A CASE OF THE DISAPPEARING HEAT INDUCED THROMBUS, CAUSING PULMONARY EMBOLISM DURING ULTRASOUND EVALUATION

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We report a case of a 58-year-old male patient who underwent successful endovenous radiofrequency ablation of the left great saphenous vein for CEAP class 4 venous disease, and on the third postoperative day had duplex ultrasound evaluation which showed successful occlusion of the GSV with Class 2 endovenous heat induced thrombus (EHIT) that disappeared during the evaluation and caused pulmonary embolism. To our knowledge no case of pulmonary embolism has been reported to occur during post operative follow up duplex scanning. Relevant literature is reviewed and possible mechanism for thrombus dislodgement is entertained.
INTRODUCTION

Endovenous thermal ablation of the saphenous veins, using radiofrequency ablation (RFA) or endovenous laser treatment (ELA) has become the most common method of treatment for varicose veins and symptomatic venous reflux disease, and is getting wide acceptance. Minor complications such as skin bruising/hematoma, bleeding, transient paresthesia and skin burns have been reported in 3-20% of patients. Major complications which include deep venous thrombosis (DVT) and pulmonary embolism (PE) are rare. Extension of thrombus from the saphenous to the femoral or popliteal veins have been reported to occur in 0-6% of patients. The term Endovenous Heat Induced Thrombus (EHIT) was introduced by Kabnick who also classified the level of thrombus from 1 to 4 classes. Hingorani reported extension of thrombus in 16% of limbs treated with RF A, and raised caution about the procedure and recommended early post operative duplex evaluation. Most of these thrombi retract or absorb, but they can also detach and cause PE.

CASE REPORT

A 58-year-old man was referred to our Greenbelt office in Maryland by his primary physician with symptoms of left calf pain and progressive edema which has gradually gotten worse over the previous three months. The symptoms were more prominent at the end of the day. His past medical history was negative. He was taking no medication. On examination his weight was 134 lb., height was 5’6” with a BMI of 21.63. His Blood pressure was 110/68, pulse rate was 82/min. and respiratory rate was 16/min. The general physical examination was
essentially negative. The right leg had no evidence of varicose veins or stigmata of venous insufficiency. There were a few spider angiomata on the right medial calf. On the left leg, there was an area of skin hyperpigmentation in the distal medial calf. There were also obvious varicosities in the medial and posterior calf regions. His CEAP class was 4 and the venous clinical severity score (VCSS) was 6. The patient stated that he used compression stocking in the past for about 3 months without significant improvement.

Duplex ultrasound evaluation was performed in our ICAVAL (Intersocietal Commission for the Accreditation of Vascular Laboratories), showed reflux in the left great saphenous vein (GSV) with a maximum reflux of 3.5 sec. near the confluence of the saphenous vein. The maximum diameter of the GSV was 11 mm above the knee and 5 mm below the knee. The patient underwent RFA of the left GSV using ClosureFAST in a standard technique, using local and tumescent anesthesia. The vein was accessed below the knee. The catheter tip was 2.8 cm from the Sapheno-femoral junction. The patient was re-evaluated 3 days later in our vascular laboratory, and the GSV was noted to be completely occluded. There was EHIT class 2 in the left Sapheno femoral junction. The common femoral vein was compressible and had flow but there was thrombus protruding into the lumen filling less than 50% of the lumen (fig 1). When the Sapheno-femoral region was re-evaluated after the compression test, the thrombus which was protruding into the femoral vein disappeared (fig2). The patient was immediately referred to the hospital for PE work up. A CT of the chest with contrast was obtained. This was positive for bilateral small segmental pulmonary emboli (fig.3). The patient had no symptoms of cough, chest pain or shortness of breath. He had no fever or chills. His vital signs were: Temperature 97.8, respiratory rate 16, heart rate 116, blood pressure 138/87, pulse oximetry was 100% on
He was admitted to the hospital and treated with enoxaparin sodium (lovenox) 1 mg/kg SC and converted to warfarin. The enoxaparin was continued till the INR was therapeutic. He was discharged from hospital after three days on 7.5 mg of warfarin and followed as an out-patient. Follow up duplex scan done after 1 week, 1 month, 2 months and 6 months showed no evidence of DVT and the GSV remained occluded. The oral anticoagulation was discontinued after 4 months. The VCSS improved from 4 to 6.

DISCUSSION

DVT and PE are rare complication of EHIT. Kabnick introduced the term EHIT and noted that this is more benign than the spontaneously occurring thrombosis, in that it is stable and usually regresses or shows complete resolution. He also made the observation that EHIT displays a different sonographic echogenicity and becomes echogenic in less than 24 hours. The EHIT in our case does show increased echogenicity. He classified EHIT from class 1 to class 4. Another classification system was recently introduced by Lawrence from level 1 to 6. The International Endovascular working group registry shows that DVT/EHIT occurred in 0.27% (10 of 3696 cases) and PE occurred in 0.023% (1 of 3696) after EVLA. In a review of 11 articles, Mozes reported 21 case of DVT and 2 cases of PE after VNUS Closure procedure. At the Arizona Heart institute with >1000 cases of venous ablation only one case of pulmonary embolism was reported. To decrease the risk of EHIT formation, several suggestions have been offered: The position of the catheter tip should be at least 2 cm from the Sapheno femoral or Sapheno popliteal junction; and reduce the thrombus load by elevation of the leg during
ablation and also by using adequate tumescent anesthesia.\textsuperscript{7} A recent paper showed that a GSV diameter of $>8$ cm and history of DVT were associated with EHIT class 2 or greater.\textsuperscript{6} A recent study which evaluated the influence of procedural factors concluded that there was no difference in catheter tip position or mean diameter of the treated vein between the EHIT and non EHIT groups.\textsuperscript{9} There is no report on association of EHIT with hypercoagulable states.

Our patient had no history of DVT, and the catheter tip was definitely identified at 2.8 cm from the Sapheno-femoral junction. The diameter of his GSV was 11 mm which may have contributed to the EHIT. We hypothesize that the standard technique of compression of the superficial and deep veins\textsuperscript{10} used to evaluate for DVT at the Sapheno femoral junction may have contributed to the dislodgement of the thrombus causing PE. To our knowledge there has been no report of PE caused during ultrasound evaluation of EHIT.

We recommend that when thrombus protrusion in to the femoral or popliteal vein is observed after endovenous ablation, one should be careful and not use excessive compression of the femoral vein to avoid dislodgement and possible PE.
REFERENCES


