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Vasc Endovascular Surg 2008; 42; 235 originally published online Jan 29, 2008;
DOI: 10.1177/1538574407312647

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High Ligation of the Saphenofemoral Junction in Endovenous Obliteration of Varicose Veins

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Background Endovenous radiofrequency (RF) ablation of the greater saphenous vein has become an accepted treatment modality. This study examines if it is necessary to perform high ligation of the saphenous vein to insure success of the procedure.

Study design A retrospective chart analysis was conducted on 219 patients who underwent RF ablation for venous insufficiency. All procedures were performed by 3 board-certified vascular surgeons. One surgeon always ligated the saphenofemoral junction (SFJ), the second never ligated, and the third ligated selectively. Demographic data were collected and analyzed.

Results A total of 77 patients underwent RF ablation with ligation of the SFJ (group I), and 142 patients underwent ablation without ligation (group II). Both groups had similar ablation success rates ($P = .0960$), 92% (group I) and 84% (group II).

Conclusion Saphenofemoral junction ligation is not indicated on a routine basis to achieve success with endovascular ablation of the greater saphenous vein.

Keywords: saphenofemoral junction; ligation; varicose veins; endovenous radiofrequency ablation

Introduction

Endovenous radiofrequency (RF) obliteration has become a reasonable option for treatment of venous insufficiency. This technique has evolved with technological advancements to replace traditional venous ligation and stripping.^{1,2} High ligation of the saphenofemoral junction (SFJ) was a vital portion toward success of traditional stripping. Therefore, a search of the literature was conducted to determine if this portion of the procedure was still necessary using the new advancement of RF obliteration. Results from this literature search were not adequate to warrant abandonment of SFJ ligation.³

In our practice, the unique opportunity was available where 3 clinical vascular surgeons performed the RF procedure using 3 discrete methods: one always

performed SFJ ligation, one never performed SFJ ligation, and one varied whether or not SFJ ligation was performed. The decision was based solely on surgeon preference. Therefore, we conducted a retrospective review of 219 patients (142 without ligation and 77 with ligation), to examine if indeed SFJ ligation was necessary. In addition to this analysis, other aspects of RF obliteration were studied, including deep venous thrombosis (DVT), wound infection, and anticoagulation rates. These were included because there has been some debate concerning specifically the DVT rate in patients' status post-RF obliteration.^{4,5}

A number of studies discussing varicose veins, venous insufficiency, and new technology were reviewed. Our study assessed the need for high ligation of the SFJ³ and the subsequent risk of DVT,^{4,5} which allowed yet another set of data to be presented to add to this milieu.

Methods

Endovenous RF obliteration was performed using the Closure System (VNUS Medical Technologies,

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Inc, Sunnyvale, CA). Using ultrasound guidance, the greater saphenous vein was accessed percutaneously below the knee, and a guidewire was then placed within the vein to allow a sheath to be guided into the vein. With the sheath in place, the catheter with collapsible electrodes was fed to the saphenofemoral junction just below the superior epigastric vein. Using ultrasound guidance, tumescent anesthesia was injected around the vein and catheter in the subcutaneous tissue. Tumescent fluid was made of 500 mL of normal saline with 50 mL of lidocaine with epinephrine and 5 mL of sodium bicarbonate. Once adequate tumescence was in place, the catheter's electrodes were deployed. The vein was then treated from below the superior epigastric vein to the site of percutaneous access. The catheter was attached to a bipolar generator controlled by a dedicated microprocessor that displayed temperature, impedance, power, and treatment time. Energy transferred from the generator to the exposed electrodes destroys the intima of the vein, which contracts the vein wall causing fibrous obliteration.^{3,6} Once the catheter had completed the treatment, ultrasound was used to verify obliteration.

A retrospective chart review was performed on patients ($n = 219$) who received RF ablation from March 2004 to May 2005. The total number of procedures was 219. All procedures were performed at a single center (Borgess Medical Center, Kalamazoo, MI) by 1 of 3 board-certified vascular surgeons. The endovenous techniques were identical except for SFJ ligation. One surgeon always ligated the SFJ, the second surgeon never ligated, and the third ligated the SFJ selectively. The patients were thus not randomized, and the procedure varied at the discretion of the surgeon. Ultrasound was always performed at the first postoperative visit within 24 hours of the procedure. This ultrasound examination determined success of the procedure as well as detection of DVT.

Data were analyzed using the Fisher exact test. The sample size allowed for a power of 82% detecting a difference of 15% between the percentages of the SFJ ligation versus no ligation groups at a 5% level of significance for procedure success.

There was no outside funding received for this study. All procedures and postoperative visits were performed by one group of surgeons and vascular technologists of an accredited vascular laboratory.

Results

A chart review was performed of ablation procedures from March 2004 to May 2005. A total of 219 procedures were performed and analyzed (Figure 1). In all, 77 patients underwent RF ablation with ligation at the SFJ (group I); whereas 142 patients underwent RF ablation without SFJ ligation (group II). The two groups were statistically similar with regard to sex, anticoagulation status, and ablation success rates (Table 1). However, there was a statistically significant difference ($P = .0367$) of patients with diabetes, more prominently represented in group II. There was no significant difference ($P > .05$) of ablation success between groups ($P = .0960$).

Complications (Table 2) were generally discovered at postoperative visits occurring within 1 month of the procedure date. Both groups incurred a 4% rate of DVT ($P = 1.000$). Failed procedure rates were not significantly different ($P = .0960$). However, there was a statistically significant difference concerning wound infection rate, 5% in group I and 0% in group II ($P = .0145$).

Failed ablations were defined as incomplete ablation (ultrasound displayed treated vein with areas obliterated and other areas patent), no ablation (ultrasound displayed patent treated vein), and patients with no follow-up ultrasound examination (Figure 1). Again, this retrospective study including 219 subjects resulted in a number of significant findings including no difference in overall result in RF success with or without SFJ ligation and an overall DVT rate of 4%.

Discussion

Debate among surgeons as to the most appropriate method and lack of reliable data in the literature^{4,5} prompted this study to be conducted. The original goal of this study was to examine the DVT rate after endovenous RF ablation of a 3-surgeon group. Within the literature, DVT rates range from 0.3%⁵ to 16%.⁴ The 4% rate of DVT falls within the range described.

Along with the DVT analysis, a unique opportunity arose to examine the need for SFJ ligation and the endovenous obliteration success rate. Of the 3 surgeons in this study, one always performed ligation, one never performed ligation, and one used

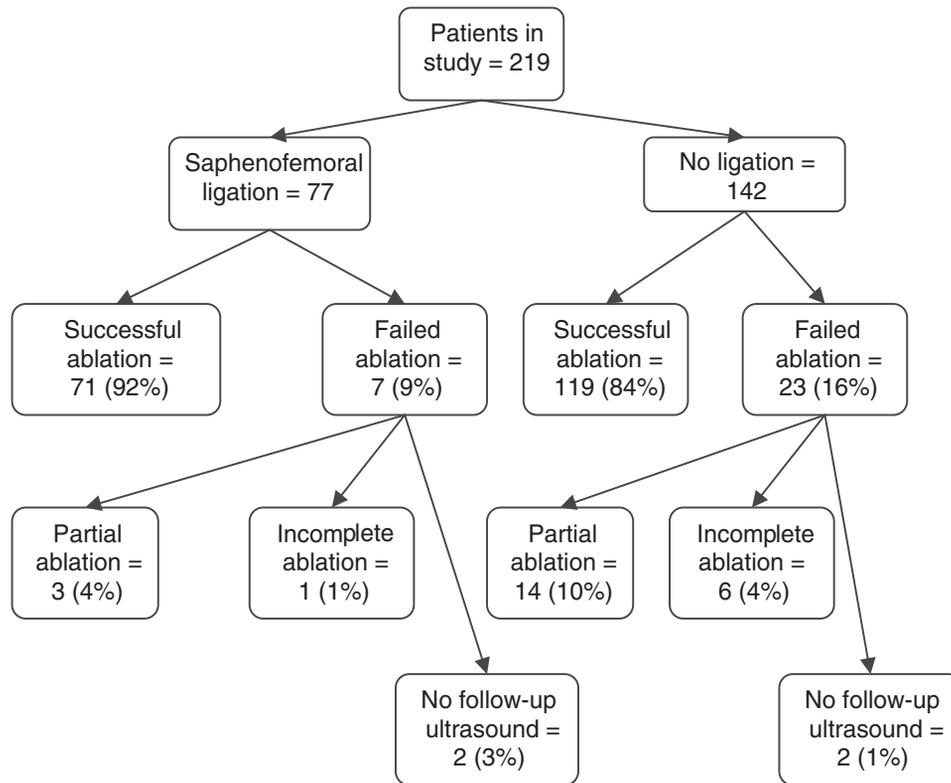


Figure 1. Distribution of patients.

Table 1. Patient Characteristics

Characteristic	SFJ Ligation	No ligation	P value
Number of procedures	77	142	
Mean age (years)	52	53	
Female percentage	74% (57/77)	73% (103/142)	
Successful ablation	92% (71/77)	84% (119/142)	.0960
# Anticoagulation	21% (16/77)	19% (27/142)	.8588
# Diabetes	3% (2/77)	11% (15/142)	.0367 ^a

Note: SFJ = saphenofemoral junction.

a. Statistically significant difference.

Table 2. Complications

Complication	SFJ Ligation	No ligation	P value
Deep venous thrombosis	4% (3/77)	4% (5/142)	1.0000
Wound infection	5% (4/77)	0% (0/142)	.0145 ^a
Ablation failure	9% (7/77)	16% (23/142)	.0960

Note: SFJ = saphenofemoral junction.

a. Statistically significant difference.

operative discretion as to when to perform ligation. Criteria to promote ligation included: aneurysmal disease of the proximal saphenous vein, multiple incompetent collateral vessels at the SFJ, and duplication of the greater saphenous vein in direct communication with the common femoral vein. All other technical aspects of the procedure were identical between surgeons. The statistical analysis divulges that SFJ ligation does not make a statistical difference ($P = .0960$) as to the success of the procedure. However, with ligation the ablative procedure was more successful (92% vs 84%). Even though the data suggest no statistical difference, additional factors may influence the need for ligation. It is likely that the success rate for ablation would be significantly lower if ligation was completely abandoned. Yet, further research involving longer follow-up would aid with this conclusion.

Of all the data analyzed, the proportion of patients with diabetes was significantly higher in the no-ligation group. By avoiding the groin incision, many complications related to diabetes can be avoided. With this, other factors should be examined in future projects, that is, obesity correlations.

Compared with similar studies,¹⁻³ this review provided further evidence of the success of the endovenous RF obliterative technology. Performing this study within one center provided strength compared with similar data. Also, the number of procedures included in this research was greater than that in other studies. This allowed for more robust statistical analysis, which led to a power of 82% with statistically significant results.

However, further analysis on endovenous RF obliteration is needed. This study only examines short-term (1 month postoperative) follow-up. Long-term follow-up is needed to further examine the success of this new technology. Also, performing this study within just one center may limit the statistical analysis of our data because the patient population may not be varied. New studies⁷ are beginning to analyze data over a longer time course. In addition, these data were compiled between 3 different surgeons with 3 different outlooks as to the use of SFJ ligation. A single surgeon study may provide a better answer because the patients would be handled

similarly. Another limitation is the fact that our study was retrospective in design. Therefore, a larger, prospective study, preferably randomized, may provide a more definitive answer.

The goal here was to determine DVT rate status post-endovenous RF obliteration. An overall 4% DVT rate was determined. In addition, further analysis of this newer technology was accomplished. However, more analysis can and needs to be done concerning this exciting progression in venous surgery.

Conclusions

SFJ ligation is not indicated on a routine basis to achieve success with endovascular ablation of the greater saphenous vein. SFJ ligation also results in a higher complication rate.

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