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Tıp Bilimleri Dergisi

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YAZARLARA BİLGİ

1. Bilim İnsanları Dayanışma Derneği Tıp Bilimleri Dergisi Bilim İnsanları Dayanışma Derneği'nin bir yayın organıdır.
2. Bu dergide genel tıp alanındaki klinik ve deneysel araştırma yazıları, olgu sunuları, derleme yazıları, editöryel yorumlar ve editöre mektuplar yayınlanır.
3. Derginin yayın dili Türkçe ve İngilizce'dir
4. Dergi her 3 ayda bir yayınlanır ve dört sayıda bir cilt tamamlanır.
5. Editörler reklam amacı ile verilen ticari ürünlerin özellikleri ve açıklamaları konusunda hiçbir garanti vermemekte ve sorumluluk kabul etmemektedir.
6. Yazıların bilimsel ve etik sorumluluğu yazarlara aittir.
7. Dergide yayınlanan yazıların telif hakkı dergiye aittir.
8. Bilimsel yazıların dergide yer alabilmesi için Yayın Kurulunun ve Bilimsel Danışma Kurulunun onayından geçmesi gerekmektedir. Bu iki kurul, yayını kabul etme, düzeltme ve yayınlamama hakkına sahiptir.
9. Dergiye gönderilen yazılar yayınlansın ya da yayınlanmasın geri verilmez.
10. Makale yayınlanmak üzere dergiye gönderildikten sonra yazarlardan hiçbiri, tüm yazarların yazılı izni olmadan yazar listesinden silinemez, ayrıca hiçbir isim, yazar olarak eklenemez ve yazar sırası değiştirelemez.
11. Bir yazının dergide yer alabilmesi için daha önce başka bir dergide yayınlanmamış veya yayınlanmak üzere gönderilmemiş olması gerekmektedir. Kongrelerde sunulmuş yazılar, bu durumun dip not olarak belirtilmesi halinde kabul edilebilir.
12. ***Yazının hazırlanması:***
    - Bu derginin yazım kuralları "Uniform requirements for manuscripts submitted to biomedical journals" (JAMA 1997; 277 (11): 927-34) ile uyumludur.
    - Yazı standart A4 kağıdına, kağıdın tek yüzü kullanılacak şekilde ve çift satır aralıklı olarak, kenarlarda en az 2.5 cm boşluk kalacak şekilde yazılmalıdır.
    - **Editöre Sunum Sayfası:** Gönderilen makalenin kategorisi, daha önce başka bir dergiye gönderilmemiş olduğu, varsa çalışmayı maddi olarak destekleyen kişi ve kuruluşlar ve varsa bu kuruluşların yazarlarla olan ilişkileri, makale İngilizce ise; İngilizce yönünden kontrolünün ve araştırma makalesi ise biyoistatistiksel kontrolünün yapıldığı belirtilmelidir.
    - Başlık sayfasından başlamak üzere tüm sayfalar sağ üst köşeden numaralandırılmalıdır. Yazının her bölümü yeni bir sayfadan başlamalı ve aşağıdaki sıraya uymalıdır: Başlık sayfası, özet, metin, teşekkür, kaynaklar, tablo ve başlıkları, şekil altyazı ları, başlıklar büyük harşerle yazılmalıdır.
    - **Başlık Sayfası:** a) Metnin özlü ve açıklayıcı bir başlığını, b) Tüm yazarların tam adlarını, akademik ve kurumsal ünvanlarını, c) Çalışmanın yapıldığı klinik veya kurumun adını, d) Sorumlu yazarın adresini, iş ve GSM telefonunu, faks numarası ve e-posta adresini içermelidir.
13. Yazı çeşitleri: Dergiye yayınlanmak üzere gönderilecek yazı çeşitleri şu şekildedir;
    - **Orijinal Araştırma:** Kliniklerde yapılan prospektifretrospektif ve her türlü deneysel çalışmalar yayınlanabilmektedir.

      Yapısı:
      - Özet (Ortalama 200-250 kelime; amaç (net ve öz), materyal ve metod/hastalar ve yöntemler (net ve anlaşılır), bulgular (objektif) ve sonuç (önemi ve literature katkısı) bölümlerinden oluşan, Türkçe ve İngilizce)
      - *Giriş* bölümü konuyu birkaç cümle ile tanımlamalı ve çalışmanın amacı net ve anlaşılır bir biçimde belirtilmelidir.
      - *Gereç ve Yöntemler/Hastalar ve Yöntemler* bölümü, hasta ve/veya laboratuar hayvanları üzerine anlaşılır ve detaylı tanımlamalar sunmalı; kullanılan araç, kimyasal malzemeler ve yöntemleri ve başvurulan istatistiksel yöntemler detaylı belirtilmelidir.
      - *Bulgular* bölümü çalışmanın sonuçlarını vermelidir. Veriler mümkün olduğunca net, tercihen de tablo veya şekiller içinde sunulmalıdır.
      - *Tartışma* bölümü bulgulardan çıkarılan sonuçları ele almalı; yalnızca ilişkili literatür değerlendirilmelidir.
      - Teşekkür
      - Kaynaklar
    - **Derleme:** Doğrudan veya davet edilen yazarlar taraŞndan hazırlanır. Tıbbi özellik gösteren her türlü konu için son tıp literatürünü de içine alacak şekilde hazırlanabilir. Yazarın o konu ile ilgili basılmış yayınlarının olması özellikle tercih nedenidir.

      Yapısı:
      - Özet (Ortalama 200-250 kelime, bölümsüz, Türkçe ve İngilizce)
      - Konu ile ilgili başlıklar
      - Kaynaklar
    - **Olgu Sunumu:** Nadir görülen, tanı ve tedavide farklılık gösteren makalelerdir. Yeterli sayıda fotoğraşarla ve şemalarla desteklenmiş olmalıdır.

      Yapısı:
      - Özet (ortalama 100-150 kelime; bölümsüz; Türkçe ve İngilizce)
      - Giriş
      - Olgu Sunumu
      - Tartışma
      - Kaynaklar
    - **Editöryel Yorum/Tartışma:** Yayınlanan orijinal araştırma makaleleri ile ilgili, araştırmanın yazarları dışındaki, o konunun uzmanı taraŞndan değerlendirilmesidir. Konu ile ilgili makalenin sonunda yayınlanır.
    - **Editöre Mektup:** Son bir yıl içinde dergide yayınlanan makaleler ile ilgili okuyucuların değişik görüş, tecrübe ve sorularını içeren en fazla 500 kelimelik yazılardır. Başlık ve özet bölümleri yoktur. Kaynak sayısı 5 ile sınırlıdır. Hangi makaleye (sayı, tarih verilerek) ithaf olunduğu belirtilmeli ve sonunda yazarın ismi, kurumu, adresi bulunmalıdır. Mektuba cevap, editör veya makalenin yazar(lar)ı tarafından, yine dergide yayınlanarak verilir.
    - ***Anahtar Kelimeler:*** En az 3 adet, Türkçe ve İngilizce yazılmalıdır. İngilizce anahtar kelimeler "Medical Subject Headings (MESH)"e uygun olarak verilmelidir (Bkz: www.nlm.nih.gov/ mesh/MBrowser.html). Türkçe anahtar kelimeler MESH terimlerinin aynen çevirisi olmalıdır.
    - **Kaynaklar:** Kaynaklar metin içerisinde geçiş sırasına göre parantez içinde numaralandırılmalıdır. Yalnızca yayınlanmış ya da yayınlanması kabul edilmiş çalışmalar kaynak olarak bildirilebilir. Dergi adları ındex Medicus'a uygun şekilde kısaltılmalıdır. Altı ya da daha az sayıda olduğunda tüm yazarlar verilmeli, altıdan fazla yazar durumunda üçüncü yazar arkasından"et al" ya da "ark." eklenmelidir. Kaynak kontrolü önem taşımaktadır ve yazarlardan he hangi bir kaynağın tamamının temini istenebilir. Kaynaklarda noktalama işaretlerine dikkat edilmeli ve aşağıda gösterilen şekilde yazılmalıdır:
    - **Makale için;** Yazar(lar)ın soyad(lar)ı ve isim(ler)inin başharf(ler)i, makale ismi, dergi ismi, yıl, volüm, sayfa no'su belirtilmelidir. Örnek: Kerem E, Reisman J, Corey M, Canny GJ, Levison H. Prediction of mortality in patients with cystic Şbrosis. N Engl J Med 1992;326:1187-91.
    - **Kitap için;** Yazar(lar)ın soyad(lar)ı ve isim(ler)inin başharf(ler)i, bölüm başlığı, editörün(lerin) ismi, kitap ismi, kaçıncı baskı olduğu, şehir, yayınevi, yıl ve sayfalar belirtilmelidir.

      Örnek:

      Yabancı dilde yayınlanan kitaplar için;

      Underwood LE, Van Wyk JJ. Normal and aberrant growth. In: Wilson JD, Foster DW, eds. Wiliams' Textbook of Endocrinology. 1st ed. Philadelphia: WB Saunders; 1992. p.1079-138.

      Türkçe kitaplar için; Sözen TH. Bruselloz. Topçu AW, Söyletir G, Doğanay M, editörler. İnfeksiyon Hastalıkları ve Mikrobiyoloji. Cilt 1. Sistemlere Göre İnfeksiyonlar. 1. Baskı. İstanbul: Nobel Tıp Kitabevleri; 2002. p.636-42.

Yazar ve editörün aynı olduğu kitaplar için; Yazar(lar)ın/ editörün soyad(lar)ı ve isim(ler)inin başharf(ler) i, bölüm başlığı, editörün(lerin) ismi, kitap ismi, kaçıncı baskı olduğu, şehir, yayınevi, yıl ve sayfalar belirtilmelidir.
Örnek:
Yabancı dilde yayınlanan kitaplar için; Solcia E, Capella C, Kloppel G. Tumors of the exocrine pancreas. In: Solcia E, Capella C, Kloppel G, eds. Tumors of the Pancreas. 2nd ed. Washington: Armed Forces Institute of Pathology; 1997. p.145-210.
Türkçe kitaplar için; Sümbüloğlu K, Sümbüloğlu V. Önemlilik testleri. Sümbüloğlu K, Sümbüloğlu V, editörler. Biyoistatistik. 8. Baskı. Ankara: Hatipoğlu Yayınevi; 1998. p.76-156.

- **On-Line makale için:** Ticari olmayan ve hükümetler ile uluslararası bilimsel kurul ve kuruluşların resmi internet sayfaları erişim tarihi belirtilerek kaynak olarak gösterilebilir. Örnek: Kavuncu V, Evcik D. Physiotherapy in rheumatoid arthritis. http://www.medscape.com/viewarticle/474880?src= search. Erişim: 20.05.2004

14. Her türlü çizim, graŞk, mikrograf ve radiograf şekil olarak adlandırılır. Metin içinde yazıdaki tüm şekil ve tablolara atıfta bulunulmalıdır. Tablo ve Şekiller (Çizim ve Fotoğraşar) cümle sonunda parantez içinde numara ile belirtilmelidir. Tabloların ve şekillerin alt yazıları ayrı bir sayfaya yazılmalıdır. Fotoğraşar yüksek çözünürlükte, JPEG formatında kayıtlı olarak gönderilmelidir.
15. Bilgilendirerek onay alma ve ETİK: Deneysel çalışmaların sonuçlarını bildiren yazılarda, çalışmanın yapıldığı gönüllü ya da hastalara uygulanacak prosedür(lerin) özelliği tümüyle anlatıldıktan sonra, onaylarının alındığını gösterir bir cümle konulmalıdır. Yazarlar, bu tür bir çalışma söz konusu olduğunda, uluslararası alanda kabul edilen klavuzlara ve T.C. Sağlık Bakanlığı taraŞndan getirilen yönetmelik ve yazılarda belirtilen hükümlere uyulduğunu belitmeli ve kurumdan aldıkalrı etik komitesi onayını göndermelidir. Hayvanlar üzerinde yapılan çalışmalarda ağrı, acı ve rahatsızlık verilmemesi için neler yapıldığı açık bir şekilde belirtilmelidir.
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- In the *Discussion*, the conclusions derived from the results should be stated. The results should be discussed with reference only to the relevant literature.
- Acknowledgements
- References

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Content:
- Abstract (200-250 words; without structural divisions; English)
- Titles on related topics
- References

■ **Case Reports:** Brief descriptions of a previously undocumented disease process, a unique unreported manifestation or treatment of a known disease process, or unique unreported complications of treatment regimens. They should include an adequate number of photos and figures.
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- Introduction
- Case report
- Discussion
- References

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■ **Key Words:** Provide at least 3 words in English. Key words format should conform to that set forth in 'Medical Subject Headings' (MESH). Please consult www.nlm.nih.gov/mesh/MBrowser.html

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■ **Format for books;** initials of author's names and surnames, chapter title, editor's name, book title, edition, city, publisher, date and pages.
Example: Underwood LE, Van Wyk JJ. Normal and aberrant growth. In: Wilson JD, Foster DW, eds. Wiliams' Textbook of Endocrinology. 1st ed. Philadelphia: WB Saunders; 1992. p.1079-138.
Format for books of which the editor and author are the same person; initials of author(s)' editor(s)' names and surnames chapter title, editor's name, book title, edition, city, publisher, date and pages.
Example: Solcia E, Capella C, Kloppel G. Tumors of the exocrine pancreas. In: Solcia E, Capella C, Kloppel G, eds. Tumors of the Pancreas. 2nd ed. Washington: Armed Forces Institute of Pathology; 1997. p.145-210.

■ **For On-Line articles;** Net pages of noncommercial, government, national or international associations should be mentioned with communication date as a reference.
Example: Örnek: Kavuncu V, Evcik D. Physiotherapy in rheumatoid arthritis. Http://www.medscape.com/viewarticle/474880?src=search. Communication: 20.05.2004

14. All constructions, graphics, pictures, micrograph and radiograph are accepted as figures. Each figures and tables require title and should be numbered in the order of their mention in the text. Tables and Figures (constructions, pictures) should be numbered as in numerals at the end of the sentences in a parenthesis. Footnotes of the tables and figures should be type-written in separate page. Pictures should have high resolution and should be sent as JPEG formation.
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İÇİNDEKİLER
Contents

ARAŞTIRMALAR/*Researches*

- **Endoveneous Ablation with a 1470 NM Diode Laser for the Treatment of Great Saphenous Vein Insufficiency: Early Term Results of a Prospective Clinical Trial** — **1**
  1470 NM Diyot Lazer ile Büyük Safen Ven Yetmezliğinin Endovenöz Ablasyon Yöntemiyle Tedavisi: Kısa Dönem Sonuçlarına İlişkin Klinik Bir Çalışma
  Cevdet FURAT

- **Koroner Arter Bypass Cerrahisinde L-Karnitinin Mykokard Fonksiyonları Üzerine Etkisi** — **9**
  The Effect of L-Carnitine on Myocardial Function After Coronary Artery Bypass Surgery
  Cevdet FURAT, Murat GÜVENER

- **Perinatoloji Kliniğimize Başvuran Tarama Testi Pozitif Gebelerde Genetik Amniyosentez Sonuçlarımız** — **15**
  Genetic Amniosentesis Results of the Pregnant Women with a Positive Screening Test Who Refered to Our Perinatology Clinic
  Hüseyin Cumhur BULUTGENÇ, Sefa KURT, Mehlika Pelin YAZ, Ömer DEMİRTAŞ, Aycan KOPUZ, Abdullah TAŞYURT

- **Minör Tükürük Bezi Tümörlerine Yaklaşımımız** — **21**
  The Approach to Minor Salivary Gland Tumors
  İbrahim ÇUKUROVA, Aytekin YAZ, Murat GÜMÜŞSOY, Ümit BAYOL, Orhan Gazi YİĞİTBAŞI

OLGU SUNUMLARI/*Case Reports*

- **Opere Beyin Tümörü Öyküsü Olan Dirençli Status Epileptikus: Olgu Sunumu** — **25**
  Refracter Status Epilepticus With History of Brain Tumor Surgery: Case Report
  Ersel DAĞ, Burcu GÖKÇE, Leyla DURUSOY, Ali Kemal ERDEMOĞLU

- **Lokal Anestezik İnfiltrasyonuna Bağlı Gelişen Ventriküler Fibrilasyon** — **29**
  Ventricular Fibrillation Due to Local Anesthesia Infiltration
  Harun AYDOĞAN, Şaban YALÇIN, Ahmet KÜÇÜK, Hasan Hüsnü YÜCE, Tekin BİLGİÇ

- **Servikal Ektopik Gebelik: Bir Olgu Sunumu** — **33**
  Cervical Ectopic Pregnancy: A Case Report
  Sefa KURT, Ömer DEMİRTAŞ, Tutku GÜRBÜZ, Mehlika Pelin YAZ, Emrah BEYAN, Gürhan KARAGÖZ, Abdullah TAŞYURT

DERLEME/*Review*

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ENDOVENOUS ABLATION WITH A 1470 NM DIODE LASER FOR THE TREATMENT OF GREAT SAPHENOUS VEIN INSUFFICIENCY: EARLY TERM RESULTS OF A PROSPECTIVE CLINICAL TRIAL

1470 NM DİYOT LAZER İLE BÜYÜK SAFEN VEN YETMEZLİĞİNİN ENDOVENÖZ ABLASYON YÖNTEMİYLE TEDAVİSİ: KISA DÖNEM SONUÇLARINA İLİŞKİN KLİNİK BİR ÇALIŞMA

Cevdet FURAT

ARAŞTIRMA

ÖZET

Amaç: Bu prospektif çalışma, 1470 nm diyot lazer ile büyük safen ven (BSV) yetmezliğinin, endovenöz lazer ablasyon (EVLA) tedavisi ile sonuçlarını göstermeyi amaçlamaktadır. Biz BSV yetmezliği tedavisinde kullanılan EVLA uygulamasının erken dönem sonuçlarını sunmayı amaçladık Bu çalışmanın amacı, 1470 nm diyot lazer dalga boyu ve radyal fiber tip EVLA ile BSV yetmezliğinin tedavisinde etkinliğini, erken dönem postoperatif morbidite ve hasta konforu ile karşılaştırmaktır.

Hastalar ve Yöntem: Bu prospektif çalışma, Mart 2011 ve Mayıs 2011 tarihleri arasında yapıldı. 1470 nm dalga boyunda lazer EVLA kullanarak toplam 95 hastada, BSV yetmezliği tedavi edildi. 95 hastanın, 45'i kadın (%47.3) ve 50'si erkek (%52.7) olmak üzere safen reflüsü olan variköz ven yetmezliği tedavi edildi. Bu hastaların yaşları 28 ile 70 yıl (ortanca 49 yıl) arasında değişmekteydi. EVLA sonrası, hastalar dupleks ultrasonografi ile monitorize edildi. Ameliyat sonrası, ameliyat sonrası 2. gün, 7. gün ve 1., 3. ve 6. ayda klinik olarak hastalar değerlendirildi. Her hasta için, her bir extremitede ağrı düzeyini değerlendirmek için EVLA sonrası iki günlük bir inceleme planlandı.

RESEARCH

ABSTRACT

Aim: This prospective study aims to demonstrate the treatment outcomes of endovenous laser ablation (EVLA) of GSV insufficiency with a 1470 nm diode laser in an ambulatory setting. We aimed to present the early term results of EVLA procedures that were used to treat great saphenous vein (GSV) insufficiency.The aim of this study is to compare efficacy, early postoperative morbiditiy and patient comfort of a 1470 nm diode laser wawelengths and radial fibre type in treatment of GSV incompetence resulting in varicosities of the lower limb.

Patients and Methods: This prospective study was conducted between March 2011 and May 2011. A total of 95 incompetent GSVs were treated using EVLA with a 1470 nm diode wavelength laser. 95 were treated for varicose veins with saphenous reflux, including 45 females (47.3%) and 50 males (52.7%). These patients ages ranged from 28 to 70 years (median, 49 years). After the EVLA, the patients were monitored using duplex ultrasonography and were assessed clinically at the 2nd postoperative day, 7th day and 1, 3 and 6 months after the surgery. The patients were scheduled for a two day examination after the EVLA to assess the level of pain that each patient was experiencing in each limb.

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Bulgular: Altı aylık bir takip süresi sonunda, dupleks ultrasonografi taramaları sonrası, toplam 95 hastada (%100) büyük safen ven (BSV) oklüzyonu saptandı. Bu çalışmada aşağıdaki komplikasyonlar gözlendi: parestezi ve hipoestezi (%1), şişme ve sertleşme (%2), deri pigmentasyonu (%4), derin ven trombozu (%0), eritem (%1) ve kanama (%1).Tüm prosedür için ortalama görsel analog ağrı skoru p <0.05 oldu.

Sonuç: EVLA prosedürünün erken dönem sonuçlarının tatmin edici olduğunu ve bu çalışmanın sonuçları; BSV yetersizliği tedavisi için 1470 nm dalga boyu kullanarak yapılan EVLA güvenliğini ve etkinliğini teyit etti. Ayrıca hastalar şimdiki nesil lazerler ile tedavi edilenlere göre minimal prosedürel rahatsızlık yaşadı. Bu durum, daha spesifik lazer enerjisi emilimi özellikleri olan ikincil damar duvarı yaralanmasıyla ilgili olabilir.

Anahtar kelimeler: Endovenöz lazer ablasyon, safen ven, venöz yetmezlik

Results: At the end of a six month follow-up period, the post procedural duplex scans revealed a total occlusion of the treated GSVs in 95 of the patients (100%). The following complications were observed in the present study: paraesthesia and hypoesthesia (1%), swelling and induration (2%), skin pigmentation (4%), deep vein thrombosis (0%), erythema (1%), and bleeding (1%). The mean visual analog pain score for the entire procedure was p<0.05.

Conclusion: Our early term results of the EVLA procedure were satisfactory, and the results of this study reaffirmed the safety and effectiveness of an EVLA using a 1470 nm wavelength for the treatment of GSV insufficiency. Furthermore patients experienced minimal post procedure discomfort compared to those treated with the current generation of lasers. This may reflecte more specific vein wall injury secondary to the absorption characteristics of the laser energy.

Key words: Endovenous laser ablation, saphenous vein, venous insufficiency

INTRODUCTION

Varicose veins are on of the most common diseases in the world and affect up to 40% of men and 32% of women (1,2). Despite their detrimental effects on patients quality of life, most patients decide not to undergo any treatment. Common symptoms of this disease include leg pain, swelling, and skin pigmentation (3). The effect of venous insufficiency on patients quality of life is comparable with other common chronic diseases such as arthritis, dibates mellitus and cardiovascular disesae (4).

The majority of varicose veins are due to great saphenous vein (GSV) incompetence, with or without incompetent perforators. The conventional treatment for great saphenous system varicose veins is the ligation of the saphenofemoral junction and stripping of the GSV. This conventional treatment includes the use of general or spinal anesthesia. In many centers, patients undergoing this operation are hospitalized for at least one day. An endovenous obliteration of the GSV is an alternative procedure to the conventional treatment. This decision to not undergo treatment is mainly because the only treatment options include classic surgery, which is invasive, and does not prevent a notable recurrence rate, and conservative treatments, which are difficult to follow. The present study aimed to evaluate the efficacy of endovenous laser ablation (EVLA) with a 1470 nm laser and to analyze the early and mid-term results of 95 separate EVLA procedures to treat GSV insufficiency.

In the last decade, the spectrum of treatments available for varicose veins has broadened with the introduction of minimally invasive treatment modalities, such as radiofrequency ablation, EVLA, and ultrasound-guided foam sclerotherapy. In particular, EVLA has been shown to be a highly effective technique with prominent occlusion rates (5,6). The aim of this prospective non-randomized study is to evaluate our results performing the EVLA procedure and to assess its safety and effectiveness in the ambulatory setting.

PATIENTS AND METHODS

Patients

This prospective non-randomized study included symptomatic patients who underwent EVLA in our hospital between March 2011 and May 2011,we performed EVLAs in 95 patients (Table 1). All patients had GSV varicosity and primary saphenofemoral junction (SFJ) insufficiency. The study is in compliance with the principles stated in the Helsinki Declaration. Approval from the hospital ethics committee was received for the study. Informed consent was obtained after the patients were given a detailed explanation of the procedure.

The principal examination included a detailed history of disease, a focused physical examination, and venous duplex ultrasound imaging. The patients with SFJ and GSV insufficiencies were evaluated as precandidates for EVLA. The duplex scanning was performed by a radiologist using an venous duplex ultrasonography examination was performed by the radiology department on each patient before and after their treatment (Acuson®, Malvern, PA, Siemens ultrasonography system, Germany, 5-12 MHz linear probe). Deep, superficial, and

perforating venous systems were evaluated. The veins were examined with the patient in an upright position to determine venous reflux, which is defined as retrograde flow of > 0.5-sec duration (7). where as a perforator was considered to be incompetent if it's diameter was 4 mm or greater and/or it's outward directional flow exceeded 0.5 s.

Patients with deep vein insufficiency as demonstrated by the venous duplex ultrasonography were not included in the study.

The GSV diameter was measured at a location that was 3 cm below the saphenofemoral junction. In addition, the small saphenous vein (SSV) diameter was measured at a location that was 1.5 cm below the SPJ while the patient was standing.

The patients who were excluded from the study included those patients with occlusive arterial disease, patients with a known thrombotic disease or hemorrhagic tendency (including oral anticoagulation use), patients with an inability to ambulate, and women who were pregnant or planning to become pregnant. The clinical, etiological, anatomical, and pathophysiological (CEAP) classification of varicose veins was determined for all patients (8,9). Patients were excluded from the study if there was any evidence of deep venous thrombosis (DVT), superficial thrombophlebitis, nonhealing ulcers or nonpalpable pedal pulses. The patients with very superficial or tortuous GSVs were also excluded from the present study. The patients were warned about vein thickening and tenderness along the tributaries after the EVLA.

There were 95 patients who were treated for varicose veins with saphenous reflux, including 45 (47.3%) females and 50 (52.7%) males. With ages ranging from 28 to 70 year(median, 49 years). The most common syptoms were cramping and pain in the lower limbs, which occured in 65(68.4%) of the patients. Other symptoms included lower limb swelling in 16(16.9%) of the patients and skin pigmentation in 5(5.3%) of the patients. 9(9.4%) of our patients chose to undergo the surgery for cosmetic reasons.

Table 1- Demographic And Clinical Data of 95 Patients in Whom Endovenous Laser Ablations were Performed

	Result
Age (years, mean (range))	49 (28-70)
Gender Sex (n (%))	
Female	45 (47.3%)
Male	50 (52.7%)
Limbs (n (%))	
Total number of limbs	118
Unilateral limbs	72 (75.8%)
Bilateral limbs	23 (24.2%)
Premorbid conditions (n (%))	
Hypertension	8 (8.4%)
Diabetes mellitus	12 (12.6%)
Hypertension+diabetes mellitus Arthritis	5 (5.3%)
	7 (7.4%)
CEAP clinical class (n(%))	
II(simple varicose vein) *(n* (%))	62 (65.3%)
III(ankle edema) *(n* (%))	20 (21%)
IV(ankle edema) *(n* (%))	10 (10.5%)
V/VI C5 (healed venous ulcer) *(n* (%))	3 (3.2%)
Varicosity at GSV *(n* (%))	Right 34 (35.7)
	Left 61 (64.2)
Varicose veins (n(%))	
Few	17 (17.9%)
Calf	35 (36.8%)
Calf and thigh	11 (11.6%)
Pain/cramping (n(%))	
Occasional	72 (68.5%)
Daily	14 (14.7%)
Edema	16 (16.8%)
Pigmentation (n(%))	
Small area	7 (7.5%)
Large area	3 (3.1%)

CEAP, clinical, etiological, anatomical, and pathological

PROCEDURE OF EVLA

For all cases, a diode laser kit was used; the kit is suitable for the 1470 nm diode laser. This kit consists of a bare fiber, a 70 cm guiding catheter with controlled pullback and guidance markings for cm, a 6 Fr introducer sheath, an 0.035-J tip guidewire with length of 150 cm, and a 16 gauge entry needle.

Table 2- Methods and Treatment Parameters

	Study Group
Laser	1470 nm
Type of Fiber	radial tip fiber
Number of Patients Treated	95
Joules Used Per cm	45 J/cm (median)

The course of GSV, branch varicosities, and perforating veins were identified by inspection while the patient was in the upright position , and were marked on the skin with a surgical pen. For all cases, EVLA was performed along with general or local anesthesia

using tumescent solution. The leg was disinfected with a povidone-iodine solution and was then covered with sterile cloths. Similarly, the transducer probe (Sonosite M-Turbo, Vascular Ultrasonography, USA, 6 -13 MHz linear) of the ultrasonography machine was disinfected with the povidone-iodine solution and placed in a sterile sheath. We used a spinal anesthesia needle (Spinocan, 0.53x88/25 gauge) and an intravenous solution device to administer the tumescent anesthesia solution using US guidance. The anesthetic solution for the tumescent anesthesia consisted of 500 mL saline, 5 mL 10% lidocaine, 10 mL 8.4% sodium bicarbonate, and 1 mL adrenaline. The GSV was inserted at knee level via a percutaneous needle puncture, 16 gauge Seldinger technique under ultrasound guidance. . In case of tortuosity of the GSV, a 2-3-cm incision was made over the GSV to facilitate the procedure. A 5 Fr sheath was then passed over the J-tip guidewire 2-3 cm below the SFJ. Once we confirmed the position of the sheath with ultrasonography, a 600-μm radial-tipped laser fiber was inserted. The distal tip of the laser fiber was positioned 2-3 cm below the SFJ; we confirmed it's position through ultrasound guidance and direct visualization of the red aiming beam of the laser fiber, which can be seen through the skin at the groin crease.

After administering the tumescent anesthesia, we performed an EVLA (1470 nm, delivering 40-70 joules/cm of energy). Laser energy was applied using the laser's continuous mode and a constant pullback with a rate corresponding to 45 J cm^{-1} (the power 4-6 W was used in CW mode) (Table 2-3), linear endovenous energy density (LEED) (statistical). An avulsion phlebectomy or a foam sclerotherapy for the leg and ankle were performed (if indicated) under local anesthesia. After each vein was ablated, the fiber and the sheath/catheter were removed, and the puncture area was covered using sterile tape. Then, an elastic compression bandage was applied then wrapped around the leg and kept over the length of the treated vein for 48 h. After patients were trans-ferred to the recovery room, they were encouraged to ambu late immediately in accordance with the hospital sedation protocol.

The patients wore elastic bandages for two days and class II (30-40 mmHg) stockings for at least one month. The patients were also advised to walk for at least one hour/day and were warned to avoid intense exercise and standing for a long period of time.

Table 3- Operative Data of 95 Patıents in Whom EVLA Procedures Were Performed

EVLA application (%)	Right 34 (35.7%)	Left 61 (64.2%)
Type of anesthesia *(n* (%))	Local: 23 (11.22)	General: 72 (88.78)
Mean laser power (W)	5.18 ± 0.83	
Mean treated vein segment (cm)	26.80 ± 8.32	
Mean tumescent anesthesia volume (mL)	460.54 ± 66.20	
Mean total applied energy (J)	2153.52±230.78	

ASSESMENT OF OUTCOME

All patients were followed up on an outpatient basis. If there were no complications, the first routine post-ablation evaluation was performed the first week after the patient was discharged. Subsequent follow-ups, which included clinical examination and venous ultrasound imaging, were performed at the two day, first week, the first, third and sixth month after the laser ablation procedure. The purpose of the ultrasonography examination was to examine the ablated vein for venous reflux and thrombus recanalization and to also exclude deep vein thrombosis. The success of the ablation procedure was defined as lack of compressibility of the treated vein segment, absence of blood flow inside the vein, decreased vein diameter, and the palpation of the fibrotic vein during examination. Complications such as pain duration, ecchymosis, skin burn, deep vein thrombosis, paresthesia, induration or complaints related to EVLA were evaluated and recorded for each case.

ASSESMENT OF PAIN

Following the treatment, all patients were informed and asked to complete a diary card for two days to record after the EVLA procedure to assess their level of pain. They were asked to use the Visual Analog Pain Scale (VAPS) (with numerical grades from 0 cm for no pain and PE 10 cm for the worst pain that the patient had ever experienced), which was provided at the time of discharge. At the first post-ablation follow-up, patients were questioned about whether they took the recommended analgesic drugs and if so, on which day they perceived the maximum amount of pain.

The pain score was assessed for each leg separately in the patients who had an EVLA administered to both legs. This pain score evaluation was conducted on 50 legs of male patients and on 45 legs of female patients (Table 4).

Table 4- Age and Pain Score of Subjects Whose Number of Legs Assessed With Respect to the Pain Score

	Female (n=45)		Male (n=50)		P
	Mean	SD	Mean	SD	
Age	43,28	12,9	42,65	17,56	0,013
Pain score	1,06	0,035	1,01	0,012	0,035
					SD, standard deviation

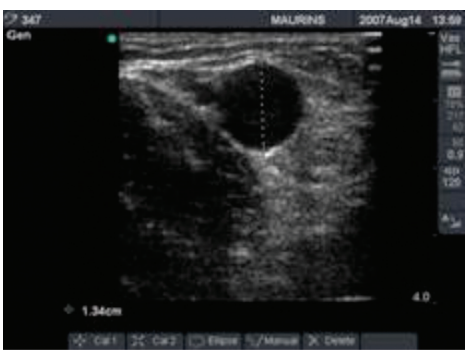
STATISTICAL ANALYSIS

Recurrence, postoperative complications, morbidity and side effect rates were compared group using Fisher's exact test. Patient satisfaction in the group was compared using a Mann-Whitney U test. A p value of <0.05 was considered significant. All analyses were performed using the statistical package SPSS® statistical for Windows version 15.0 (SPSSS, Chicago,IL, USA).

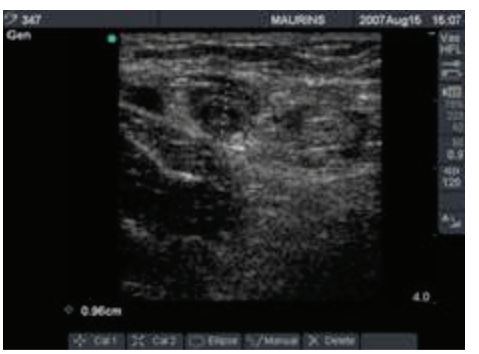
RESULTS

The optical-thermal interaction between the laser beam and the vein wall implies the dependency on chosen wavelength (10). The lengths of the GSVs that were treated in the present study ranged from 25 to 40 cm (Mean treated vein segment (cm) 26.80 ± 8.32) and the diameter of the SSV ranged from 6 to 14 mm (median, 8 mm). The mean operating time and mean amount of energy delivered per unit length were 20 min (range, 25-40 min) and 90 joules/cm (range, 50-100 joules/cm), respectively. A mean of 460.54 ± 66.20 mL tumescent solution was injected in the areas around the GSVs. The median follow-up period for all of the patients was 3 months (range, 0-6 months). The following premorbid conditions were present in these patients: hypertension (8.4%), diabetes mellitus (12.6%), and hypertension in addition to diabetes mellitus (5.3%), arthritis (7.4%) (Table 1). The mean age of the male patients was 42.65±17.56 years, and the mean age of the female patients was 43.28±12.90 years. The mean age of the female patients was greater than that of the male patients (P =

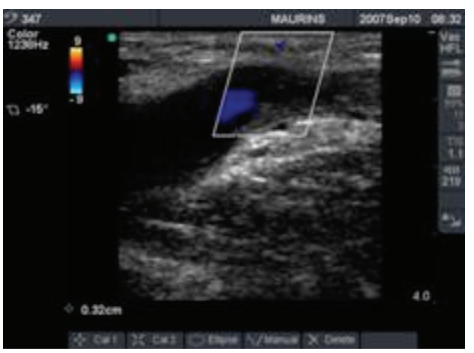
Figure 1- Ultrasonographic Image of EVLA Procedures



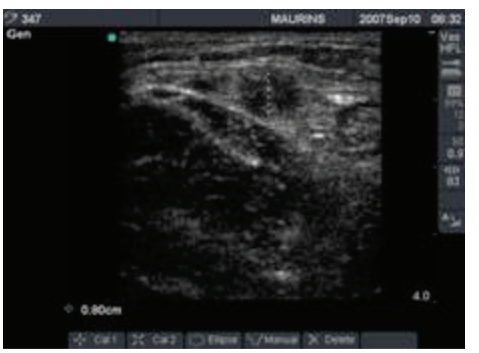
pre-op, day:0
ultrasonography image



post-op day:1
ultrasonography image



post-op day:30
ultrasonography image



post-op day:30
ultrasonography image

0.013).The mean VAP score for the male patients was 1.01±0,012 and the mean VAP score for the female patients was 1.06±0.035). The mean VAP score for all legs was 1.035±0.023. No differences were observed in the mean pain scores with respect to gender (P = 0.035) or age (P = 0.013) (Table 3). At the end of the six month follow-up period, the post-procedural duplex scans revealed a total occlusion of the treated GSVs for 95 patients (100%) and a subtotal occlusion for 0 (0%) patients.

At the one-month duplex examination, the patients who were treated using an EVLA had visible GSVs; however, the diameters of the GSVs were decreased by approximately 93%. (ultrasonography image of the EVLA procedures) (Figure 1)

There was no mortality in our study. During the follow-up visit, the varicosities of all of the patients were resolved, and all of the patients experienced an improvement in their symptoms post operatively.

The complications of EVLA that were experienced by our patients included paraesthesia and hypoesthesia of the affected lower limbs in 1 (1.05%) patients, swelling and induration in 2 (2.1%) patients, skin pigmentation in 4 (4.2%) patients, erythema in 1 (1%) patient, and bleeding from the GSV puncture site in 1 (1%) patient (Table 5).

Table 5- Complications of the EVLA Procedures

Complications	n (%)
Paraesthesia and Hypoesthesia	1(1.05%)
Skin pigmentation	4 (4.2%)
Swelling and induration	2 (2.1%)
Bleeding	1 (1%)
Erythema and bruising	1 (1%)
Deep vein thrombosis	0 (0%)

EVLA, endovenous laser ablation

The paraesthesia and hypoesthesia in the laser-ablated limbs resolved in less than one month after the procedure without treatment. The swelling, induration, erythema and local pain also resolved spontaneously in less than two weeks after the procedure.

No patient underwent a secondary surgical procedure, and none of the patients developed a pulmonary embolism.

DISCUSSION

The interaction between vein wall and laser beam has been under debate since the introduction of the endovenous laser ablation technique in the market and the subsequent FDA approval in 2002 of the laser ablation for varicose veins. The mechanism of interaction is based on several principles at the moment: optical-thermal response caused by the scattered laser beam; response of the vein wall to heat diffusion from the radial fiber tip; the direct contact between the vein wall and fiber tip; and the recently explored one, which is the evaporation condensation mechanism which implies the vein wall's response to condensing boiling bubbles. The boiling bubbles travel only the distance of around 20 mm, promotes heat transfer and thermal homogenization, before get condensing. In this case there is a correspondence to the phenomenon of heat pipe, where over the length of 20 mm the achieved saturation temperature, within the venous cylindrical volume with noncondensing bubbles, is 100°C. This phenomenon is followed by the pullback speed which is suggested to be in the range 1-2 mm/s and which assures the irreversible vein coagulation with the temperature of 100°C. The irreversible vein coagulation happens with a temperature of 75°C over 1 second or 70°C over 10 seconds exposure (11,12).

The reduced absorption in hemoglobin, in case of the 1470 nm, leads to reduced carbonization of vein wall. Its increased absorption in water enables the boiling bubble effect to the vein wall. The qualitative analysis with optical coherence tomography shows that it is enough to coagulate the intima and media layers of vein wall without any transmural defect, which happens with the RF ablation at 85° C. The applied laser energy is responsible for the thermal damage of endothelium and tunica intima (inner vein wall) which leads to the tissue destruction and permanent vein occlusion (13). The optical tomography also shows that vein perforations are noticed with hemoglobin specific wavelengths even when the average LEED (around 35 J/cm) is applied (14). EVLA has a high success rate of over 90%, as demonstrated by several years of follow-up studies, and this procedure has a lower complication rate than traditional ligation with stripping (15). EVLA for the treatment of saphenous vein insufficiency has been succesfully used for 10 years.

EVLA damages blood-filled vessels as a result of steam formation, leading to endothelial denudation, collagen contraction, and vein wall fibrosis (16).

The results of the prospective randomized study of endovenous radiofrequency obliteration (closure procedure) versus ligation and stripping in a selected patient population (EVOLVeS Study) included greater quality of life scores after endovenous treatment compared with conventional treatment for varicose veins at the one-and two-year assessment time points (6).

Endovenous ablation has advantages over conventional surgery, including a lower level of postoperative pain, shorter periods of sick leave, an earlier return to normal activities, and a reduction in the overall cost to society (17). In several large case studies, the technical success rate was approximately 100%, and the long-term success rate (up to 5 years) ranged from 90% to 100% (18).

The post-procedural duplex US evaluations for the patients in the present study revealed that a total occlusion of the treated GSVs occurred in 95 patients (100%) and that a subtotal occlusion in 0 (0%) patients. The success rate was 100% with evident thrombotic occlusion.

We used a 1470 nm laser in our study because it was readily available at our hospital. The 1470 nm wavelength has a direct impact on the vein wall due to the absorption in interstitial water. Besides, there was no scarring and carbonization effect and no general anesthesia use. There were no complications and the minimal recovery period allowed immediate return to daily activities. There were no painful indurations and paresthesia was present only absolutely, there was no case of ablation induced deep vein thrombosis.

Thromboembolic complications may occur after any type of treatment for varicose veins. DVT is a serious complication of varicose vein surgery, with an associated risk of a pulmonary embolism. Prospective duplex screening identifies DVT in 5% of patients, compared to a clinical incidence of approximately 1% (19). Van Rij et al. (20) documented DVT in 5.3% of their patients limbs after varicose vein surgery; however, the majority of these thrombi were localized to the tibial veins. As demonstrated by previous trials and case studies, DVT in patients who have undergone EVLA is rare, with a reported incidence of 0% to 6%.

EHIT is thrombus extension into a deep vein after a superficial venous thermoablation that usually carries a benign prognosis. Marsh et al (21) observed an incidence of DVT of 1% after EVLA. In their study, which included 350 patients, three cases of EHIT (0.9%) were recorded.

We observed an incidence of DVT of 1% in our EVLA study, and this case of DVT was an EHIT. This patient was asymptomatic, and the diagnosis of EHIT was based solely on the routine postprocedural US examination.

Yoshioka et al (22) observed a DVT incidence of 8.3% in their spine surgery study, in which regional anesthesia was used. However, to our knowledge, no reports exist in the literature about the DVT incidence after EVLA performed using an anesthesia method other than tumescent anesthesia.

In our EVLA study, general/regional anesthesia and intravenous sedation were not used; we used tumescent anesthesia.

Early mobilization and wearing compression stockings that were worn for at least one month postoperatively were effective at maintaining a low DVT incidence. This result was similar to those of other studies. To reduce the level of preoperative pain, the use of general/regional anesthesia or intravenous sedation during EVLA instead of tumescent anesthesia may increase the risk of DVT because the patient will not be able to stand and walk immediately after the procedure.

The mean pain score in our EVLA study was similar to the value reported in Ho et al. (23) These authors used a similar pain scale for a study of EVLA (940 nm) that included 24 patients. In addition, we observed that the pain scores in our EVLA were independent of age and gender.

Hyperpigmentation along the course of the treated vein may also be observed, especially when the vein is lo-cated above the fascial level or if the patient is thin. However, this pigmentation gradually fades over time. The mean body mass index of our patients with hyperpigmentation follow-ing the EVLA was significantly lower than that of the other patients. This factor may have contributed to the skin discoloration that was observed following the EVLA.

The endovenous laser ablation with 1470nm is a minimally invasive, with almost no pain, less bruising and swelling comparing to other wavelengths. The results of the present EVLA study using a 1470 nm laser indicate that this procedure is safe and effec-tive in all suitable patients, especially in terms of the level of postoperative pain, regardless of the patient's age and gender.

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