

with a visual analog scale for pain score >3 and Venous Clinical Severity Score >10 points. The imaging analysis included a review of both axial and 3-dimensional reconstructed CTV studies and correlated IVUS images. Please feel free to contact us to discuss these methods and procedures. The technology, experience, and methods are in constant evolution. We hope that this new perspective of IVO will contribute to the diagnosis and treatment of obstructive venous lesions.

Fabio H. Rossi, MD, PhD

Dante Pazzanese Institute
São Paulo, Brazil

Patricia E. Thorpe, MD, FSIR

Pulse Cardiovascular Institute
Scottsdale, Ariz

REFERENCES

1. Rossi FH, Kambara AM, Izukawa NM, Rodrigues TO, Rossi CBO, Sousa AG, et al. Randomized double-blinded study comparing medical treatment versus iliac vein stenting in chronic venous disease. *J Vasc Surg Venous Lymphat Disord* 2018;6:183-91.
2. Metzger PB, Rossi FH, Kambara AM, Izukawa NM, Saleh MH, Pinto IM, et al. Criteria for detecting significant chronic iliac venous obstructions with duplex ultrasound. *J Vasc Surg Venous Lymphat Disord* 2016;4:18-27.
3. Lorenção de Almeida B, Rossi FH, Guerra de Moraes Rego Sousa A, Kambara AM, Izukawa NM, Beteli CB, et al. Correlation between venous pressure gradients and intravascular ultrasound in the diagnosis of iliac vein compression syndrome. *J Vasc Surg Venous Lymphat Disord* 2018;6:492-9.
4. Rossi FH, Kambara AM, Rodrigues TO, Rossi CBO, Izukawa NM, Pinto IMF, et al. Comparison of computed tomography venography and intravascular ultrasound in screening and classification of iliac vein obstruction in patients with chronic venous disease. *J Vasc Surg Venous Lymphat Disord* 2020;8:413-22.
5. Neglén P, Raju S. Intravascular ultrasound scan evaluation of the obstructed vein. *J Vasc Surg* 2002;35:694-700.
6. Raju S, Kirk O, Davis M, Olivier J. Hemodynamics of "critical" venous stenosis and stent treatment. *J Vasc Surg Venous Lymphat Disord* 2014;2:52-9.

<https://doi.org/10.1016/j.jvsv.2020.08.016>

Endovenous glue-induced thrombosis complications



We read with great interest the article by Cho et al,¹ entitled, "Incidence, classification, and risk factors of endovenous glue-induced thrombosis after cyanoacrylate closure of the incompetent saphenous vein." Glue ablation is a new and successful technique in treatment of superficial saphenous vein insufficiency, but also has some disadvantages.² Endovenous glue-induced thrombosis (EGIT), as reported in this study, is a little-known but potentially serious complication of lower extremity endovenous interventions in which glue is used.

We have some questions and concerns regarding the study from Cho et al. EGIT is a phenomenon similar to endovenous heat-induced thrombosis (EHIT), wherein patients with early threadlike thrombus have extension across the saphenofemoral or saphenopopliteal junction.³ In the study by Cho et al,¹ EGIT developed in 11 patients (5.8%). EGIT grades I and II developed in seven (63.6%) and four (36.4%) patients, respectively. None of those patients were treated with systemic anticoagulant or antiplatelet therapy. Korepta et al⁴ reported the importance of antiplatelet therapy (325 mg acetylsalicylic acid) for EHIT grades I and II, and anticoagulant therapy for patients with grades III and IV EHIT to prevent thrombus propagation. The choice and duration of anticoagulant or antiaggregant therapy were left to the discretion of surgeon, as in the study.

Did the authors perform manual ultrasound probe compression of the saphenofemoral junction during glue injection for the recommended time? This technique, with a longer compression time, can decrease the rate of this kind of complication.

In the study, two patients had previous deep venous thrombosis history, as seen in Table II. How did the authors decide to perform this procedure for these patients? Did they evaluate the outflow venous segments (profunda femoral vein and iliac veins) preoperatively? Performing this intervention in cases with occluded venous outflow may cause significant adverse events.

We congratulate Cho et al¹ for this study and for highlighting this little-known complication of glue ablation in the treatment of incompetent saphenous vein. We would like to hear the authors' opinions on these matters.

Fatih Avni Bayraktar, MD

Mehmet Senel Bademci, MD

Cemal Kocaaslan, MD

Ahmet Oztekin, MD

Department of Cardiovascular Surgery
Istanbul Medeniyet University Medicine Faculty
Istanbul, Turkey

Kaptaniderya Tayfur, MD

Department of Cardiovascular Surgery
Ordu University Medicine Faculty
Ordu, Turkey

Ebuzer Aydin, MD

Department of Cardiovascular Surgery
Istanbul Medeniyet University Medicine Faculty
Istanbul, Turkey

REFERENCES

1. Cho S, Gibson K, Lee SH, Kim SY, Joh JH. Incidence, classification, and risk factors of endovenous glue-induced thrombosis after cyanoacrylate closure of the incompetent

- saphenous vein. *J Vasc Surg Venous Lymphat Disord* 2020;8:991-8.
2. Bademci MŞ, Kocaaslan C, Aldag M, Yalvaç EŞD, Oztekin A, Bulut N, et al. Single-center retrospective review of early outcomes of radiofrequency ablation versus cyanoacrylate ablation of isolated great saphenous vein insufficiency. *J Vasc Surg Venous Lymphat Disord* 2019;7:480-5.
 3. Pillutla A, Hendrix MP, Ha J. Endovenous glue-induced thrombosis in nonthermal glue closure therapy for greater saphenous vein insufficiency: a single-center experience. *J Vasc Interv Radiol* 2019;30:1075-80.
 4. Korepta LM, Watson JJ, Mansour MA, Chambers CM, Cuff RF, Slaikeu JD, et al. Outcomes of a single-center experience with classification and treatment of endothermal heat-induced thrombosis after endovenous ablation. *J Vasc Surg Venous Lymphat Disord* 2017;5:332-8.

<https://doi.org/10.1016/j.jvsv.2020.06.020>

Reply



We appreciate Bayraktar et al for their comments and important questions regarding our article that was recently published in the *Journal of Vascular Surgery: Venous and Lymphatic Disorders*.¹

Until now, little is known about the natural history of endovenous glue-induced thrombosis (EGIT). Therefore, there is no clear evidence to guide this complication. Therefore, the management of EGIT has been adopted with that of endovenous heat-induced thrombosis (EHIT). For the management of EHIT, antiplatelet or anticoagulant has been anecdotally used according to types of EHIT. Puggioni et al² suggested the use of antiplatelet therapy until resolution of EHIT. Ryer et al³ proposed the use of anticoagulant for each type of EHIT due to the observation of progression of thrombus in 13% of patients with EHIT type 1. Harlander-Locke et al⁴ suggested duplex surveillance for EHIT types 1 and 2, surgeon's choice for EHIT type 3, and systemic anticoagulation for EHIT type 4. Because of wide variations in the management of EHIT, the EGIT management is variable as well. Proebstle et al⁵ used the low-molecular-weight heparin in a patient with EGIT. Gibson and Ferris⁶ did not use anticoagulant in a patient with thrombus extension that protruded 2 mm into the saphenofemoral junction. Our suggestion in this article is based on our previous experience that all types of EHIT were completely resolved without the use of antiplatelet or anticoagulant.⁷ For grade 3 and 4 EGIT, anticoagulation might have a benefit to prevent the thrombus formation due to venous flow disturbance.

As Bayraktar et al mentioned, the manual ultrasound probe compression of the saphenofemoral junction or saphenopopliteal junction during glue injection is very important to decrease the rate of EGIT. In each procedure, we used this technique strictly. Finally, two patients with a previous history of deep vein thrombosis were included in this study. In our vascular laboratory's

protocol, the preoperative evaluation of the deep vein system is included. Although two patients had a previous history of deep vein thrombosis, deep veins were widely patent.

We thank Bayraktar et al for their thoughtful comments and questions and hope that further high-quality research will delineate the optimal strategies to prevent EGIT.

Jin Hyun Joh, MD, PhD

Sungsin Cho, MD, PhD

Department of Surgery

Kyung Hee University Hospital at Gangdong

Kyung Hee University School of Medicine

Seoul, Korea

REFERENCES

1. Cho S, Gibson K, Lee SH, Kim SY, Joh JH. Incidence, classification, and risk factors of endovenous glue-induced thrombosis after cyanoacrylate closure of the incompetent saphenous vein. *J Vasc Surg Venous Lymphat Disord* 2020;13:30090-1.
2. Puggioni A, Marks N, Hingorani A, Shiferson A, Alhalbouni S, Ascher E. The safety of radiofrequency ablation of the great saphenous vein in patients with previous venous thrombosis. *J Vasc Surg* 2009;49:1248-55.
3. Ryer EJ, Elmore JR, Garvin RP, Cindric MC, Dove JT, Kekulawela S, et al. Value of delayed duplex ultrasound assessment after endothermal ablation of the great saphenous vein. *J Vasc Surg* 2016;64:446-51.
4. Harlander-Locke M, Jimenez JC, Lawrence PF, Derubertis BG, Rigberg DA, Gelabert HA, et al. Management of endovenous heat-induced thrombus using a classification system and treatment algorithm following segmental thermal ablation of the small saphenous vein. *J Vasc Surg* 2013;58:427-31.
5. Proebstle TM, Alm J, Dimitri S, Rasmussen L, Whiteley M, Lawson J, et al. The European multicenter cohort study on cyanoacrylate embolization of refluxing great saphenous veins. *J Vasc Surg Venous Lymphat Disord* 2015;3:2-7.
6. Gibson K, Ferris B. Cyanoacrylate closure of incompetent great, small and accessory saphenous veins without the use of post-procedure compression: initial outcomes of a post-market evaluation of the VenaSeal System (the WAVES Study). *Vascular* 2017;25:149-56.
7. Joh JH, Park HC. Endovenous heat-induced thrombosis after radiofrequency ablations: Is it a knotty problem? *J Vasc Surg* 2015;61:166S.

<https://doi.org/10.1016/j.jvsv.2020.08.017>

A common but ignored clinical consequence of inferior vena cava anomalies



We have read the review article titled "Duplication and transposition of inferior vena cava: A meta-analysis of prevalence" by Hostiuć et al.¹ We want to congratulate the authors for this successful review article, and make some contributions.

In the review article, the prevalence of transposition and duplication of the inferior vena cava (IVC) was established, and diverse significant clinical consequences were listed on table IV. We would like to remark that