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Surgical Care of Venous and Lymphatic Disorders

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EDITORIAL

469 **Appropriate care for venous disease**

Peter F. Lawrence, MD, *and* Peter Gloviczki, MD

CLINICAL RESEARCH STUDIES

SUPERFICIAL VENOUS DISEASE

471 **A review of United States endovenous ablation practice trends from the Medicare Data Utilization and Payment Database**

Joel M. Crawford, MD, Antonios Gasparis, MD, Jose Almeida, MD, Steve Elias, MD, Thomas Wakefield, MD, Brajesh K. Lal, MD, Nicholas Osborne, MD, Sahar Amery, MD, *and* Nicos Labropoulos, PhD, *Stony Brook, NY; Miami, Fla; Englewood, NJ; Ann Arbor, Mich; and College Park, Md*

Analysis of the Medicare Provider Utilization and Payment Database from 2012 to 2015 demonstrates increased use of endovenous ablations in all regions of the United States, with 3244 unique providers performing 619,029 procedures, with an average of 1.8 ablations per patient. The absolute number of providers performing greater than one ablation per patient also increased throughout the time period analyzed.

480 **Single-center retrospective review of early outcomes of radiofrequency ablation versus cyanoacrylate ablation of isolated great saphenous vein insufficiency**

Mehmet Şenel Bademci, MD, Cemal Kocaaslan, MD, Mustafa Aldag, MD, Emine Şeyma Denli Yalvaç, MD, Ahmet Oztekin, MD, Nurgül Bulut, MD, *and* Ebuzer Aydın, MD, *Istanbul, Turkey*

In this retrospective single-center study of 159 patients, both radiofrequency ablation and cyanoacrylate closure treatment were equally safe, with similar occlusion rates, clinical success, and patient satisfaction at 1 year.

486 **Delineating the durability outcome differences after saphenous ablation with laser versus radiofrequency**

William J. Yoon, MD, Max Dresher, MA, Paul R. Crisostomo, MD, Pegge M. Halandras, MD, Carlos F. Bechara, MD, *and* Bernadette Aulivola, MD, *Maywood, Ill*

This retrospective study analyzed clinical and anatomic recurrence rate and pattern of 343 limbs in 270 consecutive patients after saphenous vein ablation using laser (EVLA) or radiofrequency (RFA). The study suggests that treated site recurrence after RFA is more frequent and that outcomes of EVLA and RFA may differ in the long term.

Cover Image: See Venous Images, page 591

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ACUTE VENOUS THROMBOEMBOLISM

493 **The implementation of a pulmonary embolism response team in the management of intermediate- or high-risk pulmonary embolism**

Eleftherios S. Xenos, MD, PhD, George A. Davis, PharmD, BCPS, Qiang He, MS, MSPH, Amanda Green, DNP, and Susan S. Smyth, MD, PhD, *Lexington, Ky*

This single-center study on implementation of a pulmonary embolism response team (PERT) for treatment of severe pulmonary embolism found that PERT resulted in increased utilization of advanced treatment modalities and shorter intensive care unit stay and overall length of stay as compared to historic controls; there was, however, no change in mortality and direct cost of treatment.

501 **Effects of a standardized emergency department protocol on after-hours use of venous duplex ultrasound**

Ross M. Clark, MD, MBA, Dyann Weingardt, RVT, James M. Goff Jr, MD, and Erika R. Ketteler, MD, *Albuquerque, NM*

This retrospective study found that a clinical decision-making tool using the Wells Score incorporated into the electronic medical record did not decrease after-hours utilization of venous duplex ultrasound studies to evaluate for deep venous thrombosis and did not affect the overall likelihood of study positivity. A higher positivity of nurse-ordered vs physician-ordered studies need further investigation.

INFERIOR VENA CAVA FILTERS

507 **Patient perspectives on inferior vena cava filter retrieval**

Afsha Aurshina, MD, Anand Brahmandam, MD, Yawei Zhang, MD, MPH, Yongli Yang, MPH, Hamid Mojibian, MD, Timur Sarac, MD, and Cassius Iyad Ochoa Char, MD, MS, FACS, *New Haven, Conn; and Columbus, Ohio*

In 604 patients with retrievable inferior vena cava filters, 42 patients who were candidates for removal had retained filters; 12% were unaware they had a filter, 23% were unaware it could be removed, and 69% were unaware of risks of leaving the filter in place. Insufficient patient education appears to be important in retention of retrievable filters that otherwise could be removed.

ILIOFEMORAL VENOUS OBSTRUCTION

514 **Defining the utility of anteroposterior venography in the diagnosis of venous iliofemoral obstruction**

Ignatius Lau, MD, C. Y. Maximilian Png, BA, Meghana Eswarappa, BA, Michael Miller, BA, Shivani Kumar, MD, Rami Tadros, MD, Ageliki Vouyouka, MD, Michael Marin, MD, Peter Faries, MD, and Windsor Ting, MD, *New York, NY*

This retrospective study of 86 patients with 77 left lower extremity and 68 right lower extremity imaging studies found that anteroposterior venography can diagnose left common iliac vein obstruction, but comprehensive evaluation of lesions in all other veins of the iliofemoral system requires intravascular ultrasound.

522 **Is it necessary to dilate stents in management of nonthrombotic iliac vein lesions?**

Afsha Aurshina, MBBS, Yuriy Ostrozhynskyy, BS, Hoang Nguyen, MD, Ahmad Alsheekh, MD, Natalie Marks, MD, RVT, Sareh Rajaei, MD, Anil Hingorani, MD, and Enrico Ascher, MD, *Brooklyn, NY*

This retrospective office-based study of 71 iliofemoral vein stentings suggests no significant benefit of balloon venoplasty to redilate Wallstents after deployment for nonthrombotic iliac vein lesions.

527 **Evaluation of anticoagulant and antiplatelet therapy after ilio caval stenting: Factors associated with stent occlusion**

Robert R. Attaran, MD, Denizhan Ozdemir, MD, I-Hsin Lin, PhD, MPH, Carlos Mena-Hurtado, MD, and Alexandra Lansky, MD, *New Haven, Conn*

In this retrospective study, 155 patients underwent iliofemoral stenting. In patients with acute deep vein thrombosis and post-thrombotic syndrome, there was a statistically significant larger stent diameter in those with patent stents. The majority of stent occlusion and restenosis cases occurred within the first 3 months, when most were still on anticoagulant therapy.

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POPLITEAL VEIN ANEURYSM

535 Editors' Choice

Treatment of popliteal vein aneurysms

Thomas Noppeney, MD, Reinhard Kopp, MD, Karin Pfister, MD, Wilma Schierling, MD, Jeanette Noppeney, MD, and Beatrix Cucuruz, MD, *Nuremberg and Regensburg, Germany; and Zürich, Switzerland*

This retrospective study analyzed the outcome of 39 patients with popliteal vein aneurysms. Thirty-one patients with aneurysms >20 mm had more turbulent flow on ultrasound and had more deep venous thrombosis than patients with smaller aneurysms ($P = .029$). Twenty-nine patients with aneurysms >20 mm underwent resection, most with good results.

HEMODIALYSIS ACCESS

543 Routine use of ultrasound to avert mechanical complications during placement of tunneled dialysis catheters for hemodialysis

Afsha Aurshina, MBBS, Amrit Hingorani, Anil Hingorani, MD, Natalie Marks, MD, and Enrico Ascher, MD, *Brooklyn, NY*

In this single-center retrospective study, 1766 tunneled dialysis catheters were placed for hemodialysis access in 1065 patients, with no mechanical complications with standard use of duplex ultrasound for placement.

OPEN VENOUS RECONSTRUCTIONS

547 Outcome of ilio caval resection and reconstruction for retroperitoneal sarcoma

Matteo Ferraris, MD, Dario Callegaro, MD, Francesco Barretta, MS, Marco Fiore, MD, Stefano Radaelli, MD, Silvia Stacchiotti, MD, Rosalba Miceli, PhD, Anna Maria Socrate, MD, Piermarco Locati, MD, and Alessandro Gronchi, MD, *Legnano and Milan, Italy*

This retrospective single-center study suggests that ilio caval resection during retroperitoneal sarcoma (RPS) surgery aids long-term survival and has complication rates comparable to multivisceral RPS surgery. For inferior vena cava reconstruction, both banked venous homograft or polytetrafluoroethylene graft had excellent patency and low risk of infection.

COMPRESSION THERAPY

557 Lower limb volume in healthy individuals after walking with compression stockings

Sergio Giancesini, MD, PhD, FACS, Giovanni Mosti, MD, Maria Grazia Sibilla, MD, Elisa Maietti, BS, PhD, Jose Antonio Diaz, MD, Joseph D. Raffetto, MD, Paolo Zamboni, MD, and Erica Menegatti, PhD, *Ferrara and Lucca, Italy; Bethesda, Md; Ann Arbor, Mich; and Boston, Mass*

This prospective crossover study analyzed the effect of graduated compression stocking (GCS) during continuous aerobic exercise on lower limb volume in healthy subjects. The study suggests that a standardized continuous walk of 30 minutes is associated with a significant lower limb volume reduction together with lower perceived exertion following the use of certified GCS.

LYMPHEDEMA

562 Perioperative variations in indices derived from noninvasive assessments to detect postmastectomy lymphedema

Kotaro Suehiro, MD, Shigeru Yamamoto, MD, Saiko Honda, MD, Noriyasu Morikage, MD, Eijiro Harada, MD, Yoshihiro Takemoto, MD, Hiroaki Nagano, MD, and Kimikazu Hamano, MD, *Ube, Yamaguchi, Japan*

Postmastectomy patients were prospectively followed up using noninvasive assessments to detect lymphedema (LE) until 2 years postoperatively. Among 93 postmastectomy patients without lymphedema, there were no differences in the arm circumferences, bioimpedance analysis (BIA), or ultrasound (US) findings between sides. Immediately after LE presentation in four patients, the common findings included abnormal BIA and abnormal US findings in the medial forearm.

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VENOUS ULCERS

570 Standardized care protocol and modifications to electronic medical records to facilitate venous ulcer healing

Julie Bitner, PA-C, Ulka Sachdev, MD, Eric S. Hager, MD, and Ellen D. Dillavou, MD, *Pittsburgh, Pa; and Durham, NC*

This retrospective review of prospectively collected data in 204 CEAP class 5 and 6 patients demonstrated that venous ulcer healing rates can be improved with a multidisciplinary care model facilitated through customization of the electronic medical record.

577 Invited Commentary — Importance of electronic medical record-facilitated pathways to optimize care for vascular disease management

William Marston, MD, *Chapel Hill, NC*

CASE REPORTS OF THE MONTH

578 Severe phlebitis-like abnormal reaction following great saphenous vein cyanoacrylate closure

Hassan Nasser, MD, Tommy Ivanics, MD, Dania Shakaroun, MD, and Judith Lin, MD, *Detroit, Mich*

583 Staged surgical treatment of a primary duodenocaval fistula in a patient with metastatic nonseminomatous germ cell tumor

Annie Boisvert, MD, Raymond Labbé, MD, and Pascal Rhéaume, MD, *Quebec City, Quebec, Canada*

587 Ultrasound diagnosis and follow-up of Takayasu arteritis with femoral vein involvement

Xinping Jiang, PhD, Jinxiang Liu, MD, Yang Zhang, MD, and Xiaofeng Sun, PhD, *Changchun, China*

VENOUS IMAGES

591 Large asymptomatic superior vena cava aneurysm

Hua Yi Zhang, MD, Wei Shuai Lian, MD, and Dong Zhe Chai, MD, *Jiaying and Shanghai, China*

REVIEW ARTICLES

592 Update on diagnosis and treatment strategies in patients with post-thrombotic syndrome due to chronic venous obstruction and role of endovenous recanalization

Karina Schleimer, MD, Mohammad Esmaeil Barbati, MD, Jochen Grommes, MD, Konrad Hoeft, MD, Irwin M. Toonder, Cees H. A. Wittens, MD, PhD, and Houman Jalaie, MD, *Aachen, Germany*

601 Comparative analysis of technical success rates and procedural complication rates of bedside inferior vena cava filter placement by intraprocedural imaging modality

Prasanna Sengodan, MD, Kesavan Sankaramangalam, MD, Manshi Li, PhD, Xiaofeng Wang, PhD, Subanandhini Subramaniam, MD, and Narendrakumar Alappan, MD, *Cleveland, Ohio*

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610 Who is treating venous disease in America today?

Josh Gabel, MD, Trevor O'Dell, BS, Elna Masuda, MD, Christian Bianchi, MD, Sharon Kiang, MD, Ahmed Abou-Zamzam, MD, and Theodore H. Teruya, MD, *Loma Linda, Calif. and Honolulu, Hawaii*

SPECIAL ARTICLE

615 Fate of the snake: A parable of blame

Lazar J. Greenfield, MD, *Ann Arbor, Mich*

PIONEERS IN VENOUS SURGERY

616 J. Leonel Villavicencio, MD (1926-2019)

Roger T. Gregory, MD, James S. T. Yao, MD, PhD, and Walter J. McCarthy, MD, *Norfolk, Va; and Chicago, Ill*

UNDER THE MACRASCOPE

617 More Merit-Based Incentive Payment System scoring

Patrick C. Ryan, MD, Jill Rathbun, MHSA, and Karen Woo, MD, MS, *Nashville, Tenn; Chicago, Ill; and Los Angeles, Calif*

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618 Review and commentary of key non-JVS-VL articles

CORRECTION

621 Correction

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