.097$). In the Virchow's triad model, infection and mechanical complications corresponded to endothelial injury and local inflammation; the presence of the catheter created conditions for blood flow disturbance; differences by transplant type and enoxaparin use may reflect the contribution of hypercoagulability.

Conclusions: Catheter-associated thrombosis after hematopoietic stem cell transplantation can be viewed as a result of the interaction of all components of Virchow's triad. The association with catheter-associated bloodstream infection supports the role of endothelial injury and local inflammation; the central venous catheter creates conditions for blood flow disturbance; the observed differences by transplant type may reflect differing degrees of systemic prothrombotic factors. Virchow's triad unifies the identified factors into a single mechanism of thrombosis; however, the contribution of individual components requires clarification in a larger sample.

	Keywords: Hematopoietic Stem Cell Transplantation; Central Venous Catheters; Venous Thrombosis; Catheter-Associated Infections; Risk Factors; Ultrasonography; Interventional
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