JSCAI
The official journal of the Society for Cardiovascular Angiography & Interventions

Editorial

Maneuvering Through the Uncertainty of Deep Vein Thrombosis Interventions: An Encouraging Contemporary Analysis

Giorgio A. Medranda, MD [a], Sahil A. Parikh, MD [b], Hady Lichaa, MD [c,*]

[a] Department of Medicine, NYU Langone Hospital—Long Island, Mineola, New York; [b] Division of Cardiology, Columbia University Irving Medical Center, New York, New York; [c] Department of Cardiology, Ascension Saint Thomas Heart Rutherford, Murfreesboro, Tennessee

Deep vein thromboses (DVTs) are common and impose significant acute and chronic implications for both patients and health care systems. Although anticoagulation is the standard of care for most patients with DVT, there remains controversy as to the role of invasive therapies for the acute management of DVT.[1] The benefits of pharmacomechanical thrombolysis in treating DVT has been evaluated in previous studies.[2,3] The Acute Venous Thrombosis: Thrombus Removal with Adjunctive Catheter-Directed Thrombolysis (ATTRACT) trial, in particular, demonstrated that a strategy of pharmacomechanical thrombolysis in patients with proximal DVTs did not lower the risk of postthrombotic syndrome; instead, it increased the risk of major bleeding.[2] The advent of mechanical thrombectomy (MT) and the increased use of intravascular ultrasound (IVUS) when treating DVT has the potential to allow for a better understanding and treatment of DVT.[4] Unfortunately, contemporary randomized evidence remain scarce in this space, and most available data on DVT intervention rely heavily on initial experience with thrombolytics and earlier generation MT devices with variable IVUS use.[2,3,5]

In this issue of *JSCAI*, Kumar et al[6] report the findings of the Detroit Evaluation of Thrombectomy and Evaluation of Intravascular Ultrasound in Deep Vein Thrombosis (DETECT-DVT) study. In this multicenter retrospective analysis, the investigators screened 1263 patients admitted to 4 Michigan community hospital emergency departments with lower extremity DVT between 2021 and 2022.[6] Among them, 45.3% were female and 87.3% Caucasian, with a mean age of 65 years.[6] Most DVTs affected a single limb (83.8%) and were acute (61.5%) based on patient-reported symptom onset and ultrasonographic interrogation.[6] Consistent with current guidelines,[7] a small fraction (8.8%) of patients with lower extremity DVT underwent intervention, most performed by vascular surgeons (64.4%), 89% guided by IVUS, with 80% of interventions being venoplasty and 30% stenting, given the findings of venous compression/obstruction as contributors to proximal DVT.[6] MT was more likely to be performed in younger patients ($P = .016$) with unilateral DVT ($P = .033$).[6] The mean number of MT passes was 4, and most patients had restoration of flow (96.7%).[6] Complication rates were low, occurring in just 1.8% of patients.[6] One in 3 patients (28.9%) had a reintervention, often requiring definitive treatment after acute intervention with venoplasty alone.[6] Interventions performed with IVUS were more likely to include venoplasty ($P < .001$) and stenting ($P = .03$) than those not performed with IVUS. The mean contrast volume used was 71 mL without appreciable changes in renal function following intervention (creatinine 1.08 mg/dL versus 1.04 mg/dL; $P = .28$). The authors concluded that use of MT was both safe and successful in restoring flow in the treatment of DVT. Furthermore, cases that used IVUS in conjunction with MT frequently resulted in both venoplasty and stenting without significant risk of acute kidney injury.

The authors should be applauded for compiling and analyzing such a comprehensive real-world database of patients admitted for DVT. This multicenter study represents one of the largest contemporary analyses of patients with DVT specifically examining the minority of patients (8.8%) who underwent intervention performed by several subspecialties (vascular surgery: 64.4%, interventional cardiology: 33.0%, interventional radiology: 12.5%). It is encouraging that so many subspecialties are performing these procedures and the diversity of providers reflects the nature of the field in which patients are treated by a "coalition of the willing" hailing from a variety of clinical backgrounds. One hopes that societies will seek to further combine experience, resources, and expertise to help continue to move the field forward toward the unified goal of improved patient outcomes.

This unique cohort of patients saw frequent use of both MT and IVUS, with high rates of flow restoration (96.7%) and reassuringly low rates of complications (1.8%). MT was offered to younger patients and those with unilateral DVTs. Use of IVUS during these cases resulted in

DOI of original article: https://doi.org/10.1016/j.jscai.2024.102153.

Abbreviations: DVT, deep vein thrombosis; IVUS, intravascular ultrasound; MT, mechanical thrombectomy.

Keywords: deep vein thrombosis; intravascular ultrasound; mechanical thrombectomy.

* Corresponding author: hady.lichaa@gmail.com (H.T. Lichaa).

https://doi.org/10.1016/j.jscai.2024.102287
Received 10 June 2024; Accepted 14 August 2024; Available online 20 September 2024

higher rates of venoplasty and stenting, a signal toward a more informed image-guided approach to DVT treatment. Reassuringly, IVUS use may have limited contrast administration without compromising procedural success, resulting in stable renal function postintervention. Despite the retrospective nature of this analysis, this study represents sorely needed real-world data in the field of DVT intervention that helps provide additional insight into more contemporary techniques and device utilization.

Several questions remain unanswered, notwithstanding the encouraging findings of the DETECT-DVT study. The authors demonstrate in this analysis how infrequently intervention is performed for DVT in a real-world contemporary practice. This raises the question of which patients may benefit most from DVT intervention with MT and IVUS. On one hand, the safety and efficacy of both MT and IVUS demonstrated in this study could support broader application of invasive therapy in patients with lower extremity DVT. On the other hand, there is likely to have been selection bias among patients referred for intervention. Given the lack of robust evidence in this space, societal guidelines will continue to maintain a lukewarm stance on the issue without more randomized clinical data.[1,8]

Another important aspect of this study was the frequent utilization of IVUS during DVT intervention. Given the acknowledged ambiguity in diagnosing the acuity/chronicity of DVTs, intravascular imaging with IVUS has the potential to more accurately evaluate and diagnose the age of DVTs and, thus, alter management strategies to target those in whom early intervention and MT is most beneficial.[9,10] Additionally, larger registries evaluating all-comers with lower extremity DVT with IVUS may fuel the development of improved diagnostic classification systems in order to more accurately identify patients with acute DVTs. Future prospective studies should aim to intervene on a broader and more diverse population of subjects admitted for lower extremity DVT. Like many retrospective studies, this analysis provides a snapshot of contemporary clinical practice and hints at the safety and efficacy of current therapeutic options. Robust randomized evidence will be required to elucidate who stands to benefit most from routine IVUS-guided MT for lower extremity DVT. Another potential area of interest would be to both develop and evaluate higher-definition IVUS systems, as has taken place in the field of percutaneous coronary intervention over the last decade. This undoubtably will improve both the diagnostic accuracy and ability to perform safe and effective interventions in patients with DVT. Finally, long-term follow-up will be required to elucidate the ideal mechanical strategy and adjunct pharmacology for patients presenting with lower extremity DVT to reduce the not insignificant reintervention rate.

Declaration of competing interest

Giorgio A. Medranda has nothing to disclose. Sahil A. Parikh reports institutional research funding from Abbott, Boston Scientific, Surmodics, TriReme Medical, Shockwave Medical, Acotec, Concept Medical, Reflow Medical, Veryan Medical, and Philips; is an advisor to Abbott, Boston Scientific, Medtronic, Cordis, and Philips; reports honoraria from Abiomed, Terumo, Inari, Penumbra, and Canon; and reports equity in Encompass Vascular, Advanced Nanotherapies, and eFemoral. Hady Lichaa is a consultant and speaker for Abbott Vascular, Cordis, Johnson & Johnson, Philips, and Penumbra.

Funding sources

This work was not supported by funding agencies in the public, commercial, or not-for-profit sectors.

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