

# Exit site complications following cyanoacrylate glue endovenous ablation of incompetent truncal veins for chronic venous insufficiency

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## ABSTRACT

In the last 5 years, the use of nonthermal, nontumescent endovenous ablation such as cyanoacrylate glue (CAG) for treatment of chronic venous insufficiency has gained global popularity. This case series discusses the presentation and management of delayed access sheath site infections in patients who have undergone CAG therapy. The authors believe such adverse effects are related to granuloma formation owing to a hypersensitivity reaction to CAG at the puncture exit site. The endovenous surgeon should be aware of preventing glue spillage into the subcutaneous space at the access site during treatment, to minimize the risk of this complication developing. (*J Vasc Surg Cases and Innovative Techniques* 2020;6:500-4.)

**Keywords:** Varicose veins; Cyanoacrylate glue; Phlebitis; Infection; Hypersensitivity reaction

Chronic venous insufficiency (CVI) is a common disease with an estimated worldwide prevalence of 84%.<sup>1</sup> CVI treatment has evolved over the past 20 years, with open high ligation and surgical stripping previously the primary choice, replaced with endothermal ablation as the gold standard.<sup>2</sup> Although thermal ablation has high long-term closure rates, its limitations include the need for tumescent anesthesia and postoperative compression hosiery, potential discomfort from bruising, and nerve injury.<sup>3</sup> Nonthermal, nontumescent (NTNT) endovenous technologies have been introduced to further minimize surgical trauma, eliminate the need for tumescent infiltration, and address the limitations of endothermal ablation. NTNT techniques are thought to enhance the perioperative experience, with better patient-centric and satisfaction-based outcomes.<sup>4</sup> Cyanoacrylate glue (CAG) is an example of a NTNT modality and has been introduced into the endovenous arena over the past 5 years, with the VenaSeal Closure System (VSCS) (Medtronic Plc, Dublin, Ireland) and VenaBlock Venous Closure System (Invamed, Ankara, Turkey) being two frequently used modalities.<sup>4</sup> Since its introduction to Singapore in February 2016, the authors' institution has

performed more than 1200 NTNT ablations. One common aftereffect of CAG closure is a distinctive erythematous dermal reaction within the first few weeks, usually affecting the skin overlying the treated truncal vein.<sup>5</sup> This effect has been termed the abnormal red skin reaction, atypical for phlebitis seen after endothermal ablation.<sup>6</sup> Itching can be a predominant feature and is often more widespread. Thought to be related to a delayed type IV hypersensitivity reaction, this feature can be prolonged, even requiring glue cast removal.<sup>7</sup>

This case series describes four patients who experienced an intense form of this reaction complicated by secondary infection necessitating surgical debridement of the exit skin site with portions of the ablated saphenous vein and extravasated glue casts for source control. All patients agreed to have their cases and images used for this article and institutional review board approval was obtained. All procedures were performed under strict sterile conditions in an operating room setting. Skin preparation was with cetrimide and chlorhexidine-based solutions before sterile draping. Puncture sites were closed with wound Steri-strips and covered with an adhesive waterproof dressing.

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**Fig 1.** Preoperative image showing pus discharge from the right calf puncture site (*thin arrow*), with glue casts excised and removed intraoperatively (*thick arrow*).

## CASE REPORTS

**Case 1.** A 41-year-old Chinese woman without drug allergies underwent a bilateral below-knee great saphenous vein (GSV) VenaBlock ablation for C2s disease. Two milliliters of CAG was injected into each GSV via distal calf punctures. She presented on postoperative day (POD) 6 with redness and tenderness at the right calf puncture site and was treated with oral amoxicillin-clavulanate acid and mefenamic acid without improvement. Wound swab yielded *Enterobacter cloacae* and *Staphylococcus aureus*. Owing to persistent symptoms and pus discharge, wound debridement was done 4 months after ablation, with glue casts excised (Fig 1). The wound healed completely within 3 weeks.

**Case 2.** A 78-year-old Chinese man who is allergic to clindamycin underwent a right GSV and small saphenous vein VenaSeal ablation for C5s disease. He presented 6 months postoperatively with two nonfluctuant tender nodules at the right calf puncture site and was prescribed intravenous amoxicillin-clavulanate acid. Magnetic resonance imaging showed cellulitis at the medial upper to mid calf, with small subcutaneous abscesses overlying the soleus muscle, closely

related to the saphenous vein and puncture site (Fig 2). The right calf puncture site and distal GSV were saucerized 1 week later, with glue casts and pus positive for *Pseudomonas aeruginosa* expressed. The debridement wound healed upon review 8 weeks later.

**Case 3.** A 61-year-old Chinese woman who is allergic to diosmin and hesperidin underwent a right GSV VenaSeal ablation for C2s disease. She presented with a small hematoma and rash around the puncture site on POD 11, which resolved with etericoxib and chlorpheniramine. She underwent a left below knee GSV VenaBlock ablation for C2s disease 6 months later. We used 1.3 mL of CAG was used to occlude 24 cm of the GSV. Phlebitis was noted on POD 23 and she was admitted for left lower limb cellulitis on POD 40, which improved with intravenous antibiotics. However, she was readmitted on POD 65 because of pus discharge from the left calf puncture site, and a subcutaneous fluid collection was seen on ultrasound. Glue casts were seen during wound debridement (Fig 3). Histology showed fibrinopurulent exudate and culture yielded *Staphylococcus aureus*. The debridement wound healed well within 8 weeks (Fig 3).



**Fig 2.** Preoperative magnetic resonance image showing cellulitis with small abscesses of the left calf (white arrows), with glue casts removed from the saucerization wounds (black arrow).

**Case 4.** A 41-year-old Chinese woman without drug allergy underwent a bilateral below knee GSV VenaBlock ablation for C2s disease. She presented with fever and pus discharge from the right ankle puncture site 6 weeks thereafter. The infected puncture site was saucerized, yielding glue exudate and pus positive for *P aeruginosa* (Fig 4). The saucerization wound healed well thereafter.

## DISCUSSION

CAG therapy has been associated with a phlebitis-like reaction, thought to be a type IV hypersensitivity reaction.<sup>5</sup> Park et al<sup>5</sup> reported on the features differentiating phlebitis-like abnormal reaction from classic phlebitis for patients after CAG treatment for incompetent saphenous veins, which defined the former as an unusual skin reaction over the treated area several days after CAG treatment. Phlebitis-like abnormal reaction also differs from

typical postendothelial ablation phlebitis in that prophylactic nonsteroidal anti-inflammatory drug use after the procedure does not decrease its incidence. Jones et al<sup>7</sup> reported a previous case of delayed hypersensitivity reaction 4 months postoperatively, with histologic studies showing a predilection of mononuclear T4 lymphocytes in the affected vein. Almeida et al<sup>8</sup> reported that GSV segments 5.5 years after VenaSeal still showed histology consistent with a foreign body reaction.

Beyond causing discomfort, a delayed hypersensitivity reaction with granuloma formation can become a nidus for infection. All patients in the series had positive wound cultures for *Staphylococcus* or *Pseudomonas*, likely via biofilm formation around the granuloma.<sup>9</sup> These organisms are known to produce biofilms highly resistant to systemic antibiotics and often require source control via surgical debridement.<sup>9</sup>



**Fig 3.** Preoperative imaging showing calf puncture site redness and discharge, with a preoperative ultrasound image showing a subcutaneous fluid collection (*white arrow*) and a healed postdebridement wound.

The authors believe that, in light of increasing evidence of delayed hypersensitivity reactions associated with CAG-based vein ablation, patients should be warned of the risks of delayed local puncture site complications and infections preoperatively. In current practice, the sheath is left in as long as possible and the glue catheter is removed within the sheath once the last dose of glue is applied 3 cm from the puncture site, ensuring minimal spillage within the subcutaneous space.<sup>10</sup> The subcutaneous space has many immune cells and CAG may trigger a hypersensitivity reaction, possibly explaining the relatively high rate of phlebitis-like reaction.<sup>10</sup> Jones et al<sup>7</sup> have suggested sheathing the catheter upon removal, to minimize glue spillage and exposure. A CAG-related type IV hypersensitivity is also more

frequent in patients with multiple drug allergies. Hence, caution should be exercised in offering patients with multiple drug allergies CAG ablation.

### CONCLUSIONS

We found that a delayed phlebitis-like reaction seems to infrequently follow CAG ablation for CVI, sometimes complicated by puncture site wound infections that require surgical excision. We postulate that this is caused by secondary glue extravasation during sheath removal. Patients should be advised on such complications and clinicians should recognize them postoperatively. Clinicians should also exercise care upon sheath removal to minimize depositing CAG at the exit site, by removing the catheter within the sheath.



**Fig 4.** Preoperative imaging of ankle puncture site with pus discharge (*thin arrow*), with intraoperative expression of glue exudate (*thick arrow*), and postsaucerization wound.

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