

Great Saphenous Vein Occlusion with Cyanoacrylate: An Alternative to Endovenous Laser Ablation?

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ABSTRACT

Objective: We present our initial center experience, using cyanoacrylate for great saphenous vein occlusion.

Materials and Methods: Total of six cases of great saphenous vein incompetency treated with cyanoacrylate embolization without use of conscious sedation or tumescent anesthesia are described with the procedural details and initial results.

Results: All six cases of great saphenous vein were successfully occluded with this technique and none of them showed any recanalization at 1st, 3rd or 6 month follow up.

Conclusion: Cyanoacrylate occlusion of great saphenous vein is a promising alternative in treating great saphenous vein incompetency.

Keywords: Cyanoacrylate glue, great saphenous vein ablation, pharmacologic ablation

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INTRODUCTION

Endovenous thermal ablation treatments are now widely in use for patients with great saphenous vein (GSV) incompetency. They are preferred because of their lesser comorbidity and shorter recovery time over surgical stripping and have an occlusion rate over 90% in 5 year follow up [1]. A new non thermal occlusion technique with cyanoacrylate (CA) was introduced first in a swine model [2, 3] and then on a human pilot study in 2013 [4]. The commercially available systems are Sapheon Venaseal Closure System (Sapheon, Santa Rosa, Calif) in Europe and Variclose System (Biolas, FG Group, Ankara, Turkey) in our country.

Herein we present our initial experience with CA in 6 cases of GSV incompetency.

MATERIALS and METHODS

Technique

The procedures were carried out without intravenous sedation and perivenous tumescent anesthesia and The Variclose System (Biolas, FG Group, Ankara, Turkey) containing a 7 Fr sheath, 5 Fr outer catheter, 0.035 guidewire, inner glue catheter, ready for use CA tube and an application gun was used for the treatment (Figure 1).



Figure 1:

- a; The Variclose System containing a 7 Fr sheath, 5 Fr outer catheter, 0.035 guidewire, inner glue catheter, ready for use CA tube and an application gun
- b; Withdrawal of the CA from the tube into the syringe
- c; Insertion of the syringe into the application gun
- d; Image of the attached outer and inner catheter with the application gun
- e; and f; Delivery of the CA from the tip of the inner catheter with every puff

GSVs were accessed under ultrasound (US) guidance with a micropuncture set (Micro-Stick, Medcomp, Harleysville, PA, USA) below the knee level, and the 7 Fr sheath was introduced using a guidewire. Through the sheath the outer catheter (5 Fr) was advanced to the saphenofemoral junction (SFJ) under US guidance. Then the inner glue catheter connected to the application gun which is designed with a

trigger pulse delivering 0,1 mL of CA in every puff, was placed at least 4 cm distal to the SFJ. While compressing the SFJ manually to prevent any passage of CA into the main femoral vein, the glue was delivered via the gun withdrawing the catheter in every 3 cm until the access point (Figure 2).

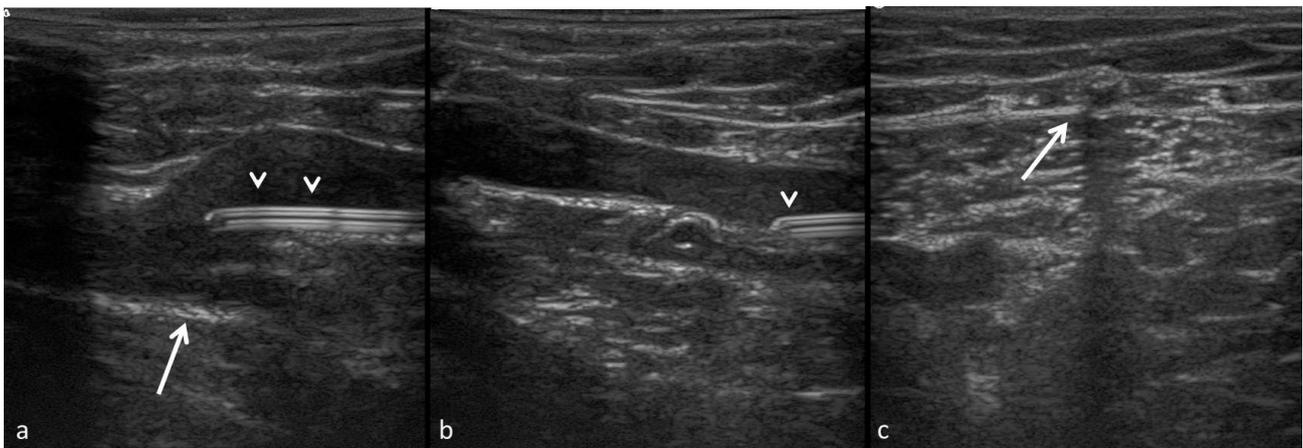


Figure 2:

- a; US images during the procedure. a; arrival of the outer catheter (white arrowheads) to the SFJ (white arrow), b; Withdrawal of the tip (arrowhead) 4 cm distal to the SFJ, c; Hyperechogenic image of the CA in the axial plane

Cases

Total of 6 cases were selected for treatment with CA embolization. Informed consent forms were obtained from all the patients before the procedure. The decision was made regarding the risk of having hyperpigmentation (matting) after laser treatment. Other than that, all 6 cases were also candidates for endovenous laser ablation therapy for lower extremity varices (Table).

Table: Patient characteristics

Case	Age	Maximum GSV diameter(mm)	CEAP Score	Treated GSV lenght (cm)
1	18	11	C2, EP, AS, PR	45
2	42	13	C3, EP, AS, PR	38
3	34	9	C1, EP, AS, PR	37
4	36	9*	C2, EP, AS, PR	20
5	41	8	C3, EP, AS, PR	51
6	34	9	C1, EP, AS, PR	30

*Treated through the anterior thigh collateral

GSV: Great saphenous vein

CEAP: Comprehensive classification system for chronic venous disorders ; C: Clinical classification, E: Etiological classification, A: Anatomical classification, P: Pathophysiology

RESULTS

The procedures were uneventful in 5 out of 6 patients. Only in 1 patient (case 1, 18 yo female), slight thrombi protrusion into the common femoral vein was observed right at the end of the procedure.

A single dose of enoxaparin (Clexane) 0.6 ml was administered and the patient was called back for the next day. Next day the patient revisited and US examination showed total resolution of the thrombus

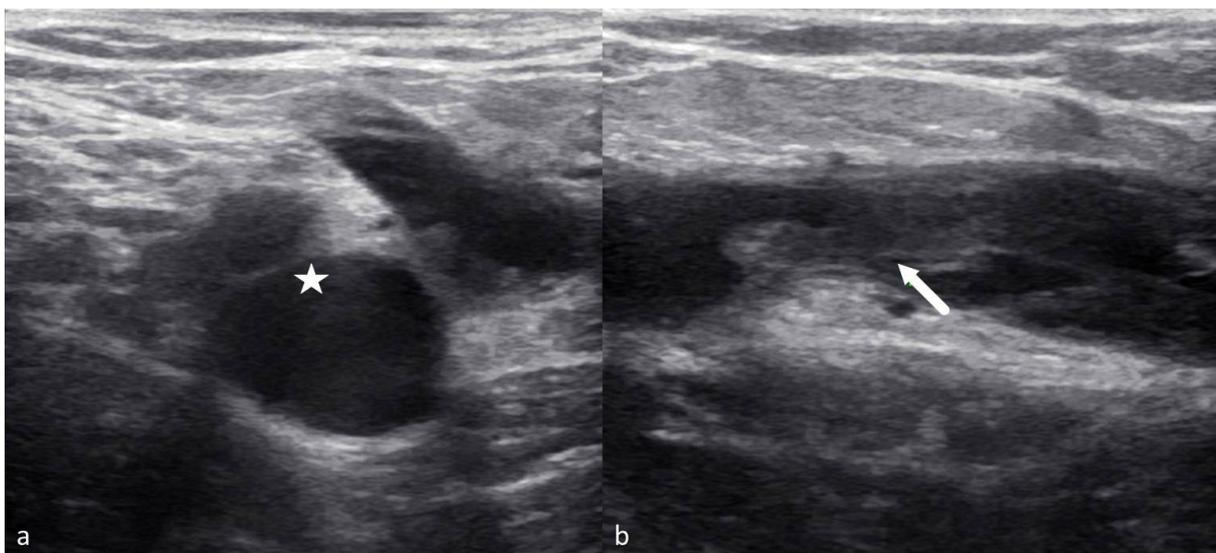


Figure 3:

a; Axial US image of the SFJ showing the patent main femoral vein, b; sagittal view of the GSV occluded with the hyperechoic CA (white arrow)

All cases were followed up with compression stockings for one week and called back at 1 week and 1 month clinical and US follow ups. On follow up at first week, 1, 3 and 6 months (Figure 4)

the hyperechogenic materials were clearly visible in GSV without any recanalization in all 6 patients and complaints regarding incompetency showed total relief.

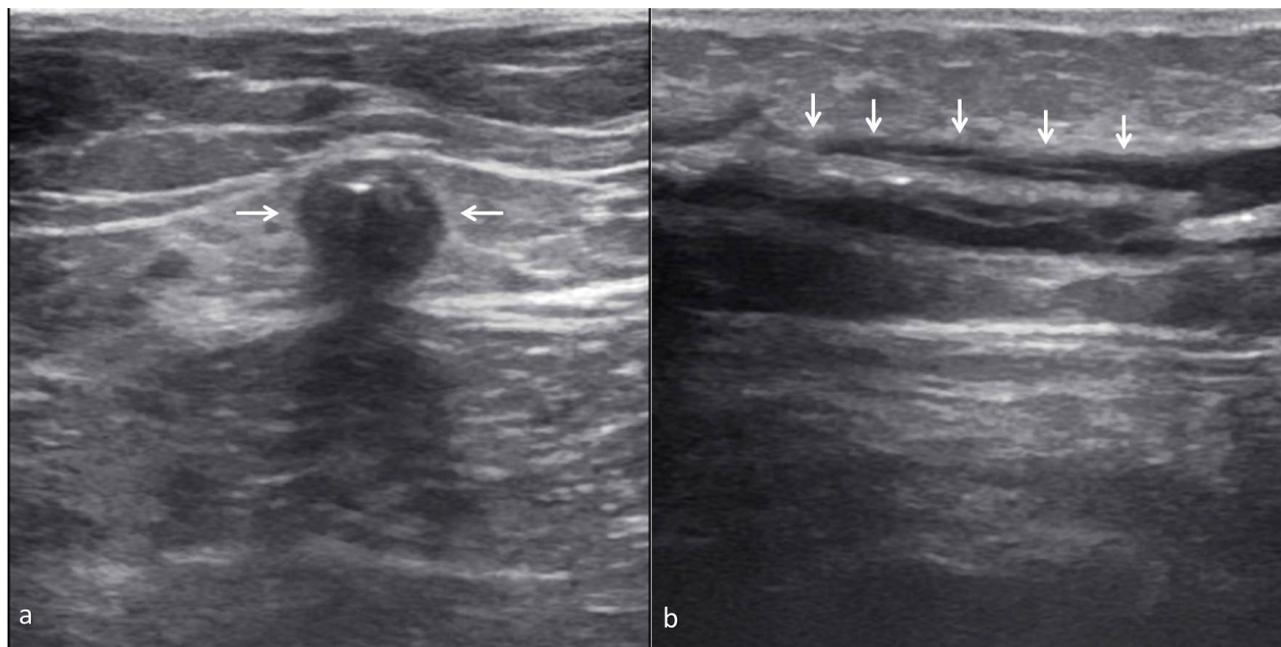


Figure 4: Hyperechogenic CA still visible in GSV on 1 month follow up axial (a) and longitudinal (b) US images

DISCUSSION

Tumescent anesthesia is essential and is highly protective in perivenous tissue damage. However, it is time consuming and administering it with multiple needle injections causes post procedural pain and bruising. Also most of the patients prefer to have the procedure under intravenous sedation not to feel the obnoxious needle injections during the procedure. The primary advantage of non-thermal occlusion with CA is that it does not require perivenous tumescent anesthesia which is a necessity in endovenous thermal ablation techniques, laser or radiofrequency ablation, to prevent perivenous tissue damage generated by the heat.

Cyanoacrylate, a liquid adhesive that has been widely used in arteriovenous malformations, polymerizes in plasma and blood leading adhesion of the targeted vessel. Studies so far present an occlusion rate of the GSV as high as 92-96% on follow ups of 6 and 12 and 24 months emphasizing on removing the step of tumescent anesthesia leading to less peri and post procedural complaints [4-6]. Also one case report was presented of CA usage in GSV occlusion in a patient under anti coagulation showing successful initial closure although on follow up recanalization was seen [7]. No major complication is seen in the literature although thrombus extension

to the main common femoral vein was observed and dissolved spontaneously without the need of anticoagulation [4]. In our experience we also observed a case where thrombus extension was seen into the common femoral vein resolving one day after although we have administered one dose of enoxaparin.

Another advantage of this technique suggested by the first studies is elimination of the compression stockings after the procedure as occlusion with CA does not perforate the vein wall. However in our cases we did not omit this step as the knowledge on compression stockings is limited and further randomized studies are needed regarding this application.

Pharmacological embolization has some issues that are to be addressed. First of all, the liquid embolic agent has to be optimized for this procedure. The chemical mixture of the agent is to be studied for long term safety and durability.

Secondly, the maximum diameter of the GSV that can be treated with this compound should be studied further as there is no data regarding the behavior of the CA with larger vessel sizes.

Interventional radiologists whom are experienced in CA embolization are well aware of the fact that

non-target embolization is a major risk with liquid embolic agents. So, this has to be emphasized clearly during this procedure as well. Experienced hands are definitely needed for performing CA embolization for GSV occlusion.

Endovenous occlusion of the GSV with CA is seemingly a promising alternative method to endovenous thermal ablation techniques with the benefit of not requiring tumescent anesthesia and

intravenous sedation therefore eliminating peri and post procedural pain and bruising. However further multicenter, randomized studies with bigger cohorts are needed.

CONFLICT of INTEREST

None

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