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EDITORIAL

771 The future of iliofemoral deep vein thrombosis treatment

Cees H. A. Wittens, MD, PhD, and Stephen A. Black, MD, PhD, *Maastricht, The Netherlands; and London, United Kingdom*

CLINICAL RESEARCH STUDIES

ACUTE VENOUS THROMBOEMBOLISM

773 Fast-track thrombolysis protocol: A single-session approach for acute iliofemoral deep venous thrombosis

Enrico Ascher, MD, Jesse Chait, BS, Albert Pavalonis, DO, Natalie Marks, MD, Anil Hingorani, MD, and Pavel Kibrik, DO, *Brooklyn, NY*

Our novel fast-track thrombolysis protocol is a safe, efficacious, and cost-saving single-session strategy for acute iliofemoral deep venous thrombosis. The combination of pharmacomechanical thrombectomy, balloon maceration, and vein stenting resulted in decreased length of stay. During the 5-year study period, there were no cases of pulmonary embolism, significant local or systemic hemorrhage, limb loss, or mortality.

781 Single- versus multiple-stage catheter-directed thrombolysis for acute iliofemoral deep venous thrombosis does not have an impact on iliac vein stent length or patency rates

Catherine Go, MD, Zein Saadeddin, MD, Yash Pandya, MD, Rabih A. Chaer, MD, MSc, Mohammad H. Eslami, MD, Eric S. Hager, MD, Michael J. Singh, MD, and Efthymios D. Avgerinos, MD, *Pittsburgh, Pa*

This single-center, retrospective study compared single-stage (12 limbs) vs multiple-stage (73 limbs) thrombolysis and stenting for acute deep venous thrombosis and found no differences in overall stented length and primary patency. Early and 2-year stent failures were associated with incomplete thrombus clearance but not with number of lysis sessions or length of stent coverage.

VENOUS INJURIES

789 Editors' Choice Prevention and treatment of dilator injuries during central venous catheter placement

Paul E. Collier, MD, FACS, *Sewickley, Pa*

There was an 85% mortality rate from injuries to major intrathoracic veins by dilators in this retrospective, nonrandomized review of 20 completed malpractice cases. Attention to technique is important to prevent these injuries and prompt recognition and treatment of perforations with minimally invasive techniques improves survival rates.

Cover Image: See Clinical Research Studies, page 773

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793 Impact of inferior vena cava ligation on mortality in trauma patients

Saskya Byerly, MD, Vincent Cheng, MD, Anastasia Plotkin, MD, Kazuhide Matsushima, MD, Kenji Inaba, MD, and Gregory A. Magee, MD, MSc, *Miami, Fla; and Los Angeles, Calif*

This National Trauma Data Bank study analyzed the 443 patients with isolated inferior vena cava (IVC) injury who underwent ligation vs repair. IVC ligation was not independently associated with mortality or lower extremity amputation, but it was associated with acute kidney injury and need for fasciotomy.

ILIOFEMORAL VENOUS OBSTRUCTION

801 A comparison between intravascular ultrasound and venography in identifying key parameters essential for iliac vein stenting

Myriam L. Montminy, MD, James D. Thomasson, MD, Guillermo J. Tanaka, MD, Lara M. Lamanilao, BS, William Crim, MS, and Seshadri Raju, MD, FACS, *Jackson, Miss*

A blinded comparison of venography and intravascular ultrasound in 155 limbs undergoing stent placement to correct iliac vein stenosis found that venography missed a lesion or its location in 51% of the limbs ($P < .0001$). The location of iliac vein confluence and the optimal distal landing zone were significantly different between the two techniques.

SUPERFICIAL VENOUS DISEASE

808 Significant physician practice variability in the utilization of endovenous thermal ablation in the 2017 Medicare population

Margaret Mann, MD, Peiqi Wang, MD, MPH, Marlin Schul, MD, MBA, Neil M. Khilnani, MD, Angela Park, BS, Martin A. Makary, MD, MPH, and Caitlin W. Hicks, MD, MS, *Cleveland, Ohio; Baltimore, Md; Lafayette, Ind; and New York, NY*

Among 2462 physicians who performed endovenous thermal ablation procedures in 102,145 patients with chronic venous insufficiency, the physician ablation rate varied substantially based on practice specialty, experience, and venous ablation practice volume. The authors suggest that outlier physicians performing a high number of venous ablation procedures per patient be educated using a claims-based peer-benchmarked practice pattern measure.

817 Venous thromboembolism complications after endovenous laser ablation for varicose veins and role of duplex ultrasound scan

Hiroko Nemoto, MD, Makoto Mo, PhD, Takaaki Ito, PhD, Yoshinori Inoue, PhD, Yukio Obitsu, PhD, Kimihiko Kichikawa, PhD, Takashi Yamaki, PhD, and Tomohiro Ogawa, PhD, on behalf of the Japanese Endovenous Ablation Committee for Varicose Veins, *Yokohama, Hyogo, Tokyo, Chiba, Nara, and Fukushima, Japan*

In this Japanese nationwide survey, the incidence of venous thromboembolism (VTE) complications after endovenous laser ablation for varicose veins was low (0.11% for endovenous heat-induced thrombosis [EHIT] class 3, 0.013% for EHIT class 4, 0.063% for other types of deep venous thrombosis, and 0.0067% for pulmonary embolism). Because the occurrence of severe VTE complications cannot be predicted by venous duplex ultrasound scanning, the value of this modality is unclear.

824 A comparison of duplex ultrasound findings after cyanoacrylate embolization versus endovenous laser ablation of the great saphenous vein

Brandon McGuinness, MD, Fadi Elias, MSc, MD, Khatija Pinky Ali, MD, Mirza Shahzaib Ahmad, James Namburi, BSc, Beverley Chan, MSc, MD, David Szalay, MEd, MD, and Theodore Rapanos, MSc, MD, *Hamilton, Ontario, Canada; and Princeton, NJ*

In this single-center, cross-sectional study of 119 patients, there was a trend toward a reduction in vein diameter after cyanoacrylate embolization of the great saphenous vein. This study suggests that the glue cast remains present for years after therapy and breakdown of the glue cast alone is an unlikely cause of anatomic recurrence.

CONTENTS (continued)

832 Venous intima-media thickness increases both in deep and superficial systems in patients with great saphenous vein reflux

Daniele Bissacco, MD, Sara Oberto, MD, Dimitrios Kontothanassis, MD, and Alberto Caggiati, MD, Milan, Padua, and Rome, Italy

In this study, venous intima-media thickness of the great saphenous vein (GSV) and femoral vein (FV) was measured by duplex ultrasound examination in patients with deep system and GSV incompetence. Venous intima-media thickness was significantly increased in both GSV and FV in legs affected by GSV reflux. Wall changes occurring in competent FV of limbs with GSV reflux led to the hypothesis that hemodynamic overload owing to superficial reflux is extended to the deep system as well.

VENOUS THORACIC OUTLET SYNDROME

839 Evolving strategies for the management of venous thoracic outlet syndrome

Nicholas Madden, DO, Keith D. Calligaro, MD, Matthew J. Dougherty, MD, Krystal Maloni, MD, and Douglas A. Troutman, DO, Philadelphia, Pa

An infraclavicular approach for rib resection in 40 venous thoracic outlet syndrome patients was a viable alternative to traditional techniques performed in 11 patients in this single-center, retrospective review. Adjuncts such as preoperative catheter-directed thrombolysis, infusion catheters, balloon angioplasty, sequential compression sleeves to the affected arm, and low-dose heparin infusions through the venous sheath helped achieve durable outcomes with this technique.

PELVIC AND RENAL VENOUS DISORDERS

845 Posture commonly and considerably modifies stenosis of left common iliac and left renal veins in women diagnosed with pelvic venous disorder

Marek Krzanowski, MD, PhD, Lukasz Partyka, MD, PhD, Lukasz Drelicharz, MD, PhD, Malgorzata Mielnik, MD, Marzena Frolow, MD, PhD, Krzysztof Piotr Malinowski, MSc, Agnieszka Sliwka, PhD, Karolina Marciniak, MR, and Tomasz Aleksiejew-Kleszczynski, MD, Krakow, Poland

Intravascular ultrasound assessment of left common iliac and left renal vein stenosis was frequently and substantially affected by body position changes in a prospective study of 41 women diagnosed with pelvic venous disorder. The authors suggest that criteria for diagnosis of May-Thurner and nutcracker syndromes should be redefined.

853 Outcomes of left renal vein stenting in patients with nutcracker syndrome

Efthymios D. Avgerinos, MD, Zein Saadeddin, MD, Rishab Humar, BS, Karim Salem, MD, Michael Singh, MD, Eric Hager, MD, Michel Makaroun, MD, and Rabih A. Chaer, MD, MSc, Pittsburgh, Pa

This retrospective, single-center cohort study of 18 patients diagnosed with nutcracker syndrome (NCS), in five after failed left renal vein transposition, showed that renal vein stenting is safe, with good midterm patency rates and symptom relief. This study suggests that minimally invasive approaches may have a potential role in the treatment of NCS.

VENOUS ANEURYSMS

860 Contemporary management of lower extremity venous aneurysms

Rhusheet Patel, MD, Stefan Hanish, BS, Donald Baril, MD, Karen Woo, MD, and Peter Lawrence, MD, Los Angeles, Calif

In this single-center, retrospective review of lower extremity venous aneurysms in 11 patients, six with symptoms benefited from surgical interventions. Larger, multicenter studies are required to properly characterize the natural history and management of this disease.

VENOUS ACCESS

865 Ultrasound-based prediction of cephalic vein cutdown success prior to totally implantable venous access device placement

Wojciech Staszewicz, MD, Surrenaido P. Naiken, MD, André Mennet, MD, Jeremy Meyer, MD, PhD, Marc Righini, MD, Philippe Morel, MD, and Christian Toso, MD, PhD, Geneva, Switzerland

This single-center, prospective study of 160 patients who underwent cephalic vein cutdown for totally implantable venous access device (TIVAD) insertion found that an inability to visualize the vein on the preoperative ultrasound imaging and depth of the vein were predictors of failure of TIVAD insertion. Preoperative ultrasound imaging seems to be useful for performing TIVAD insertion by venous cutdown.

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ANGIOSCOPY FOR VENOUS DISEASE

870 Angioscopy: Direct visualization of chronic venous occlusion, May-Thurner syndrome, and other applications in phlebology

Mina Kang, BMedSc, Claudia Hurwitz, MBBS, Tom Exner, PhD, Anes Yang, MD, BMed, MPH, David Connor, PhD, and Kurosh Parsi, MBBS, FACD, FACP, MSc, PhD, *Sydney, New South Wales, Australia*

Endoscopic imaging of the venous system in this single-center, retrospective study demonstrated potential applicability of angioscopy in diagnosis and characterization of chronic venous occlusion, deployment of venous stents, angioscopy-guided thrombectomy, foam sclerotherapy, and endovenous laser ablation.

VENOUS LABORATORY

882 Prospective study comparing the rate of deep venous thrombosis of complete and incomplete lower extremity venous duplex ultrasound examinations

Khanh P. Nguyen, MD, Jacob Weber, MD, Rikki Samuel, RN, and Gregory L. Moneta, MD, *Portland, Ore*

This prospective, observational study of 2843 patients analyzed the rate of deep venous thrombosis (DVT) in lower extremity venous duplex ultrasound examinations that were complete vs those that were incomplete. There were similar rates of DVT in repeated studies after incomplete examinations (9.1%) and in initially complete studies (13.1%; $P = .33$), suggesting that all incomplete studies should be followed by repeated examination.

889 Invited Commentary — Repeated venous duplex ultrasound examination when the initial study is incomplete

Russell H. Samson, MD, DFSVS, RVT, *Sarasota, Fla*

LYMPHEDEMA

890 The diagnostic unreliability of classic physical signs of lymphedema

Arjun Jayaraj, MD, Seshadri Raju, MD, Corbin May, MS, and Nicholas Pace, MS, *Jackson, Miss*

Single-center, retrospective analysis of prospectively collected data of 436 consecutive limbs with swelling that underwent lymphoscintigraphy revealed that clinical signs of lymphedema are unreliable in making the correct diagnosis in one-third of the patients. Routine lymphoscintigraphy is recommended for diagnosis of lymphedema.

CASE REPORT OF THE MONTH

898 Aneurysm resection interposed with a spiral saphenous vein graft in a patient with a popliteal venous aneurysm with thrombosis

Yoshitaka Yamamoto, PhD, Keiichi Kimura, PhD, Shintaro Takago, MD, Hiroki Kato, PhD, Kenji Iino, PhD, and Hirofumi Takemura, PhD, *Kanazawa, Japan*

REVIEW ARTICLE

902 A systematic review and meta-analysis of comparative studies comparing nonthermal versus thermal endovenous ablation in superficial venous incompetence

Ahmed Hassanin, MD, Thomas M. Aherne, MCh, Garrett Greene, PhD, Emily Boyle, MD, Bridget Egan, MCh, Sean Tierney, MCh, Stewart R. Walsh, MCh, Seamus McHugh, MD, and Sayed Aly, PhD, *Dublin and Galway, Ireland; and Sohag, Egypt*

VENOUS VANTAGE POINT

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

JOURNAL OF VASCULAR SURGERY: VENOUS AND LYMPHATIC DISORDERS – NOVEMBER 2019 AUDIOVISUAL SUMMARY

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