Thermal vs Non-Thermal Ablation for Treatment of Great Saphenous Veins in Patients with Lower Extremity Superficial Venous Disease

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Florida Vascular Society 2026
Orlando, Florida

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Disclosures

No financial disclosures

Background

- **Chronic venous insufficiency management:**
  - Historically: ligation with vein stripping
  - Recent decades:

Thermal Ablations	Non-thermal, Non-tumescent (NTNT) Ablations
Radiofrequency (RFA) Endovenous laser ablation (EVLA)	Mechanochemical ablation (MOCA, ClariVein) Cyanoacrylate (VenaSeal) Varithena (sclerotherapy)

This study sought to:

Investigate quality of life outcomes in patients who have received thermal versus non-thermal ablation treatments of GSV reflux using the Vascular Quality Initiative Varicose Vein Registry (VQI-VVR).

Methods

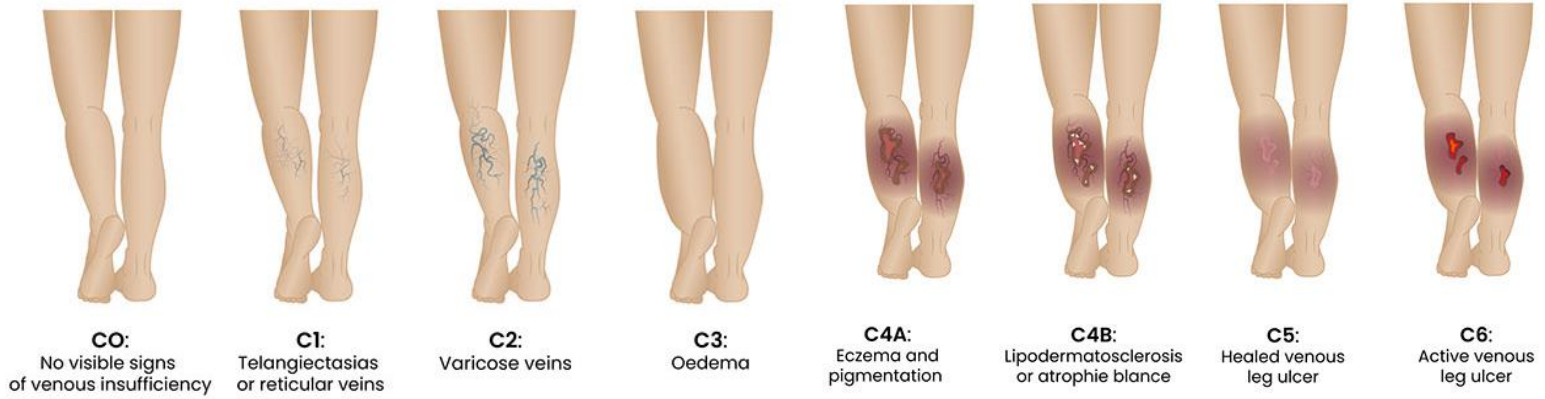
- Multi-center, retrospective study
  - Included adults undergoing thermal or non-thermal ablations of the **GSV** for documented reflux from 2014-2026

- Collected data on:
  - Demographics: race, ethnicity, procedure site, prior venous procedures
  - Procedural variables
    - Anesthesia type, truncated segment treated, side treated, vein diameter
  - Post-operative and follow-up variables
    - Complications (immediate & at follow-up), hospital readmission, recanalized veins, ulcer healing

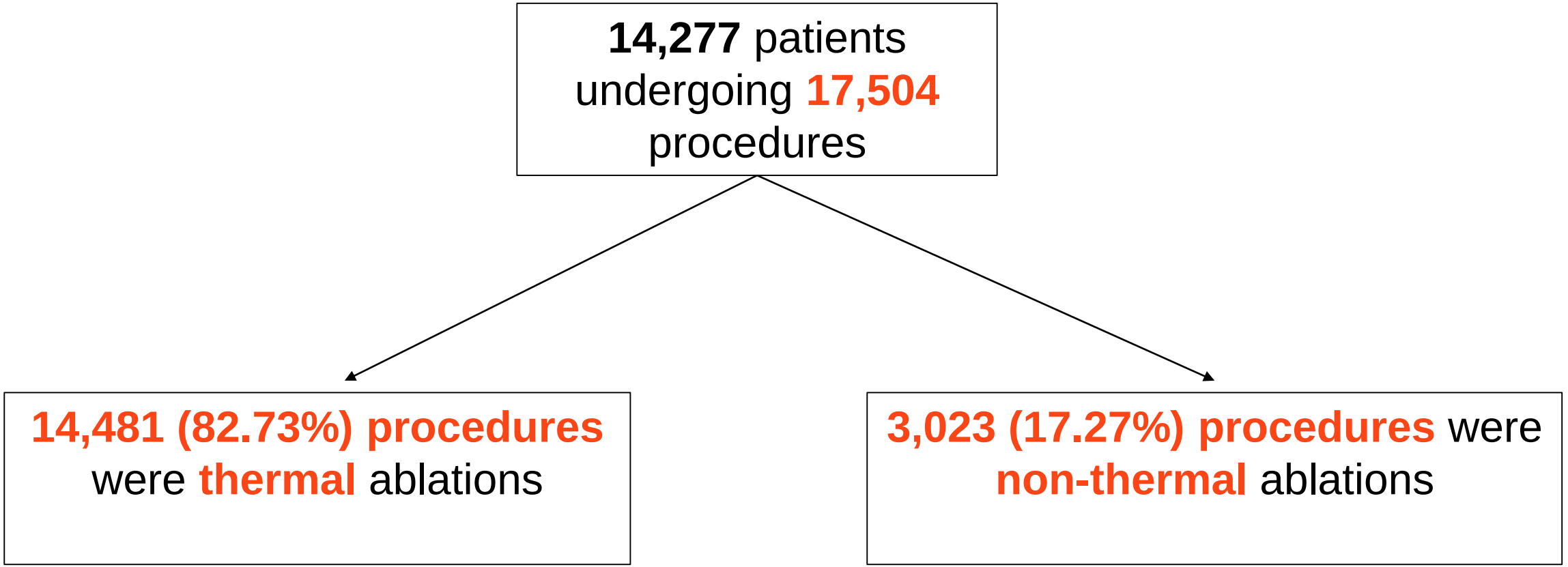
Methods

<u>Primary outcome of interest and comparator</u> was quality of life defined as:

- C-classification changes
- Pain or discomfort changes
- Work impact



Study Population

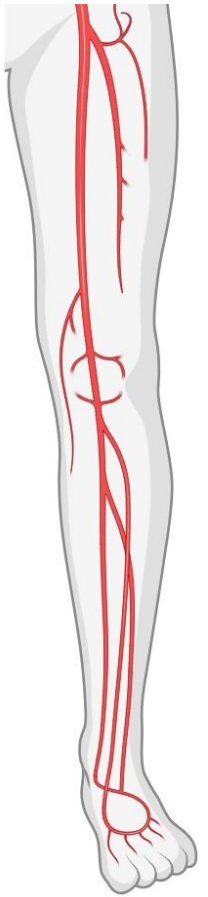


Study Population and Demographic Comparison

Variable	All Ablations (n=17,504)	Thermal (n=14,481)	Non-thermal (n=3,023)	*p*-value
Age (years, Median [Q1, Q3])	58 (46, 68)	58 (46, 68)	61 (48, 70)	**<0.0001**
BMI (kg/m^2,Median [Q1,Q3])	29.53 (25.35, 34.96)	29.49 (25.38, 34.87)	29.62 (25.40, 35.18)	0.2734
Male	6,332 (36.17%)	5,204 (35.94%)	1,128 (37.31%)	0.1571
Side Treated				
Left	8,874 (50.70%)	7,343 (50.71%)	1,531 (50.65%)	0.9522
Right	8,630 (49.30%)	7,138 (49.29%)	1,492 (49.35%)	
Race				
Black	1,038 (5.93%)	913 (6.31%)	125 (4.14%)	**<0.0001**
White	13,998 (80.00%)	11,431 (78.95%)	2,567 (84.97%)	
Unknown/Other	2,099 (11.99%)	1,825 (12.60%)	274 (9.07%)	
Non-white	3,502 (20.00%)	3,048 (21.05%)	454 (15.03%)	**<0.0001**
Ethnicity				
Hispanic/Latino	1,114 (6.36%)	938 (6.52%)	176 (5.85%)	0.1900
Not Hispanic/Latino	16,285 (93.04%)	13,453 (93.48%)	2,832 (94.15%)	
Procedure Site				
Hospital	3,052 (17.43%)	2,415 (34.47%)	637 (28.20%)	**<0.0001**
Non-Hospital	6,213 (35.49%)	4,591 (65.53%)	1,622 (71.80%)	

Operative Data

Variable	All Ablations (n=17,504)	Thermal (n=14,481)	Non-thermal (n=3,023)	*p*-value
Largest diameter of treated vein (mm)	7 (5.7, 9)	7.3 (6, 9.1)	6 (4, 8)	**<0.0001**
Anesthesia Types				
General	391 (2.23%)	255 (1.76%)	136 (4.50%)	**<0.0001**
Local	2,256 (12.89%)	685 (4.73%)	1,571 (51.97%)	**<0.0001**
Sedation	520 (2.97%)	423 (2.92%)	97 (3.21%)	0.4095
Regional/Tumescent	5,219 (29.81%)	5,089 (35.14%)	130 (4.30%)	**<0.0001**
Multiple types	8,411 (48.05%)	7,900 (54.55%)	511 (16.90%)	**<0.0001**
None	690 (3.94%)	117 (0.81%)	573 (18.95%)	**<0.0001**
Truncal Segment Treated				
GSV above knee	15,298 (87.40%)	12,940 (89.36%)	2,358 (78.00%)	**<0.0001**
GSV below knee	2,206 (12.60%)	1,541 (10.64%)	665 (22.00%)	**<0.0001**



Thermal

Non-thermal

Hospital and Non-Hospital Outcomes

Variable	All Ablations (n=17,504)	Thermal (n=14,481)	Non-thermal (n=3,023)	*p*-value
Complications				
None	17,452 (99.70%)	14,452 (99.80%)	3,000 (99.24%)	**<0.0001**
Mild Allergic Reaction	17 (0.10%)	7 (0.05%)	10 (0.33%)	**<0.0001**
Severe Allergic Reaction	2 (0.01%)	0 (0.00%)	2 (0.07%)	**0.0052**
Cough/Chest Tightness	1 (0.00%)	0 (0.00%)	1 (0.03%)	**0.0159**
Pulmonary Embolism	2 (0.01%)	1 (0.01%)	1 (0.03%)	**0.0171**
Other	20 (0.11%)	15 (0.10%)	5 (0.17%)	**0.0083**
Compression Therapy Required				
Yes	16,038 (91.62%)	13,887 (96.02%)	2,151 (71.23%)	**<0.0001**
No	1,444 (8.25%)	575 (3.98%)	869 (28.77%)	
Days of Compression Therapy	7 (7, 7)	7 (7, 7)	7 (7, 14)	**<0.0001**

Complications

Variable	All Ablations (n=17,504)	Thermal (n=14,481)	Non-thermal (n=3,023)	*p*-value
Missed days of work	1 (1, 3)	1 (1,3)	1 (1,3)	**0.0086**
VCSS score	5 (2, 7)	5 (2, 7)	4 (2, 7)	**<0.0001**
Complications at Follow-Up				
None	650 (3.73%)	566 (6.55%)	84 (6.31%)	0.8114
Bleeding Requiring Intervention	4 (0.02%)	3 (0.03%)	1 (0.08%)	0.4364
Skin Blister	17 (0.10%)	13 (0.15%)	4 (0.30%)	0.2704
DVT	56 (0.32%)	45 (0.52%)	11 (0.83%)	0.1673
Hematoma	18 (0.10%)	12 (0.14%)	6 (0.45%)	**0.0250**
Paresthesia	123 (0.71%)	119 (1.38%)	4 (0.30%)	**0.0003**
Pigmentation	62 (0.36%)	48 (0.56%)	14 (1.05%)	**0.0390**
Superficial Phlebitis	179 (1.03%)	150 (1.74%)	29 (2.18%)	0.2667
Induced Ulcer	4 (0.02%)	4 (0.05%)	0 (0.00%)	1.0000
Wound Infection	24 (0.14%)	18 (0.21%)	6 (0.45%)	0.1225
Proximal Thrombus Extension	191 (1.10%)	173 (2.00%)	18 (1.35%)	0.1315
Proximal Thrombus in Deep Vein				
EHIT 2	56 (0.32%)	44 (0.29%)	12 (0.55%)	0.0643
EHIT 3	21 (0.12%)	17 (0.11%)	4 (0.18%)	0.3243

Quality of Life

Variable	All Ablations (n=17,504)	Thermal (n=14,481)	Non-thermal (n=3,023)	*p*-value
Pain or Other Discomfort Changes				
Mild or Moderate → None	3,143 (18.04%)	2,718 (17.83%)	425 (19.50%)	0.0607
Severe → Mild or Moderate	315 (1.81%)	255 (1.67%)	60 (2.75%)	**0.0008**
Severe → None	317 (1.82%)	270 (1.77%)	47 (2.16%)	0.2297
Work Impact				
Unable or severely reduced work → Mild/moderately reduced work	232 (1.33%)	208 (1.36%)	24 (1.10%)	0.3683
Unable or severely reduced work → Symptoms but full work	110 (0.63%)	99 (0.65%)	11 (0.50%)	0.5619
Unable or severely reduced work → None	333 (1.91%)	285 (1.87%)	48 (2.20%)	0.9670
Mild/moderately reduced work → None	1,453 (8.34%)	1,272 (83.46%)	181 (8.30%)	0.2777
C-Classification Score Changes				
C3 → C1 or C0	1,121 (6.44%)	936 (6.14%)	185 (8.49%)	**<0.0001**
C2 → C1 or C0	765 (4.39%)	658 (4.32%)	107 (4.91%)	0.2187
C6 → C5	216 (12.40%)	192 (1.26%)	24 (1.10%)	0.6050

Ulcer healing

Variable	All Ablations (n=17,504)	Thermal (n=14,481)	Non-thermal (n=3,023)	*p*-value
Number of Healed Ulcers				
1	412 (2.37%)	357 (2.34%)	55 (2.52%)	0.5978
2	43 (0.25%)	37 (0.24%)	6 (0.28%)	0.8161
≥3	31 (0.18%)	22 (0.14%)	9 (0.41%)	**0.0114**
Ulcer Duration				
<3 months	133 (0.76%)	120 (0.79%)	13 (0.60%)	0.4289
3-12 months	218 (1.25%)	187 (1.23%)	31 (1.42%)	0.4115
>12 months	112 (0.64%)	90 (0.59%)	22 (1.01%)	**0.0304**
Duplex Ultrasound Performed				
Yes	5,100 (29.28%)	4,305 (79.33%)	795 (66.69%)	**<0.0001**
No	1,519 (8.72%)	1,122 (20.67%)	397 (33.31%)	

Limitations

This study has **limitations** inherent to its retrospective design and the use of registry data. The large sample size made detecting small, statistically significant differences likely, even if they were not clinically significant. The dataset did not allow for granular stratification by specific device, requiring a grouped analysis of thermal and non-thermal techniques which may mask device-specific outcomes.

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Take Home Points

Overall **thermal and non-thermal ablation therapies are both effective** in treatment of chronic venous abnormalities.
Notably, **non-thermal ablations were associated with greater improvements in CEAP scores from C3 to C1**, suggesting this treatment modality may be more effective in improving quality of life outcomes.

Further, ongoing analyses will compare these data against multiple truncal and non-truncal veins for thermal and non-thermal ablations within the VQI.

Acknowledgements

- University of Florida Department of Surgery
- Division of Vascular Surgery and Endovascular Therapy
- Florida Vascular Society

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