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Our surgical approach to small saphenous vein reflux

Küçük safen ven reflüsünde cerrahi deneyimlerimiz

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ABSTRACT

Objectives: In this study, we present our surgical approach to small saphenous vein reflux and short-term endovenous laser ablation experiences.

Patients and methods: A total of 35 patients (20 males, 15 females; mean age 43.8±14.4 years; range, 20 to 70 years) who were operated for small saphenous vein reflux in our clinic between January 2017 and October 2017 were retrospectively analyzed. Age, gender, preoperative comorbidities, diameters of the small and great saphenous veins, venous injury scores, surgical method, anesthesia techniques, and postoperative complications were evaluated.

Results: The mean operated small saphenous vein diameter was 9.5±2.2 cm. Sedation analgesia (n=10, 29%) and tumescent anesthesia (n=25, 71%) were used. Endovenous laser ablation was performed to 21 patients (60%). The small saphenous vein division and partial excision were performed to 13 patients (37%). We had only one complicated operation due to catheterization failure, and we performed ultrasound-guided sclerosing agent infusion to the small saphenous vein. We also performed varicose pack excision in 19 patients (54%) and perforator vein ligation in six patients (17%) in a single session. We observed no sural nerve injury in any patient during the postoperative period.

Conclusion: Today, surgical experience for small saphenous vein has been steadily increasing. Endovenous techniques are still the most optimal options for small saphenous vein surgery and can be safely used under the guidance of ultrasound to avoid complications.

Keywords: Endovenous laser ablation; small saphenous vein; varicose veins.

ÖZ

Amaç: Bu çalışmada, küçük safen ven reflüsüne yönelik cerrahi yaklaşımımız ve endovenöz lazer ablasyona ait kısa dönem deneyimimiz sunuldu.

Hastalar ve Yöntemler: Ocak 2017 - Ekim 2017 tarihleri arasında kliniğimizde küçük safen ven reflüsü nedeniyle ameliyat edilen toplam 35 hasta (20 erkek, 15 kadın; ort. yaş 43.8±14.4 yıl; dağılım 20-70 yıl) retrospektif olarak incelendi. Yaş, cinsiyet, ameliyat öncesi eşlik eden hastalıklar, küçük ve büyük safen ven çapları, venöz hasar skorları, cerrahi yöntem, anestezi teknikleri ve ameliyat sonrası komplikasyonlar değerlendirildi.

Bulgular: Ortalama ameliyat edilen küçük safen ven çapı 9.5±2.2 cm idi. Sedasyon aneljezi (n=10, %29) ve tümesan anestezi (n=25, %71) kullanıldı. Yirmi bir hastaya (%60) endovenöz lazer ablasyon uygulandı. On üç hastaya (%37) küçük safen venin divizyonu ve parsiyel eksizyonu uygulandı. Başarısız kateterizasyon nedeniyle yalnızca bir komplikasyonlu ameliyat yapıldı ve küçük safen vene ultrason aracılı sklerozan ajan infüzyonu uygulandı. Aynı seansta 19 hastaya (%54) variköz pake eksizyonu ve altısına (%17) perforan ven ligasyonu uygulandı. Hiçbir hastada ameliyat sonrası dönemde sural sinir hasarı izlenmedi.

Sonuç: Günümüzde küçük safen vene yönelik cerrahi deneyim gün geçtikçe artmaktadır. Endovenöz teknikler, küçük safen ven cerrahisinde halen en ideal seçenekler olup, komplikasyonları önlemek için ultrason eşliğinde güvenle kullanılabilir.

Anahtar sözcükler: Endovenöz lazer ablasyon; küçük safen ven; variköz venler.

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Today, chronic venous insufficiency is one of the most common diseases and the prevalence of superficial vein reflux is 21%.[1] Using endovenous saphenous vein ablation technique has been rapidly increased for the treatment of superficial venous system reflux and this technique can reduce the morbidity of saphenous vein stripping. Recovery time of the patients with endovenous techniques has been decreased in experienced centers compared to other techniques, such as high ligation and stripping. Endovenous ablation is also associated with less hematoma, pain, and superior cosmetic benefits. These advantages make the endovenous ablation techniques first option by patients and surgeons.[2] The occlusion rates of saphenous veins with endovenous ablation increase up to 90%. Today, many studies have shown that endovenous ablation is more effective than surgery.[3,4]

Small saphenous reflux, which is an underestimated condition, is another common disease for the venous system. Small saphenous vein reflux is responsible 15% of all venous reflux.[5] In this study, we aimed to present our approach to small saphenous vein reflux, our surgical technique, and short-term experiences for endovenous ablation of small saphenous vein.

PATIENTS AND METHODS

A total of 35 patients (20 males, 15 females; mean age 43.8±14.4 years; range, 20 to 70 years) who were operated for small saphenous vein reflux in our clinic between January 2017 and October 2017 were retrospectively analyzed. Age, gender, preoperative comorbidities (i.e., deep venous thrombosis and venous ulcer), diameters of bilateral small saphenous vein and great saphenous vein, amount of energy used during endovenous laser ablation, additional surgical interventions to endovenous ablation (i.e., perforator vein ligation and pack excision) and other surgical approaches for small saphenous vein surgery (division and partial excision) were examined (Tables 1, 2, and 3).

In prone position, we first performed puncture of small saphenous vein with ultrasound guidance. After introducing the guidewire, we positioned 4F sheath and radial 1470 nm laser catheter approximately 3 cm away from the saphenopopliteal junction. Tumescent anesthesia was performed to avoid compression of vein. We used ice-packs to protect skin externally. Thermal ablation was, then, performed. Tumescent anesthesia contains 500 mL isotonic saline cooled to +4°C, 40 mL of sodium bicarbonate (8.4%), 1 mL adrenaline (0.25 mg), and 400 mg prilocaine.

We preferred endovenous laser ablation for each eligible patient. Patients who underwent ligation and partial excision had severe angulation of parva vein or parva vein was lying less than 1 cm beneath the skin and separation from the skin by tumescent anesthesia would be painful. Sural nerve injury was assessed according to the complaints of the patient within the first three months postoperatively.

We also preoperatively evaluated the Venous Disability Score (VDS), Venous Segmental Disease Score (VSDS), and Clinical, Etiology, Anatomy, Pathophysiology Classification (CEAP). The VDS

Table 1. Preoperative characteristics of the patients

	n	%	Mean±SD	Min-Max
Age (year)			43.1±14.4	20-70
Sex				
Female	15	43		
Male	20	57		
Deep vein thrombosis	1	2		
Venous ulcer	1	2		
Clinical, etiology, anatomy, pathophysiology classification operated limb			3.1±0.6	2-5
Venous disability score			3.1±0.6	2-5
Venous segmental disease score operated limb reflux			1.8±1.4	0.5-8.5
Right great saphenous vein			4.5±1.9	2.5-10
Left great saphenous vein			4.5±1.6	2.5-8.5
Right small saphenous vein			6.5±2.8	3-12
Left small saphenous vein			5.6±2.7	3-14
Operated limb vena saphena parva diameter			9.5±2.2	5.7-12

SD: Standard deviation; Min: Minimum; Max: Maximum.

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Table 2. Intraoperative data of the patients (n=35)

	n	%	Mean±SD	Min-Max
Right limb	11	31		
Left limb	24	69		
Anesthesia				
Sedoanalgesia	10	29		
Tumescent	25	71		
Endovenous laser ablation	21	60		
Division and partial excision	13	37		
Pack excision	19	17		
Perforator vein ligation	6	17		
Energy (joule)			842±286	600-1600
Incomplete endovenous laser ablation	1	3		
Sural nerve injury	-	-		

SD: Standard deviation; Min: Minimum; Max: Maximum.

and VSDS are both part of venous severity scoring system and they are in use for completing the missing parts of the CEAP scoring system. The latter combines the anatomic and pathological components of the disease. Veins are graded according to presence of reflux and obstruction based on Doppler imaging studies; therefore, the severity of the disease is assessed as anatomical and pathological scores (1-10 points). The VDS is in use to evaluate normal activity level of patients rather than ability to complete an eight-hour workday. This scoring system indicates asymptomatic patients (0 points), symptomatic patients who are able to carry out usual activities without compression therapy (1 point), symptomatic patients who are able to carry out usual activities with compression therapy or limb elevation (2 points), and symptomatic patients who are unable to carry out usual activities with compression therapy (3 points) (Table 1).[6]

Statistical analysis

Statistical analysis was performed using the IBM SPSS version 22.0 software (IBM Corp., Armonk, NY, USA). Continuous variables were expressed in mean ± standard deviation (SD), and categorical variables in numbers and percentages. A p value of <0.05 was considered statistically significant.

Table 3. Distribution of patients according to clinical, etiology, anatomy, pathophysiology classification score

Clinical, Etiology, Anatomy, Pathophysiology	n	%
0	0	0
1	0	0
2	3	8.82
3	27	79.41
4	4	11.76
5	0	0
6	1	2.94

RESULTS

One patient had deep venous thrombosis in his past medical history and one patient had venous ulcer during preoperatively. The mean right and left great saphenous vein diameters were 4.5±1.9 cm and 4.5±1.6 cm, respectively. The mean operated limb small saphenous vein diameter was 9.5±2.2 cm. The mean operated limb CEAP score was 3.1±0.6. The mean VDS score was 1.3±0.5. The mean operated limb venous segmental disease reflux score was 1.8±1.4. Although the expansion of small saphenous vein diameters was significant, the VDS score addressing daily effect of venous disease was mildly high. The CEAP score of operated legs were higher. This was associated with chronic venous disease. All the preoperative data are presented in Table 1.

We used sedation analgesia for 10 patients (29%) and tumescent anesthesia for 25 patients (71%). We performed small saphenous vein endovenous laser ablation in 21 patients (60%). The mean used energy amount was 842±286 joules (range, 600 to 1600 joule). Small saphenous vein division and partial excision were performed in 13 patients (37%). We had only one complicated operation due to catheterization failure; therefore, we performed catheter-guided sclerosing agent infusion to the small saphenous vein. We also performed varicose pack excision in 19 patients (54%) and perforator vein ligation in six patients (17%) in a single session . We did not observe sural verve injury postoperatively. None of these patients were treated for the great saphenous vein. We did not perform great saphenous vein ablation in any of the patients for saphena magna reflux. Postoperative data are presented in Table 2.

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DISCUSSION

Great saphenous vein diseases are treated surgically for a long time. Small saphenous vein reflux is often ignored by surgeons until today. It is considered risky due to its proximity to sural nerve location and the operation may cause permanent nerve injury. Anatomic variations of parva-popliteal junction may also increase the failure of surgical approach.[5] With the increasing use of endovenous ablation techniques for the great saphenous vein, venous surgery practices have become easier and this technique provides better cosmetic outcomes for the patients with reduced morbidity postoperatively. Using of this easily applied method lead us to perform small saphenous vein endovenous ablation surgery. Increased experience in ultrasound use also reduces the complication risk about anatomical variations. Therefore, today, in our practice, we can also complete unsuccessful ablation procedures safely with open surgical methods with ultrasound guiding.

The CEAP, VDS and VSDS scores are important for deciding surgery, outpatient care, and postoperative follow-ups. As a rule of thumb, surgeons do not operate numbers, but patients. The VDS is the numerical display of individuals having difficulties and complaints in their daily life. Each patient should be, therefore, recorded with these scores.

O'Hare et al.[7] presented surgical interventions to small saphenous vein with a multicenter study throughout three years. In this study, they showed 67 small saphenous vein stripping and 116 saphenopopliteal junction disconnection operation. This study showed that there was a deficiency to perform small saphenous vein surgery. Surgical interventions for small saphenous vein increased after using endovenous techniques. In another study by Roopram et al.,[8] endovenous laser ablation was compared with conventional surgery. A total of 118 patients (67%) underwent endovenous laser ablation, while 57 patients (33%) underwent ligation of the parva-popliteal junction. The authors found that 21% residual incompetence of the parva-popliteal junction after six weeks in the ligation group, compared to 0.9% in the laser group. They concluded that ablation surgery was more effective for small saphenous vein. In our surgical practice, we also preferred endovenous ablation method for small saphenous vein surgery in the first-line setting. In our study, we operated 35 patients during a-10-month period and we were able to perform laser ablation method for 21 patients (60%). O'Hare et al.[7] also showed better neurological outcomes in the laser ablation group. They found that ablation methods provided more benefits than conventional surgery in the treatment of symptomatic varicose veins due to an incompetent small saphenous vein. In our practice, when we were unable to perform endovenous technique due to puncture problems such as sural nerve adjacent to small saphenous vein or anatomical variations of parva-popliteal junction, we preferred saphenopopliteal junction division and partial excision (%37).

Sural nerve injury is the most important point of this surgical intervention, and this problem blocked surgeons from operating on small saphenous vein in the past.[5] In our technique, we also spared the sural nerve and we chose patients and surgical method according to this problem. In our technique, ultrasound-guided percutaneous cannulation was performed, and the small saphenous vein was cannulated at 20 cm distal point (about mid-calf level) of the parva-popliteal junction. We avoided more distal cannulation and laser ablation of the middle segment of small saphenous vein to prevent sural nerve injury. Perivenous tumescent anesthesia was also infiltrated along the parva to the cannulation side to separate sural nerve from small saphenous vein. We attempted to infiltrate tumescent anesthesia more intensive, compared to the great saphenous vein ablation to prevent skin injury, and we also protected the skin with cold compresses and ice packs, as the small saphenous vein is closer to skin than the great saphenous vein. In a study by Sanioglu et al.,[9] 30 patients presented with small saphenous vein thermal ablations after ultrasonographic identification of the sural nerve. The authors asked the patients about neurological complications during outpatient follow-up visits. None of the patients showed any evidence suggesting postoperative sural nerve damage. They suggested that choosing puncture side according to the risky point using ultrasound imaging could be more effective. Consistent with this opinion, we used this technique in our patients, and we did not see sural nerve injury during the postoperative period. When we were unable to perform laser ablation, we preferred division and partial excision. We did not perform small saphenous vein excision within more than 10 cm distal from the saphenopopliteal junction level. Therefore, not only we protected the sural nerve from laser ablation injury, but also we spared sural nerve during small saphenous vein excision.

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In conclusion, small saphenous vein surgery is ignored until today. The increased use of endovenous techniques and increased experience of ultrasound imaging give an advantage to perform the surgery of this avoided area. In our practices, we preferred endovenous ablation of the small saphenous vein as a first option. If we are unable to perform endovenous ablation technique, division and a partial excision of the vein with guiding of ultrasound should be the second option. We believe that small saphenous vein surgery, today, is not as risky, as it was in the past, in terms of complications. Endovenous techniques can be used safely with guiding ultrasound imaging.

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