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Diagnosis of recurrent reflux within the remnant non-treatment stump after bilateral cyanoacrylate ablation of the great saphenous veins

Seung Joon Park[1], Su Bin Yim[2], Dae Won Cha[1], Sung Chul Kim[1] and Jo Han Rhee[2]

Abstract

Cyanoacrylate ablation, along with mechanochemical ablation, is one of the best-known non-thermal ablation treatment methods for superficial venous reflux. Cyanoacrylate ablation is comparable to thermal ablation in terms of efficacy and safety, and offers the benefit of not requiring tumescent injections and the use of compression stockings. Here, we report about a patient who developed recurrent reflux in the residual stump after cyanoacrylate ablation. As a refluxing long residual stump can be a risk factor for late recurrence, improvements are needed to make the protocol more refined, including leaving the stump as short as possible.

Keywords

Varicose vein, recurrent, stump, cyanoacrylate, endovenous ablation

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Introduction

Since the beginning of the 21st century, endovenous thermal ablation (EVTA) has been firmly established as the new first-line treatment for varicose veins owing to its remarkable convenience and effectiveness.[1,2] Although tumescent injection is an important procedure that reduces complications that can arise during EVTA, it is a most time-consuming and effortful process for physicians. Meanwhile, the use of compression stockings post-procedure is highly inconvenient for patients. Cyanoacrylate ablation (CA) requires neither perivenous tumescent injection nor the use of compression stockings, owing to the rapid closure effect associated with rapid polymerization.[3–12] This makes CA a highly attractive option for both physicians and patients.

Case report

Informed consent was obtained for publication of this report. The 54-year-old woman presented to the clinic for heaviness, cramps, night cramps, and edema in the legs. She worked as a hospice nurse, a job that requires prolonged standing for ⩾6 h at a time.

Her body mass index was 24 kg/m^2. Based on the CEAP classification, the diagnosis was C3EpAsPr for the right leg and C2EpAsPr for the left leg. Duplex sonography indicated that the great saphenous vein (GSV) diameter at 3 cm from the saphenofemoral junction (SFJ) was 8 mm for the right leg and 7 mm for the left leg, and significant reflux originating from the SFJ (>1 s) was observed in both GSVs. The CA procedure was performed in the usual manner according to the manufacturer's instructions for use. Specifically, the first adhesive injection was placed 5 cm caudal to the SFJ with ultrasound probe compression between the mid portion of the delivery catheter tip and the SFJ. The length of the vein on which CA was performed was 36.5 cm for the right GSV and 31 cm for the left GSV. No adjunctive treatment was administered, and no compression stockings were used post-procedure. The patient was told to resume routine daily

[1]Samsung Vein Clinic, Daejeon, Korea
[2]Woori Vein Clinic, Cheongju, Korea

Corresponding Author:
Seung Joon Park, Samsung Vein Clinic, 1109, Dunsan-dong, Seo-gu, Daejeon, Korea.
Email: there4u@unitel.co.kr

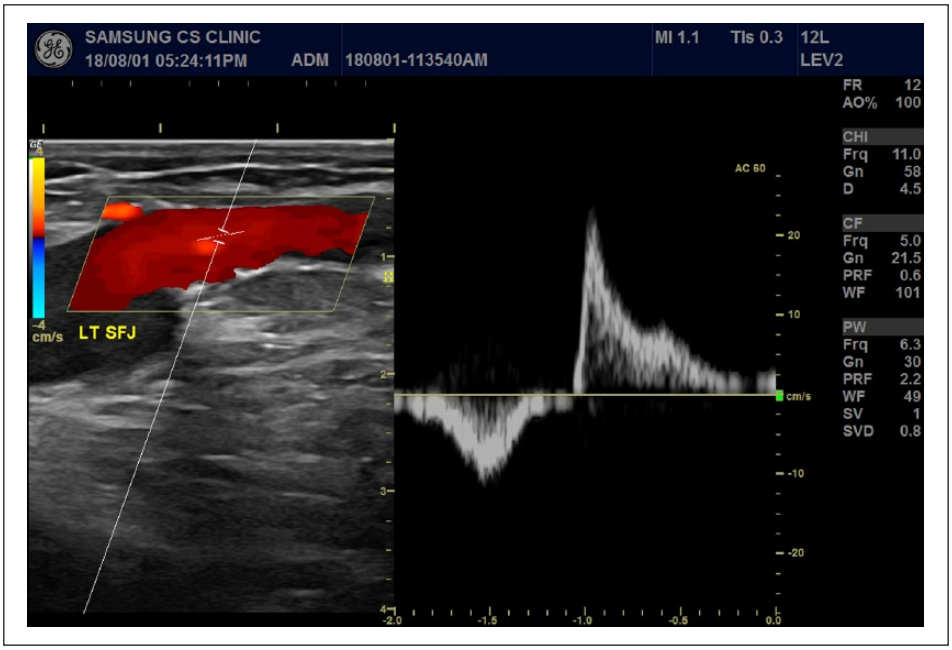

Figure 1. Recurrent reflux within the remnant non-treatment stump after cyanoacrylate ablation of the great saphenous vein. The length of the right and left refluxing stumps were 3.5 and 4 cm, respectively.

activities but to avoid strenuous exercise for 2 weeks. No adverse event occurred after CA. Post-procedure duplex ultrasound follow-up was conducted. While assessments at 1 week, 1 month, and 3 months postoperatively showed complete occlusion and no reflux of the both SFJ, the assessment at 9 months showed complete occlusion of the treated GSVs but recanalization with reflux in the both non-treated stumps (Figure 1).

Discussion

Since its first use as a treatment for varicose veins in 2010, CA has been demonstrated to be safe and effective in several clinical trials.[3–12] SFJ reflux is one of the most common and important factors in the etiology of varicose veins. According to the valvular incompetence theory, terminal valves (TVs) and preterminal valves (PTVs) play a significant role in the development of varicose veins.[13] In a cadaver study by Mühlberger et al.,[14] TVs were detected in 70% of cadavers, located 0.44 cm inferior to the SFJ on average; PTVs were detected in 85% of cadavers, located 4.15 cm inferior to the SFJ on average. According to Geier et al.,[15] who studied 279 cases of groin recurrence, a long residual stump was the cause of the recurrence in two-thirds of all patients. Incompetence of a long residual stump can cause recurrent varicosities in the long-term via the following three mechanisms:

1. Causing recanalization of the distal closed GSV;
2. Inferior migration of the reflux via the major superficial tributary veins (MSTVs) near the SFJ (most frequently, via the anterior accessory saphenous vein);
3. Causing reticular veins or varicose veins that are directly connected to the stump, rather than the MSTV.[16]

Thus, in the case of endovenous treatment, it is critical to perform proper ablation in the zone between the TVs and the PTVs, which corresponds to the stump. When performing CA, it is highly important to make sure that any residual stump is as short as possible and to avoid causing injury beyond the SFJ. To this end, cyanoacrylate injection should be started at the minimum possible distance from the SFJ, while applying compression to the proximal GSV with the ultrasound probe as close to the SFJ as possible. According to Almeida et al.,[3] in the first use of CA in a human subject, cyanoacrylate was delivered via a catheter tip positioned 3–4 cm from the SFJ, and a thread-like thrombus extension across the SFJ was observed in 8 of 38 patients (21.1%) in follow-up ultrasound 48 h post-procedure. To prevent the formation of thrombus extension, the injection protocol was modified such that the catheter tip was positioned 5 cm from the SFJ. This modified injection protocol has been used in subsequent studies. Table 1 shows an analysis of the compression points during the first adhesive injection, starting points, occlusion rates, and recanalization patterns reported in major studies to date. Compression points have been reported 2 cm above the catheter by Gibson et al., between the delivery catheter and the SFJ by Proebstle et al., at the proximal GSV by Morrison et al., and at the SFJ by other authors. The post-procedure mean stump length was measured by Gibson and Ferris;[5] when the ultrasound probe compression was 2 cm above the catheter and the injection was placed 5 cm caudal to the SFJ, the post-procedure mean stump length was

Table 1. Compression points, starting points, occlusion rates, and recanalization patterns in major studies.

	No. of legs	CA system	Compression point	Starting point	1-year occlusion rate (%)	Recanalization	Thrombus extension rate (%)
Almeida et al.[4]	38	VenaSeal	just caudal to SFJ	3–4 cm	94.70	CR:1, PR:1	21
Gibson and Ferris[5]	50	VenaSeal	2 cm above the catheter	5 cm	100[a]		2
Proebstle et al.[6]	70	VenaSeal	Between the delivery catheter and the SFJ	5 cm	92.90	PR: 5	1.40
Tekin et al.[7]	62	VariClose	SFJ	5 cm	90.30	CR: 4, PR: 2	0
Eroglu et al.[8]	168	VariClose	SFJ	3 cm	96.60	CR: 2, PR: 9	0
Chan et al.[9]	108	VenaSeal	SFJ	4 cm	75.70	CR: 24, PR: 3	1.90
Morrison et al.[10]	108	VenaSeal	Proximal GSV	5 cm	97.20	CR, PR: not defined. Total: 3	0
Bozkurt and Yilmaz[11]	154	VariClose	SFJ	3 cm	95.80	PR: 3	0
Koramaz et al.[12]	166	VariClose	SFJ	3 cm	98.60	PR: 2	0

CA: cyanoacrylate ablation; SFJ: saphenofemoral junction; CR: complete recanalization PR: partial recanalization; GSV: great saphenous vein.
[a]1-month occlusion rate.

3.3 ± 1.6 cm. This is greater than the length of the typical residual stump resulting from endovenous laser ablation (EVLA). In this case, the first adhesive injection was performed while compressing the mid portion between the SFJ and the delivery catheter tip with the ultrasound probe. This approach potentially acted as a contributing factor in the long residual stump, and we thought that compression of the GSV adjacent to the SFJ would have allowed for more proximal migration of cyanoacrylate, resulting in a shorter stump. The protocol provided by the manufacturer for VariClose (another CA system) suggests an abrasion point starting 3 cm caudal to the SFJ, as VariClose differs from VenaSeal in its chemical composition and injection method. It is noteworthy that there were no reported cases of thrombus or glue extension beyond the SFJ in studies that used VariClose. The concept of treatment failure or recanalization was defined by Almeida et al. as the presence of a patent segment in the treated saphenous vein >5 cm. While this standard was used in most subsequent studies, recanalization was defined as the presence of a patent segment >10 cm in length in reports by Proebstle et al.[6] and Tekin et al.;[7] thus, a consensus definition is needed. Based on the standard defined by Almeida et al., the case in this study can be classified as successful treatment with complete occlusion. However, given that the symptom-free interval was 7.4 years and varicose vein recurrence-free interval was 6.3 years in patients with a long residual stump in a report by Geier et al.,[15] and judging from our extensive experience with EVTA, we believe that a long residual stump could cause late treatment failure. Thus, long-term follow-up is required to determine the success rate of CA.

Conclusion

Considering its short-term treatment outcomes, safety, and convenience, CA is certainly a revolutionary treatment method. However, to improve the long-term treatment outcomes and safety, it is important to conduct long-term follow-up and further develop refined standard treatment protocols that consider the starting point of adhesive injection, the compression point during the first adhesive injection, the differences in vessel diameter, the injection methods, the presence or absence of a perforator, and the viability of adjunctive phlebectomy or sclerotherapy.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

Ethical approval to report this case was obtained from Samsung Vein Surgery Clinic (approval number/ID: 201803/SVC).

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Informed consent

Written informed consent was obtained from the patient for her anonymized information to be published in this article.

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