Deep Vein Thrombosis: Final Report of the Prospective Multicenter Peripheral Registry of Endovascular Treatment

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Background: To address the limitations of anticoagulation, more aggressive endovascular therapies, such as pharmacomechanical thrombosis and/or percutaneous mechanical thrombectomy have been employed with the objective to achieve early lysis/removal of the thrombotic occlusion to restore flow. Thrombosis resolution also provides the advantage of uncovering an underlying stenosis. Options for addressing stenotic veins include venous angioplasty and/or stent placement. This registry looks at the use and clinical benefit of rheolytic thrombectomy with/without adjunctive therapies in treating deep vein thrombosis (DVT).

Methods: A two-phase prospective registry capturing patient DVT history, procedural information (including a thrombus score based on venography), clinical events, and follow-up. Phase 1 patients (n = 170) were followed up to 3 months postprocedure to document symptomatic improvement by the SF12 questionnaire while Phase 2 patients (n = 201) were followed up to 12 months.

Results: There were 371 patients (35 enrolling centers) treated for DVT, including 211 male and 157 female (mean age, 52 years; range, 17-87 years) with 11% upper (UE) and 89% lower extremity (LE) DVT. Sixty-nine percent reported symptoms <14 days (acute). Adjunctive therapies included lytic delivered by AngioJet (86%), catheter-directed thrombolysis (60%), and stenting (32%). Seventy-five percent of all cases were completed in <24 hours. There was an overall mean reduction in thrombus of 89%, with substantial lysis (≥50%) achieved in 96% of the patients. In the LE cases, the substantial lysis rates for both acute (97%) and chronic (95%) were statistically significant (P < .0001). Bleeding requiring transfusions were minimal (<5%). Quality of life analysis showed significant improvement (P < .0001) from baseline through 12 months for both physical and mental measures. Freedom of thrombosis rates at 90, 180, and 365 days were 94%, 88%, and 84%, respectively.

Conclusions: Aggressive endovascular treatment of DVT using rheolytic thrombectomy combined with adjunctive therapies forms an effective and safe strategy for the comprehensive treatment of DVT, with excellent clinical improvement and freedom from rethrombosis rates.

Axitinib Treatment Impairs Venous Thrombus Resolution


Background: Tumors are prothrombotic, while venous thromboembolic events are a leading cause of mortality in cancer patients. Venous thrombi resolve through a process of organization, including the formation of neovascular channels in the thrombus. Use of antiangiogenic therapy is associated with increased incidence and severity of venous thromboembolism. The aim was to investigate whether axitinib, a clinically used, selective vascular endothelial growth factor receptor inhibitor, affects resolution of venous thrombi.

Methods: Thrombus was induced in 48 mice (10- to 12-week-old male Balb/c). Twenty-four hours postinduction, either axitinib (25 mg/kg), or vehicle control was administered twice daily by intraperitoneal injection. Thrombi were harvested at days 3, 10, and 17 postinduction for histological analysis (n = 6 per group). Hematoxylin and eosin stained sections were used to estimate thrombus volume and recanalization. CD31 immunohistochemistry was used to identify neovascular channels within the thrombus and picrosirius red staining used to identify collagen as another marker of organisation. Macrophage and neutrophil content of the thrombus was estimated by immunohistochemical staining for Mac-2 and Ly6-G respectively. Measurement of thrombus size, organization, and inflammatory cell content was carried out by image analysis of stained sections. Statistical analysis was carried out by two-way analysis of variance.

Results: Axitinib treatment resulted in impaired thrombus resolution (P < .001), thrombus organization (both collagen content, P < .0001 and neovascularization, P < .0001), and vein recanalization (P < .001) compared with vehicle treated controls. These were associated with reduced thrombus macrophage content (P < .0001).

Conclusions: Axitinib axitinib impaired resolution of venous thrombi. Inhibition of thrombus neovascularization is consistent with the role of VEGFR signaling in angiogenesis. These findings complement previous studies in which upregulating thrombus VEGF levels resulted in increased monocyte recruitment and accelerated thrombus resolution. Although antiangiogenic therapy improves survival in cancer patients, it is important to highlight the prothrombotic potential of this class of drugs. It is possible that inhibition of thrombus resolution by axitinib in this study could account for the increased incidence and severity of venous thromboembolism in clinical studies.

Abstracts

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