Dear Editors,

In recent years, minimally invasive techniques have been established for the treatment of varicose veins [1]. According to the current German S2k guidelines for treatment of varicose veins, endovenous and open-surgical techniques are considered equivalent methods for treatment of saphenous vein incompetence [1, 2]. Recently, a new therapeutic concept, cyanoacrylate closure (CAC), has been approved for the treatment of varicose veins [3]. As no thermal energy is used, there is no risk of nerve damage. According to the latest literature, cyanoacrylate closure offers success rates equivalent to endovenous thermal ablation with lower rates of complications [4, 5]. However, although complications are rare, cyanoacrylate glue treatment can potentially lead to issues such as phlebitis, cellulitis, and deep vein thrombosis, with bacteremia and hypersensitivity reactions also having been reported [6–11]. We report the case of an 86-year-old woman who developed a persistent iliac vein thrombosis after CAC of the great saphenous vein.

The woman presented in our emergency department with swelling and erythema of the left leg following cyanoacrylate closure of the great saphenous vein two weeks previously. Duplex sonography showed the great saphenous vein bulging, constricting the common femoral vein (CFV) and significantly reducing flow in that vein. On fat-saturated contrast-enhanced (CE) T1-weighted magnetic resonance tomography (MRT) sequences, a mainly hypointense mass surrounded by contrast material (representing cyanoacrylate with venous thrombus) was depicted at the saphenofemoral junction (SFJ) extending into the external iliac vein, resulting in a subtotal lumen occlusion (Figure 1). At no point did the patient show any signs of pulmonary embolism such as dyspnea or chest pain, and her cardiorespiratory status was always stable.

Symptoms did not improve after six months of full anticoagulant treatment with edoxaban and compression therapy. Our suspected diagnosis was substantiated by a control MRT, which showed a persistent subtotal occlusion at the SFJ (Figure 2). The patient continued to receive full anticoagulant treatment with edoxaban to avoid thromboembolic complications and prescriptions for compression stockings to reduce the swelling. Surgical removal of the adhesive was waived due to the poor chances of recanalization and a high risk of potential intraoperative complications.

Endovenous glue-induced thrombosis (EGIT) is a rare phenomenon unique to nonthermal endovenous glue-closure therapy [6, 12, 13]. As described in the literature, EGIT usually resolves spontaneously within five to six weeks after detection without the need for anticoagulation and without deep vein thrombosis or pulmonary embolism [8]. In our case, EGIT developed after cyanoacrylate glue treatment of the great saphenous vein and symptoms did not improve despite full anticoagulant treatment with edoxaban. Currently, only one case of accidental cyanoacrylate glue injection into the deep venous system has been reported, resulting in an obstruction of the SFJ and development of a collateral circulation in this area [12]. According to this case report, surgical glue removal was not successful due to the hard consistency of the glue and the associated risk of potential intraoperative complications such as vessel perforation, vessel rupture or pulmonary embolism [12]. Lindow et al. [14] reported that the main determining factor in thrombectomy for iliofemoral thrombosis is the age of the thrombosis, since successful surgical removal of a thrombus is only possible up to a maximum thrombus age of ten days. Cyanoacrylate is a strong

Figure 1 Fat-saturated contrast-enhanced (CE) T1-weighted magnetic resonance tomography (MRT) shows a mainly hypointense, contrast-material surrounded mass (representing cyanoacrylate with venous thrombus) at the saphenofemoral junction (SFJ) extending into the external iliac vein, resulting in a subtotal lumen occlusion.
and fast-acting adhesive, thus even early surgical thrombectomy might not have been successful. In our case, glue extension into the deep venous system caused a persistent subtotal lumen occlusion of the iliofemoral veins. This is of clinical importance as the patient now requires lifelong anticoagulant treatment and has a reduced quality of life due to postthrombotic-syndrome.

Various EGIT risk factors have been considered, such as older age or different starting distances from the SFJ but, as in our case, it remains unclear why and how EGIT develops in some patients [8, 12, 13]. However, a possible spread of cyanoacrylate into the deep venous system is described in the literature [8, 12, 13]. Even if there is a high rate of spontaneous resolution without specific treatment, our observation of glue extension into the deep vein system suggests that endovenous glue-closure therapy carries the potential risk of serious complications. Careful ultrasound monitoring is mandatory during the first delivery of cyanoacrylate in order to avoid proximal glue embolization [6, 13]. However, based on the mechanism of action and the few reports describing it [8, 12, 13], such events would appear unavoidable in some cases. In light of our observation and reports from other colleagues [6–12] it has to be considered whether CAC is an appropriate first line treatment for varicose veins at all. Every medical procedure has the risk of complications, but when planning the most appropriate treatment for a patient, it is important to consider what we want to achieve in terms of the potential harm and benefits of treatment. As the benefit of an intervention should always be related to the patient, it seems doubtful that we could achieve the best treatment results with a chemical substance (super glue) that remains permanently in the veins. In light of our observations, the only benefit of CAC might be the avoidance of tumescent anesthesia, thus resulting in a shorter procedure time.

Endovenous procedures are safe and effective treatment options for varicose veins but, as in our case, there can be serious complications. Our concluding observation suggests that anticoagulant treatment and compression therapy might be the only treatment options, since surgical glue removal might not be successful due to the hard consistency of the glue and the associated risk of potential intraoperative complications such as vessel perforation, vessel rupture or pulmonary embolism. Patients should be informed about the risk of an unresolvable deep vein thrombosis in rare cases after CAC, which is not to be expected in other available endovenous treatment approaches or open surgery. Furthermore, CAC and the severe adverse events reported so far must be evaluated in light of the current low level of evidence as stated in the current German guidelines on treatment of varicose veins.

Conflict of interest
None.

Paul Gressenberger¹, Rupert Horst Portugaller², Katharina Gütl¹, Viktoria Muster¹, Philipp Jud¹, Johannes Schmid³, Kurt Tiesenhausen⁴, Marianne Brodmann¹, Thomas Gary¹

(1) Division of Angiology, Department of Internal Medicine, Medical University of Graz, Austria
(2) Division of Neuroradiology, Vascular and Interventional Radiology, Medical University of Graz, Austria
(3) Division of General Radiology, Department of Radiology, Medical University of Graz, Austria
(4) Division of Vascular Surgery, Department of Surgery, Medical University of Graz, Austria

Correspondence to
Paul Gressenberger, MD
Division of Angiology
Medical University of Graz
Auenbruggerplatz 15
8036 Graz, Austria
E-mail: paul.gressenberger@medunigraz.at

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