Population-Based Analysis of Venous Thrombosis Events Following Saphenous Ablation

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Abstract: Venous thrombotic events following great and small saphenous vein ablation procedures for varicose veins have been reported. Current knowledge of these events is based on single institution studies with small sample sizes.

Methods: The National Surgical Quality Improvement Program (NSQIP) database (2005-2009) was used to identify a total of 3,874 patients who underwent radiofrequency ablation (RFA) or endovenous laser ablation (EVL) of the great and small saphenous veins with or without stab phlebectomy. Outcome variables included clinically documented postoperative deep vein thrombosis (DVT) or pulmonary embolism (PE). Bivariate and multivariable logistic regression analyses were performed to identify risk factors associated with venous thrombotic events after ablation procedures.

Results: A total of 2,897 (74.8%) patients underwent RFA and 977 (25.2%) underwent EVLA for lower extremity varicose veins. Patients who underwent RFA were more likely to be older (53.8 vs 51.8 yr, P<0.001), obese (42.8% vs 38%, P=0.009), diabetic (8.5% vs 6.4%, P=0.01) hypertensive (31.9% vs 26.8%, P=0.002) and to have undergone procedures involving both veins (24% vs 4%, P<0.0001). Patients who underwent EVLA were more likely to have undergone concomitant stab phlebectomy (44.9% vs 31.7%, P<0.0001), had longer operative times (63.6 min vs 57.3 min, P<0.0001). The incidence of DVT (1.74% vs 1.52%, P=0.63) and pulmonary embolus (0.07% vs 0%, P=1) were similar between EVLA and RFA. No significant predictors of DVT in the postoperative period were identified on bivariate or multivariable analyses. In the subgroup of patients who underwent ablation procedures only (no stab phlebectomy, N=2514), there was a trend toward higher incidence of DVT in patients undergoing EVLA (2.6% vs 1.4%, P=0.057). After adjusting for patient demographics, patients presenting with lower extremity ulcers were 2.4 times more likely to develop DVT compared to those without ulcers (OR=2.4, 95% CI=1.01-6.11, P=0.04). In the multivariate model when only ablation procedures were performed, EVLA was associated with an 83% increase in odds of DVT compared to RFA, although not statistically significant (OR=1.83, 95% CI=0.95-3.52, P=0.06).

Conclusions: The incidence of venous thrombotic events after saphenous ablation is low. However, given that patients with lower extremity ulcers experienced an increased risk of DVT, care should be taken to ensure that the ablation catheter is positioned an appropriate distance from the inferior vena cava in an ER subtype-specific fashion. This study was designed to test whether specific ERs mediate relaxation in human veins, and whether ER-meditated activity and vein relaxation are enhanced in varicose veins.

Methods: To test whether specific ERs mediate relaxation in human veins, we hypothesized that estrogens might mediate venous dilation in the setting of varicose veins. We have previously shown that estrogens induce relaxation of rat inferior vena cava in an ER subtype-specific fashion. This study was designed to test whether specific ERs mediate relaxation in human veins, and whether ER-meditated activity and vein relaxation are enhanced in varicose veins.

Results: A direct comparison was performed using 810nm and 1470nm diode lasers at clinically relevant treatment parameters in combination with Bare Tip (BT) and Jacketed Tip (J) fibers. Cohorts of 12 samples each were tested encompassing 810nm/BT Fiber, 810nm/J Fiber, 1470nm/BT Fiber, and 1470nm/J Fiber. Simulated veins with a thickness of 0.5 mm were staked on a gelatin base. The fibers were attached to a motorized slider and oriented so that the fiber tip was in contact and parallel to the vein throughout each test run. The assembly was covered with sheep blood to a depth of 2 - 3 mm. The pullback slider and laser were started simultaneously, pulling fibers over the vein at set rates to achieve the desired LEEDs. The lengths of all perforations within a vein segment were measured, added together and divided by the vein length to obtain the percent length of perforation.

Results: The results show the degree of perforation for each test group along with the t-test statistical analysis between groups. (See Tables I and II) The actual treatment lengths had a mean of 61.6mm ± 4.9mm. There was no significant difference between the groups of vessel lengths.

Conclusions: Surprisingly, the J fiber was superior when comparing like fibers in degree of perforations. However, jacketed tip fibers demonstrated a significantly lower degree of perforation compared to bare tip fibers with the 810 or 1470 nm lasers at standard clinical parameters. This in vitro study suggests that jacketed tip fibers are superior in terms of postoperative recovery limiting pain and bruising.