ORIGINAL CONTRIBUTIONS

**Peripheral Vascular Disease**

2 Long-Term Outcomes of Successful Endovascular Therapy Via the Retrograde Approach for Below-the-Knee Chronic Total Occlusion in Patients With Critical Limb Ischemia After a Failed Antegrade Approach

| Junya Matsumi, MD; Takuma Takada, MD; Noriaki Moriyama, MD; Tomoki Ochiai, MD; Kazuki Tóbita, MD; Koki Shishido, MD; Kazuya Sugitatsu, MD; Shingo Mizuno, MD; Futoshi Yamanaka, MD; Masato Murakami, MD; Yutaka Tanaka, MD; Saeko Takahashi; Takeshi Akasaka, MD; Shigeru Saito, MD |

This study evaluated long-term results following successful endovascular therapy (EVT) for chronic total occlusion (CTO) below the knee (BTK) using the retrograde approach after a failed antegrade approach. Nineteen patients (19 limbs) with critical limb ischemia who underwent successful EVT for BTK-CTO using the retrograde approach after a failed antegrade approach during 2010-2014 were studied.

**Peripheral Vascular Disease**

9 Randomized, Double-Blind Study Comparing Patient Comfort and Safety Between Iodixanol 320 mg I/mL and Iopamidol 370 mg I/mL in Patients Undergoing Peripheral Arteriography – The COMFORT II Trial

| Christian Rosenberg, MD; José Joaquin Martínez-Rodrigo, MD, PhD; Elena Lonjedo Vicent, PhD; Juan Macho, MD, PhD; Lauren Lim, PharmD; Thomas M. Todoran, MD, MSc; for the Peripheral Discomfort Study Investigator Panel |

Numerous clinical trials conducted 10-20 years ago evaluated contrast-induced discomfort. It is unknown whether those data are applicable to current-day clinical practice. This study was performed to provide contemporary contrast-induced patient discomfort data obtained during peripheral arteriography procedures using iso-osmolar iodixanol 320 mg I/mL, compared with low-osmolar iopamidol 370 mg I/mL.

**Coronary Artery Disease**

16 A Prospective Multicenter Study Using a Virtual 3 Fr Percutaneous Coronary Intervention System: The V3 Registry

| Fuminobu Yoshimachi, MD, PhD; Yoshitoki Takagawa, MD, PhD; Hidenobu Teraí, MD, PhD; Akihiko Takahashi, MD, PhD; Yoshihisa Shimada, MD, PhD; Takaaki Katsuki, MD, PhD; Satoru Tóhara, MD, PhD; Hiroshi Ueno, MD, PhD; Masanori Takada, MD, PhD; Nobuo Shiode, MD, PhD; Kumihiko Yamada, MD, PhD; Noriyuki Kinoshita, MD, PhD; Tatsuyoshi Honda, MD, PhD; Hiroshi Asano, MD, PhD; Satoshi Takeshita, MD, PhD; Hiroaki Koike, MD, PhD; Tomyasu Shin, MD; Motomaru Masutani, MD, PhD; Takeshi Matsugake, MD, PhD; Shigeru Saito, MD; Yuki Ikari, MD, PhD; The V3 Registry Investigators |

A small-diameter guiding catheter (GC) makes less-invasive percutaneous coronary intervention (PCI) possible. The virtual 3 Fr (V3) is an extremely slender PCI system; however, the outcomes of using this system have not yet been determined. Therefore, our objective was to evaluate the safety and feasibility of the V3 sheathless 5 Fr PCI.

**Coronary Artery Disease**

25 Alternative Rota-Flush Solution for Patients With Severe Coronary Artery Calcification who Undergo Rotational Atherectomy

| Michael S. Lee, MD; Moo-Hyun Kim, MD; Seung-Woon Rha, MD |

Potential complications of rotational atherectomy include coronary spasm and slow-flow/no-flow. A pressured rota-flush solution is infused into the device to lubricate the drive shaft to minimize the risk of these complications as well as facilitate delivery of the device. We assessed the feasibility and safety of a rota-flush solution with 10,000 U of unfractionated heparin in 1 L of normal saline in 67 consecutive patients who underwent rotational atherectomy from July 2012 to June 2015.
Initial Single-Center Experience With the Fully Repositionable Transfemoral Lotus Aortic Valve System

Kai-Uwe Jan, MD; Florian Leuschner, MD; Benjamin Meder, MD; Hugo A. Katus, MD; Raffi Bekeredjian, MD; Emmanuel Chorianopoulos, MD

Transcatheter aortic valve replacement (TAVR) has become the standard therapy for patients with severe symptomatic aortic stenosis and unacceptable high risk for surgical aortic valve replacement. This study offers the first real-world experience with the second-generation, mechanically expanded, fully repositionable transfemoral Lotus TAVR device.

Bioprosthetic Aortic Paravalvular Leak: Is Valve-in-Valve Another Solution?

Anwar Tandar, MD; David A. Bull, MD; Frederick G.P. Welt, MD

Paravalvular leak (PVL) following aortic valve implantation is a rare complication but may cause potentially serious consequences. Many of these patients are considered too high risk to undergo a repeat surgical procedure; hence, a percutaneous transcatheter approach has often been utilized. TAVR using a valve-in-valve approach, may provide an alternative approach for bioprosthetic PVL in the aortic position.

Catheter-Directed Fibrinolysis of Submassive Pulmonary Embolism After IVC Filter Migration to Renal Veins

Kershaw V. Patel, MD; Jeffrey A. Leef, MD; John E. Blair, MD; Atman P. Shah, MD; Sandeep Nathan, MD, MSc; Jonathan D. Paul, MD

A 76-year-old male presented with a submassive pulmonary embolism despite having an inferior vena cava (IVC) filter. Imaging scans demonstrated pulmonary artery emboli and deep vein thrombosis in the left common femoral vein. Venography revealed the IVC filter with struts extending into the right and left renal veins. A new filter was therefore deployed below the prior filter, offering symptom relief.

Orbital Atherectomy in the Renal Artery: A New Frontier for an Emerging Technology?

Javier A. Valle, MD, MSc; Ehrin J. Armstrong, MD, MSc; Stephen W. Waldo, MD

Orbital atherectomy (OA) has been developed as a method to modify calcified plaque in the peripheral vasculature, with extensive experience and data supporting its use in infrainguinal peripheral arterial disease. However, calcific atherosclerotic disease occurs in other vascular beds that may benefit from OA. We describe the first reported use of OA in a renal artery.

Play the Map: Ablation of a Macro Reentrant Atrial Tachycardia in a Patient After Senning Repair for Transposition of the Great Arteries

Emre Yalcinkaya, MD; Firat Duru, MD, Prof; Matthias Greutmann, MD, PhD; Thomas Wolber, MD, PhD

A 50-year-old male patient who had undergone Senning repair for transposition of the great arteries at the age of 7 years was referred with recurrent supraventricular tachycardias. Fast anatomical mapping of the systemic venous atrium was performed with the CARTO electroanatomical mapping system, and facilitated the understanding of the underlying mechanism.

LETTER TO THE EDITOR

War On Shock

Alexander G. Truesdell, MD

2016 REVIEWER THANK YOU

The editors and staff wish to thank the international cardiovascular experts who were active in evaluating manuscripts for the JIC throughout 2016.
ORIGINAL CONTRIBUTIONS

Coronary Artery Disease

36  Initial Experience of Bioabsorbable Polymer Everolimus-Eluting Synergy Stents in High-Risk Patients Undergoing Complex Percutaneous Coronary Intervention With Early Discontinuation of Dual-Antiplatelet Therapy  
Rebecca L. Noad, MB, PhD;  Colm G. Hanratty, MD;  Simon J. Walsh, MD  
This study assessed those in our unit who underwent percutaneous coronary intervention with a Synergy stent to examine a minimum of 6 months of clinical outcomes after early discontinuation of dual-antiplatelet therapy.

Coronary Artery Disease

42  The SYNTAX Score Does Not Predict Risk of Adverse Events in Patients With Non-ST Elevation Acute Coronary Syndrome Who Undergo Coronary Artery Bypass Graft Surgery  
Björn Redfors, MD, PhD;  Chun-Hui He, MD, PhD;  Tidlo Palmertini, MD;  Adriano Caixeta, MD, PhD;  Gennaro Giustino, MD;  Girma Minaku Ayele, PhD;  Ajay J. Kirtane, MD, SM;  Roxana Mehran, MD;  Gregg W. Stone, MD;  Philippe Généreux, MD  
We tested the ability of the SYNTAX score to predict 1-year adverse outcomes for patients with non-ST segment elevation acute coronary syndromes who undergo coronary artery bypass graft surgery.

Peripheral Vascular Disease

51  Double Inferior Vena Cava and its Implications During Endovascular and Surgical Interventions: A Word of Caution  
Nicolas W. Shammas, MD, MS;  Rayan Jo Rachwan, MD;  Ghassan Daher, MD;  Bassel Bou Dargham, BS  
Double inferior venal cava is likely to be encountered by surgical and endovascular specialists. Its course should be well understood with the aid of CTA and MRI before abdominal and pelvic/retroperitoneal surgical interventions.

Coronary Artery Disease

54  Importance of Adjunct Delivery Techniques to Optimize Deployment Success of Distal Protection Filters During Vein Graft Intervention  
Antony G. Kaliyadan, MD;  Harnish Chawla, MD;  David L. Fischman, MD;  Nicholas Ruggiero II, MD;  Michael Gannon, MD;  Paul Walinsky, MD;  Michael P. Savage, MD  
Deployment of distal protection filters can be technically challenging in the presence of complex anatomy. We assessed the impact of adjunct delivery techniques on the deployment success of distal protection filters in saphenous vein grafts.

Coronary Artery Disease

59  Incidence of Bradycardia and Outcomes of Patients Who Underwent Orbital Atherectomy Without a Temporary Pacemaker  
Michael S. Lee, MD;  Heajung Nguyen, MD;  Richard Shlofmitz, MD  
We analyzed the incidence of bradycardia and the safety of patients with severely calcified coronary lesions who underwent orbital atherectomy without the insertion of a temporary pacemaker.

Coronary Artery Disease

63  Periprocedural Myocardial Injury After Recanalization of Single Chronic Coronary Occlusion – A Propensity Score Analysis Comparing Long-Term Clinical Outcomes  
Milez Jaguszewski, MD, PhD;  Natasza Gilis-Malinowska, MD;  Juan Luis Gutierrez-Chico, MD, PhD;  Michal Chmielecki, MD, PhD;  Pawel Skarzynski, MD, PhD;  Slawomir Burawski, MD, PhD;  Piotr Drevia, MD;  Radoslaw Targoski, MD, PhD;  Lukasz Lewicki, MD, PhD;  Witold Dubaniewicz, MD, PhD;  Marcin Fijalkowski, MD, PhD;  Marcin Gruchala, MD, PhD;  Dariusz Gicewicz, MD, PhD  
A long-term clinical study on the impact of periprocedural myocardial injury in antegrade PCI-CTO patients.
Transcatheter Aortic Valve Replacement

69 Comparative Matched Outcome of Evolut-R vs CoreValve Transcatheter Aortic Valve Implantation
Uri Landes, MD; Tamarin Bentel, MD; Alon Barsheshet, MD; Abid Assali, MD; Hanna Vaknin-Assa, MD; Avner Levi, MD; Katia Orvin, MD; Ran Komonski, MD

The Evolut-R (Medtronic, Inc) is a transcatheter aortic valve implantation (TAVI) system that was built on the foundation of the CoreValve device platform. Although already in extensive clinical utilization, it is unknown if the Evolut-R improves TAVI outcome. Herein, we compared TAVI outcomes of the Evolut-R and CoreValve devices.

ONLINE EXCLUSIVE www.invasivecardiology.com

PERIPHERAL INTERVENTION

E17 Novel Crossing System for Chronic Total Occlusion Recanalization: First-in-Man Experience With the SoundBite Crossing System
Andrew Benko, MD; Simon Bérubé, MD; Christopher E. Buller, MD; Steven Dion, MSc; Louis-Philippe Riel, MSc; Martin Brouillette, PhD; Philippe Généreau, MD

Percutaneous intervention of CTO lesions has been associated with a lower procedural success rate. Current dedicated CTO devices may be of limited use for the non-CTO expert, and are associated with increased intra-procedural complication rates. The SoundBite Crossing System [SoundBite Medical Solutions, Inc] is a newly developed device using shockwaves [short-duration, high-amplitude pressure pulses] delivered to the tip of guidewire to facilitate penetration of the proximal cap and crossing of the occlusion. The current report describes the first-in-man use of the SoundBite Crossing System in two occluded lower-limb arteries.

CLINICAL IMAGES

E21 Novel Use of MitraClip for Severe Mitral Regurgitation Due to Infective Endocarditis
Pranav Chandrashekar, MBBS; Erin A. Fender, MD; Mohammed A. Al-Hijji, MD; Krishnaswamy Chandrasekaran, MD; Charanjit S. Rihal, MD; Mackram F. Eleid, MD; Nandan S. Anavekar, MBBC

This case demonstrates a potential role for transcatheter mitral valve repair in treating acute severe mitral regurgitation due to endocarditis.

CLINICAL IMAGES

E23 Transcatheter Mitral Paravalvular Leak Closure Facilitated by Preprocedural Cardiac CT for Simulation of Fluoroscopic Anatomy and Paravalvular Defect Localization
Kasper Korsholm, MD; Ulrik Mortensen, MD, PhD; Jesper Møller Jensen, MD, PhD; Nicolo Piazza, MD, PhD; Pascal Theriault-Lauzier, MD, PhD; Jens Erik Nielsen-Kudsk, MD, DMSc

Paravalvular leakage (PVL) occurs in 6%-15% of cases after surgical heart valve replacement. We report the first use of dedicated software for fluoroscopic simulation [FluoroCT] in transcatheter mitral PVL closure.

CLINICAL IMAGES

E26 Posterior Descending Coronary Artery Arising From a Septal Branch of the Left Anterior Descending Coronary Artery
Nathaniel R. Smilowitz, MD; Louai Razzouk, MD, MPH; James N. Slater, MD

Coronary angiography revealed a non-dominant right coronary artery and a long anomalous branch of the proximal left anterior descending coronary artery that coursed inferiorly to give rise to the posterior descending artery. No epicardial coronary artery disease was visualized.

CLINICAL IMAGES

E28 Late Double-Barrel Lumen Following Successful CTO-PCI Using the Crossboss Stingray System
James Roy, MB, BCH; David Rees, MBBS, PhD; David Ramsay, MBBS; James Weaver, MBBS, PhD

We present a case of double-lumen formation seen 1 year post CTO-PCI using subintimal dissection reentry with late restoration of major side branches.
Coronary Artery Disease

76 Randomized Angiographic and Intravascular Ultrasound Comparison of Dual-Antiplatelet Therapy vs Triple-Antiplatelet Therapy to Reduce Neointimal Tissue Proliferation in Diabetic Patients
Maria Fernanda Zuliani Mauro, MD; J. Armando Mangione, MD; J. Ribamar Costa, Jr, MD; Ricardo Costa, MD; Luiz Alberto Piva e Mattos, MD; Rodolfo Staico, MD; Fausto Feres, MD; Dmytiry Siqueira, MD; Amanda Sousa, MD; Alexandre Abizaid, MD

This prospective, placebo-controlled trial was conducted in diabetic patients randomized to receive either standard dual-antiplatelet therapy vs triple-antiplatelet therapy with cilostazol for a minimum of 12 months after PCI with the Endeavor zotarolimus-eluting stent.

Coronary Artery Disease

83 Percutaneous Coronary Intervention of Coronary Chronic Total Occlusions Improves Peak Oxygen Uptake During Cardiopulmonary Exercise Testing
Shuaib M. Abdullah, MD, MSCs; Jeffrey L. Hastings, MD, MS; Suwetha Amsavelu, BS; Fransisco Garcia-Monales, MD; Fury Hendrix; Aris Karatasakis, MD; Barbara A. Danek, MD; Judit Karacsonyi, MD; Bavana V. Rangan, BDS, MPH; Michele Roele, RN, BSN; Houman Khalili, MD; Subhash Banerjee, MD; Emmanouil S. Brilakis, MD, PhD

Although coronary chronic total occlusions (CTOs) are treated with percutaneous coronary intervention (PCI) to improve symptoms, studies demonstrating symptom improvement have been mostly limited to questionnaire responses. The current study assessed for changes in peak oxygen uptake during cardiopulmonary exercise testing after CTO-PCI.

Coronary Artery Disease

92 “Single-Operator” Technique for Advancing the Orbital Atherectomy Device
Michael S. Lee, MD; Heajung Nguyen, MD; Daniel Philipson, MD; Richard A. Shlofmitz, MD

Orbital atherectomy (OA) is an effective treatment strategy to facilitate optimal stent expansion. Since reluctance with the utilization of OA may stem in part from operator inexperience and unavailability of an experienced assistant, we assessed the feasibility and safety of the “single-operator” technique, in which the operator autonomously advances the OA device while maintaining wire position.

Peripheral Vascular Disease

97 First Clinical Experience With Targeted REnal Nerve Demodulation (TREND-1) Using a Neurotropic Agent for the Treatment of Sympathetic Hypertension
Nicholas Kipshidze, MD, PhD; Horst Sievert, MD; Michael H. Wholey, MD, MBA; Konstantin Kipiani, MD; Vakhtang Kipiani, MD; Tea Mukhuradze, MD; Mark Wholey, MD; Emily Stein, PhD; K. T. Venkateswar Rao, PhD

Our aim was to evaluate the feasibility and safety of a novel targeted neuromodulatory treatment for sympathetic hypertension involving a one-time local injection of neurotropic agents near renal nerves by treating 7 patients suffering from uncontrolled hypertension per ESH-ESC guidelines with a single dose of NW2013, a neurotropic Na’/K’ ATPase antagonist.

Coronary Artery Disease

105 Validation of a Novel Monitoring System to Measure Contrast Volume Use During Invasive Angiography
Anand Prasad, MD; Irma Scholler, RN; Daniel Levin, MD; Gia Banda; Christopher M. Mullin, MS; Steven R. Bailey, MD

Multiple studies have demonstrated the relationship between contrast volume (CV) and the risk of acute kidney injury. Quantification of total CV is often estimated and therefore may be inaccurate. We described validation of a novel contrast monitoring system designed to detect and display single injection and total CV use on a monitor system in real time.
Transcatheter Aortic Valve Replacement

109 The Society of Thoracic Surgery Risk Score as a Predictor of 30-Day Mortality in Transcatheter vs Surgical Aortic Valve Replacement: A Single-Center Experience and its Implications for the Development of a TAVR Risk-Prediction Model

Pakash Balan, MD, JD; Yelin Zhao, MS; Sarah Johnson, ANP; Salman Anain, MD; Abhijeet Dholbe, MD; Anthony Estrella, MD; Richard Smalling, MD, PhD; Tom C. Nguyen, MD

The Society of Thoracic Surgery (STS) risk score serves as an important determinant of eligibility for transcatheter aortic valve replacement (TAVR). This study compares the STS score’s discriminatory power for TAVR mortality as compared with surgical aortic valve replacement mortality.

NEW TECHNIQUE

E30 Percutaneous Tricuspid Valve Regurgitation Repair With the MitraClip Device Using an Edge-to-Edge Bicuspidization Technique

Sameer Gafoor, MD; O. Madalina Petrescu, MD; Eric J. Lehr, MD, PhD; Charles Puls, MD; Ming Zhang, MD, PhD; John L. Petersen II, MD; John V. Olsen, MD; Irina Penev, PA; Mayank Agrawal, MD; Rahul Sharma, MD; Glenn Barnhart, MD

Patients who present with both severe mitral and tricuspid regurgitation who are symptomatic despite optimal medical therapy and at prohibitive risk for surgery pose a significant therapeutic challenge. We present a periprocedural imaging strategy for percutaneous tricuspid valve repair with the MitraClip device using a bicuspidization technique.

CLINICAL IMAGES

E37 A New Strategy for Transcatheter Left Atrial Appendage Closure With Cerebral Embolic Protection in Patient With Left Auricular Thrombosis and Total Contraindication to Long-Term Anticoagulation

Salvatore Saccò, MD; Jayme Ferro, MD; Tomoyuki Umemoto, MD; Riccardo Turri, MD; Carlo Penzo, MD; Andrea Pacchioni, MD

We describe a clinical case with permanent atrial fibrillation, absolute contraindication to long-term anticoagulation therapy, and persistent thrombus formation in LAA treated with transcatheter LAA closure and a supraaortic trunk protection system in order to avoid risk of periprocedural stroke.

CLINICAL IMAGES

E39 Fractured Wire in the Left Internal Mammary Artery: A Novel Retrieval Technique

Michael D. Dyal, MD; Abdulla A. Damlaji, MD, MPH; Pablo Rengifo-Moreno, MD; Eduardo J. de Marchena, MD

Although fractured coronary wires are a rare occurrence, failure to retrieve them successfully puts patients at undue risk. We offer a technique that can be used when traditional retrieval with a Microsnare system is unsuccessful.

CLINICAL IMAGES

E41 Unusual Repair of Aortic Coarctation: Transcatheter Intervention Implications

Adami J. Carlisle, MD; Anand D. Shah, MD; David Appel, MD; Brian E. Kogon, MD

A loud murmur was detected in a patient who had previously undergone mechanical aortic valve replacement and aortic coarctation repair, found to be related to unusual, extra-anatomic surgical repair, transverse aorta to descending aorta bypass.
The Journal of Invasive Cardiology®

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Coronary Artery Disease
116 The Impact of Age and Sex on In-Hospital Outcomes of Chronic Total Occlusion Percutaneous Coronary Intervention
Aris Karatasakis, MD; Rahel Iwnetu, MD; Barbara A. Danek, MD; Dimitri Karmpaliotis, MD; Khaldoon Alaswad, MD; Farouc A. Jaffer, MD, PhD; Robert W. Yeh, MD, MS, MBA; David E. Kandzari, MD; Nicholas J. Lembo, MD; Mitul Patel, MD; Ehtisham Mahmud, MD; William L. Lombardi, MD; R. Michael Wyman, MD; J. Aaron Gaunt, MD; Anthony H. Doherty, MD; Catalin Toma, MD; James W. Choi, MD; Barry F. Uretsky, MD; Jeffrey W. Moses, MD; Ajay J. Kirtane, MD; Ziad A. Ali, MD, DPhil; Manish Parikh, MD; Judit Karacsonyi, MD; Bavani F. Ranjani, BDS, MPH; Craig A. Thompson, MD; Subhash Banerjee, MD; Emmanouil S. Brilakis, MD, PhD

Our objective was to determine the effect of age and sex on procedural outcomes and efficiency of chronic total occlusion (CTO) percutaneous coronary intervention (PCI). We examined the clinical and angiographic characteristics and outcomes of 1675 CTO-PCIs performed in 1644 patients between 2012 and 2016 at 15 United States centers.

Coronary Artery Disease
123 Impact of Chronic Total Occlusions on Revascularization Scores and Outcome Prediction
Björn Redfors, MD, PhD; Tullio Palmieri, MD; Adriano Caixeta, MD, PhD; Girma Minahlu Ayele, PhD; Dominic P. Francese, MPH; Roxana Mehran, MD; Emmanouil S. Brilakis, MD, PhD; Ajay J. Kirtane, MD, SM; Dimitri Karmpaliotis, MD, PhD; Gregg W. Stone, MD; Philippe Généreux, MD

The SYNTAX score (SS) algorithm assigns CTO lesions a greater weight (5× points) than non-CTO lesions (50% to <100% diameter stenosis; 2× points). In order to evaluate the contribution of CTO-related SS to the overall SS for patients with CTO and compare the traditional SS to a simplified variant, we calculated the SS and the simplified SS (2× points also to CTO lesions) for 4356 patients from the angiographic substudy of the ACUITY (Acute Catheterization and Urgent Intervention Triage StrategY) trial. We compared the association between SS and 1-year mortality and major adverse cardiac events for patients with and without a CTO. We also compared the simplified SS with the traditional SS.

Commentary
132 The SYNTAX Score for Chronic Total Occlusions: Building a Better Mousetrap
Salman A. Arain, MD and H. Vernon Anderson, MD

Despite its widespread applicability and reproducibility, the SYNTAX score is less than ideal for evaluating patients with CTOs. As the number of CTO-PCIs grows, there is a need to develop a more clinically relevant CTO classification system that incorporates both angiographic and non-angiographic variables for maximum relevancy. The authors have taken an important step in this direction. Their findings suggest that it may be possible to update the SS rather than devise a new scheme from scratch. This is good news for both patients with CTOs and the clinicians who treat them, because if the current trend in outcomes continues to hold, we are not far from a time when PCI for certain CTOs is considered to be the norm rather than the exception to the rule.

Peripheral Vascular Disease
135 Atherectomy in Peripheral Artery Disease: A Review
Tariq M. Bhat, MD; Maxwell E. Afari, MD; Laurence A. Garcia, MD

Peripheral arterial disease (PAD) is a clinical manifestation of systemic atherosclerosis and is associated with significant morbidity and mortality. The physiological force and shear stress from angioplasty and stenting have made PAD treatment challenging. Atherectomy devices have continued to emerge as a major therapy in the management of peripheral vascular disease. This article presents a review of the current literature for the atherectomy devices used in PAD.
Transcatheter Aortic Valve Replacement

145 Percutaneous Mitral Valve Repair With the MitraClip in Primary Compared With Secondary Mitral Valve Regurgitation Using the Mitral Valve Academic Research Consortium Criteria
Julia Seeger, MD; Patrick Müller; Birgida Gonska, MD; Dominik Scharnbeck, MD; Sinisa Mankovic, MD; Daniel Walcher, MD; Wolfgang Rothbauer, MD; Jochen Wohle, MD

Our aim was to compare early device success, procedural success, and 30-day safety endpoint according to the new Mitral Valve Academic Research Consortium (MVARC) criteria in severe primary and secondary mitral regurgitation (MR) patients. A total of 210 patients were enrolled; 105 patients with primary MR were compared with 105 patients with secondary MR. All patients were highly symptomatic (New York Heart Association III/IV 79.0% vs 87.6%). Decision for MitraClip therapy was done by the heart team.

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NEW TECHNIQUE
E43 Recanalization of Total Occlusion of the Superficial Femoral Artery and Profunda Femoris Using the Transluminal Approach
Nicolas W. Shammas, MD, MS; Ghassan E. Daher, MD; Bassel Bou Dargham, BS; Rayan Jo Rachwan, MD; Jon Robken, MD

Chronic total occlusions are seen in 30%-40% of symptomatic superficial femoral artery (SFA) disease. Despite advances in revascularization techniques, 10%-20% of these occlusions cannot be crossed. We report one case and review the literature on transluminal retrograde crossing of the SFA from the profunda femoris.

FIRST IN MAN
E47 Novel Crossing System for the Recanalization of Complex Chronic Total Occlusions: Ex vivo Proof of Concept of the SoundBite Crossing System Simon Bérubé, MD; Andrew Benko, MD; Marc-Antoine Despatis, MD; MSC; Louis-Philippe Riel, MSc; Marianne Brodmann, MD; Eric Therasse, MD; Martin Brouillette, PhD; Jihad A. Mustapha, MD; Philippe Généreux, MD

The current report describes the first use of the SoundBite Crossing System in the recanalization of human ex vivo occluded arteries below the knee during a simulated procedure performed under fluoroscopy. Microcomputed tomography and histologic evaluation of the occluded and recanalized segment are provided to support therapeutic mechanism.

FIRST IN MAN
E51 First-in-man Percutaneous Left Atrial Appendage Closure With an Amplatzer Amulet and TriGuard Embolic Protection Device in a Patient With Left Atrial Appendage Thrombus
Francesca Del Furia, MD; Marco B. Accona, MD; Francesco Giannini, MD; Richard J. Jobbou, MD; Damiano Regazzoli, MD; Antonio Mangieri, MD; Azeem Latib, MD; Antonio Colombo, MD; Matteo Montorfano, MD

We report on first-in-man percutaneous LAA closure with the Amplatzer Amulet device in the presence of LAA thrombus using the TriGuard EPD as a cerebral protection device.

CLINICAL IMAGES
E53 Not All That Blurs is Clot: An Unusual But Not Infrequent Cause of Acute Coronary Syndrome
José Antonio Baz Alonso, MD; Saleta Fernández Barbeira, MD; Jorge Alberto Vitela Rodríguez, MD; Jorge Andrade Pacheco, MD; Alberto Ortiz Sáez, MD; Guillermo Bastos Fernández; Antonio Alejandro De Miguel Castro, MD; Andrés Igüiez Romo, MD, PhD

One of the most frequent causes of acute coronary syndromes in patients with previous PCI is stent thrombosis. Intracoronary loss of unexpanded stents is rather an infrequent but serious complication that can trigger an acute cardiovascular event. Its proper identification is challenging and the best treatment strategy remains unclear.
Coronary Artery Disease

151 Percutaneous Transcatheter Therapies for the Management of Left Ventricular Assist Device Complications
Rohan J. Kalathiya, MD; Jonathan Grinstein, MD; Nir Uriel, MD; Atman P. Shah, MD
The utilization of continuous-flow left ventricular assist devices (LVADs) has greatly increased over the last decade. This increased use of LVAD therapy has led to the observation of mechanical complications such as device thrombosis, de novo aortic insufficiency, and outflow graft stenosis. Surgical repair for these complications remains the therapy of choice; however, surgery may be associated with high operative risk in some patients. The purpose of this article is to discuss mechanical complications associated with LVAD therapy and interventional transcatheter therapies that have been used to solve these increasingly complex problems.

Coronary Artery Disease

164 Root Cause Analysis of Deaths in ST-Segment Elevation Myocardial Infarctions Treated With Primary PCI: What Can We Do Better?
Fredy El Sakr, MD; Mohamad Kenaan, MD; Daniel Menees, MD; Milan Seth, BS, MS; Hitinder S. Gurm, MD
Recent data demonstrate that mortality of patients with ST-elevation myocardial infarction has not changed despite dramatic reduction in door-to-balloon times. Identifying potential areas in care that can be further optimized to decrease mortality remains a priority. We performed a root-cause analysis of all patients who died following primary percutaneous coronary intervention (PCI) during index hospitalization from 2008 to 2013 at the University of Michigan. Mortality following primary PCI was deemed mostly unpreventable. However, improvement in symptom-onset to medical care was identified as one potential target that might be of value in further reducing the mortality associated with ST-elevation myocardial infarction.

Advances in Vein Therapies

169 Antecubital Fossa Venous Access For Right Heart Catheterization
Omar Waheed; Abhinav Sharma, MD; Maninder Singh, MD; Edo Kaluski, MD
With the advance of radial access and ulnar access, there has been an increased interest in performing right heart catheterization and right-heart based procedures via antecubital venous access. Our purpose is to describe the venous anatomy of the upper extremities, technique, equipment, and cost for employing this approach. Reported also is the international experience based on publications assessing procedural success, complications, fluoroscopy time and radiation dose, access-site compression time, and time to ambulation. Antecubital-venous-access based right heart catheterization carries satisfactory success rates, requires a short learning curve, and is exceptionally safe even when performed with full anticoagulation.

Peripheral Vascular Disease

175 Lack of Association Between Limb Hemodynamics and Response to Infrapopliteal Endovascular Therapy in Patients With Critical Limb Ischemia
J.A. Mustapha, MD; Larry J. Diaz-Sandrinal, MD; George Adams, MD; Michael R. Jaff, DO; Robert Beasley, MD; Theresa McGoff, RN; Sara Finton, RN; Larry E. Miller, PhD; Mohammad Ansari, MD; Fadi Saab, MD
Non-invasive limb hemodynamics may aid in diagnosis of critical limb ischemia, although the relationship with disease severity and response to endovascular therapy is unclear. This prospective, single-center study enrolled 100 critical limb ischemia patients (175 lesions, Rutherford class 4–6) who underwent infrapopliteal endovascular revascularization in the Peripheral Registery of Endovascular Clinical OutcoMEs (PRIME) registry. Hemodynamic measures included ankle-brachial index, toe-brachial index, and toe pressure. Non-invasive hemodynamic studies may have limited clinical usefulness in patients with critical limb ischemia.
Transcatheter Aortic Valve Replacement

181 Low-Volume Contrast CT Angiography Via Pulmonary Artery Injection for Measurement of Aortic Annulus in Patients Undergoing Transcatheter Aortic Valve Replacement
Vien T. Truong, MD; Joseph Choo, MD; Luke McCoy, MD; Adam Mussman, MD; Stephanie Ambach; Dean Kereakes, MD; Ian Sarenbock, MD; Wojciech Mazur, MD

Aortic stenosis is the most common valvular heart disease, and TAVR has evolved as an alternative method for surgical valve replacement. Computed tomography (CT) angiography is essential for measurement of aortic annulus prior to TAVR. Our objective was to investigate the feasibility and image quality of low-dose contrast CT angiography with pulmonary artery protocol.

NEW TECHNIQUE

E63 Saphenous Vein Graft Aneurysm 10 Years After Paclitaxel-Eluting Stent Implantation
Akihito Tanaka, MD; Richard J. Jabbour, MD; Francesco Giannini, MD; Azeem Latib, MD; Antonio Colombo, MD

A patient underwent paclitaxel-eluting implantation for a saphenous vein graft stenosis. A follow-up angiogram at 8 months demonstrated no re-stenosis with multifocal persistent contrast staining. After 10 years, a saphenous vein graft aneurysm was revealed within the stented segment.

Clinical Images

E61 Management of Guidewire Entrapment With Laser Atherectomy
Judit Karacsonyi, MD; Jose Roberto Martinez-Parachini, MD; Barbara Anna Danek, MD; Aris Karatasakis, MD; Imre Ungi, MD; Subhash Banerjee, MD; Emmanouil S. Brilakis, MD, PhD

A 62-year-old man was referred for PCI of a severe circumflex lesion. The guidewire became entangled in the previously implanted LAD stent. The left main was engaged with a second guide catheter, followed by balloon dilations, various microcatheters, and laser atherectomy. The wire eventually fractured without protruding into the aorta. Two stents were implanted into the circumflex lesion followed by left main stenting that covered the fragment.

E60 Ventricular Rupture Following Myocardial Infarction
Christian Fielder Camm, MA [Cantab], BM BCh, MRCP; Stefan Neubauer, MD, FMedSci, FRCP; David P. Taggart, MBCHB, FRCS, MD [Hons], PhD; Oliver J. Rider, BA [Oxon], BM BCh, MRCP [UK], D.Phil [Oxon]

A 70-year-old man presented with prolonged cardiac chest pain and was awaiting CABG following angiography showing extensive multivessel disease. Upon further chest pain, cardiac MRI revealed ventricular rupture, which was managed aggressively with combined bypass surgery and rupture repair.

E53 First-in-Man Percutaneous Transaxillary Artery Placement and Removal of the Impella 5.0 Mechanical Circulatory Support Device
Kenta Nakamura, MD; Sandeep Krishnan, MD; Claudius Mahr, DO; James M. McCabe, MD

We report on the fully percutaneous insertion and removal of the Impella 5.0 microaxial flow device via the axillary artery in a patient with cardiogenic shock and peripheral artery disease.

Clinical Images

E64 Spontaneous Regression of Possible Transcatheter Aortic Valve Thrombosis Without Additional Anticoagulant: Two-Year Follow-Up
Ryo Yanagisawa, MD; Kentaro Hayashida, MD; Masahiro Jinzaki, MD; Keiichi Fukuda, MD

An 84-year-old man with symptomatic severe aortic stenosis underwent TAVI. Computed tomography revealed a new hypo-attenuated leaflet thickening (HALT) with reduced leaflet motion at 1 year, considered to indicate leaflet thrombosis. At 2 years, leaflet mobility had improved, with spontaneous regression of HALT.
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## Coronary Artery Disease

188 **Sex-Related Differences in Outcomes After Percutaneous Balloon Aortic Valvuloplasty**

Marzena Daniec, MD; Artur Dziewierz, MD, PhD; Danuta Sorysz, MD, PhD; Paweł Kleczyński, MD, PhD; Tomasz Rakowski, MD, PhD; Łukasz Rzeszutko, MD, PhD; Jarosław Tęgda, MD, PhD; Marek Tomala, MD, PhD; Bartłomiej Naurotek, MD; Krzysztof Żmudka, MD, PhD; Dariusz Dudek, MD, PhD

We evaluated sex-related differences in short- and long-term outcomes of patients undergoing balloon aortic valvuloplasty (BAV) for severe aortic stenosis (AS). We followed a total of 112 patients with severe AS who underwent 114 BAV procedures as palliative procedure, bridge to definitive treatment, or before urgent non-cardiac surgery for 24 months.

## Coronary Artery Disease

195 **Impact of the Occlusion Duration on the Performance of J-CTO Score in Predicting Failure of Percutaneous Coronary Intervention for Chronic Total Occlusion**

Antonio de Castro-Filho, MD; Edgar Stroppa Lamas, MD; Rafael A. Meneguz-Moreno, MD; Rodolfo Staico, MD, PhD; Dmytry Siqueira, MD, PhD; Ricardo A. Costa, MD, PhD; Sérgio N. Braga, MD, PhD; J. Ribamar Costa Jr, MD, PhD; Daniel Chamié, MD; Alexandre Abizaid, MD, PhD

The present study examined the association between Multicenter CTO Registry in Japan (J-CTO) score in predicting PCI failure correlating with the estimated duration of chronic total occlusion. Our observational study involved all consecutive procedures performed at a single tertiary-care cardiology center between January 2009 and December 2014.

## Coronary Artery Disease

203 **Impact of Impaired Renal Function in Patients With Severely Calcified Coronary Lesions Treated With Orbital Atherectomy**

Michael S. Lee, MD; Evan Shlofmitz, DO; Gentian Lluri, MD, PhD; Richard A. Shlofmitz, MD

Percutaneous coronary intervention (PCI) of lesions with severe coronary artery calcification (CAC) is associated with increased adverse clinical event rates. Patients with chronic kidney disease (CKD) are at increased risk for atherosclerotic cardiovascular disease, including vascular calcification, and have worse outcomes after PCI. We evaluated the clinical outcomes of patients with CKD who underwent orbital atherectomy for severe CAC prior to stent implantation.

## Peripheral Vascular Disease

207 **Five-Year Freedom From Target-Lesion Revascularization Using Excimer Laser Ablation Therapy in the Treatment of In-Stent Restenosis of Femoropopliteal Arteries**

Nicolas W. Shammas, MD, MS; Gail A. Shammas, BS, RN; Lorraine Arikat, RA; Andrew N. Shammas, BS; Alec Darrow, BS; Avantika Banejee, MS; Benjamin Rudy, BA

Target-lesion revascularization (TLR) and loss of patency remain high following treatment of in-stent restenosis (ISR) of the femoropopliteal (FP) artery. Excimer laser atherectomy (ELA) is effective in reducing TLR and improves patency at 6-month and 1-year follow-up when compared with angioplasty. We conducted a retrospective analysis from our center to examine the 5-year outcomes of ELA in the treatment of ISR of the FP arteries.

## Transcatheter Aortic Valve Replacement

209 **Transcatheter Aortic Valve Replacement Versus Surgical Valve Replacement in Low-Intermediate Surgical Risk Patients: A Systematic Review and Meta-Analysis**

Aakash Garg, MD; Sunil V. Rao, MD; Ganttam Visveswaran, MD; Sahil Agnawal, MD; Abhishek Sharma, MD; Lohit Garg, MD; Indrajit Mahata, MD; Jalej Garg, MD; Dinesh Singal, MD; Marc Cohen, MD; John B. Kostis, MD, PhD

Transcatheter aortic valve replacement (TAVR) is a viable alternative to surgical aortic valve replacement (SAVR) in patients with severe aortic stenosis (SAS) at high risk for surgery. We evaluated the outcomes of TAVR vs SAVR in...
Born from surgical risk considerations, TAVR ultimately will be defined by individualized outcomes. As we treat severe aortic stenosis among ever lower-risk patients, we will need to retain both TAVR and SAVR as possible options.

**Commentary**

**217 Born From Risk: What Made TAVR Possible and the Future of a Transformational Technology**

Paksh Balan, MD, JD; Tom C. Nguyen, MD; H. Vernon Anderson, MD

Born from surgical risk considerations, TAVR ultimately will be defined by individualized outcomes. As we treat severe aortic stenosis among ever lower-risk patients, we will need to retain both TAVR and SAVR as possible options.

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**ONLINE IMAGES**

**CLINICAL IMAGES**

<table>
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<th>E65</th>
<th>Transcatheter Aortic Valve Replacement for Perceval Sutureless Aortic Valve Failure</th>
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<td>Ankur Kalra, MD; Manuel Reyes, MD; Eric Y. Yang, MD; Stephen H. Little, MD; Faisal Nabi, MD; Colin M. Barker, MD; Mahesh Ramchandani, MD; Ross M. Reul, MD; Michael J. Reardon, MD; Neal S. Kleinman, MD</td>
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</tbody>
</table>

As experience with Perceval aortic prosthesis and valve-in-valve TAVR grows, it will be crucial to meticulously document short- and long-term follow-up for establishment of real-world safety and durability of these new technologies.

**CLINICAL IMAGES**

<table>
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<th>E66</th>
<th>Spontaneous Coronary Artery Dissection After Pregnancy as First Manifestation of a Vascular Ehlers-Danlos Syndrome</th>
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<td>Alberto F. Cereda, MD; Paolo A. Canova, MD; Francesco S. Soriano, MD</td>
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We report the case of a myocardial infarction in the postpartum period due to a spontaneous coronary artery dissection. Intracoronary imaging (optical coherence tomography) was critical and led us to formulate the right diagnosis.

**CLINICAL IMAGES**

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<tr>
<th>E67</th>
<th>Retrograde Intervention of a Right Coronary Artery Chronic Total Occlusion Through an Ipsilateral Kugel’s Artery Collateral</th>
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<td>Koyu Sakai, MD; Junichi Omura, MD; Masashi Iwabuchi, MD</td>
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Kugel described the arteria anastomotica auricularis magna. We describe a first case of chronic total occlusion of the right coronary artery that was successfully recanalized using the reverse controlled antegrade and retrograde subintimal tracking technique through the ipsilateral Kugel's artery collateral.

**CLINICAL IMAGES**

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<th>E68</th>
<th>Coronary CT Angiography for In-Stent Restenosis: Diagnosis and Therapeutic Planning</th>
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<td>José Rozado, MD; Isaac Pascual, MD; María Martín, MD, PhD; Juan Calvo, MD; Pablo Avanzas, MD; César Moris, MD, PhD</td>
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This case is illustrative of the potential role of coronary CT angiography to identify the severity and mechanism of restenosis, and thus guide the PCI procedure in a case of especially difficult catheterization.

**CLINICAL IMAGES**

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<th>E69</th>
<th>Percutaneous Translarynx Transcatheter Aortic Valve Replacement</th>
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<tr>
<td>Rajiv Tatal, MD, MPH; Amer Hawatmeh, MD; Mohammad Thawabi, MD; Bruce Haik, MD; Najam Wasty, MD; Mark Russo, MD</td>
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The axillary artery is an alternative, large-caliber vessel that can be utilized in the presence of hostile aortoiliac segments. It can accommodate sheaths up to 18 Fr and is infrequently affected by atherosclerosis.

**CLINICAL IMAGES**

<table>
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<th>E70</th>
<th>Hemodynamic Findings of Severe Subacute Aortic Regurgitation</th>
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<tr>
<td>David W. Lee, MD; Amanda Clark, MD; George A. Stouffer, MD</td>
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The hemodynamic features of subacute aortic regurgitation include equalization of left ventricular pressure and the aortic pressure during diastole, a mildly increased pulse pressure, and systemic hypotension.
Radial Access Technique
219 Balloon-Assisted Tracking Use Reduces Radial Artery Access Failure in an Experienced Radial Center and is Feasible During Primary PCI for STEMI
Daniel Obaid, MBBch, PhD; Ahmed Hailan, MBBS; Alexander Chase, MBBch, PhD; Stephen Dorman, MBBch; Geraint Jenkins, MBBch; Adrian Raybould, MBBS; Mark Ramsey, MBBS, MD; Phillip Thomas, MBBS; David Smith, MBBS, MD; Adrian Ionescu, MD
Arterial spasm prevents percutaneous coronary intervention (PCI) from the radial artery in a small percentage of cases. This prospective study assesses balloon-assisted tracking in reducing radial access failure during PCI.

Commentary
225 The Compleat Radialist
James C. Blankenship, MD
For radial access to become the dominant access route, United States interventionalists will need embody the “perfect example of the practitioner of his or her craft,” or “compleat” radialists.

Peripheral Vascular Disease
227 Abdominal Infrarenal Aortic Stenosis Approached Through a Full Transradial Approach: A Case Series
Italo Porto, MD, PhD; Francesco Barzotta, MD, PhD; Cristina Aurigemma, MD, PhD; Massimo Gustapane, MD; Carlo Tani, MD
Six consecutive patients with infrarenal abdominal aortic stenosis underwent unilateral or bilateral transradial approach for stenting of the aortic lesion using either a “bare-on-the-wire” or a “support-catheter” technique, according to patient anatomy and technical requirements.

Congenital Heart Disease
232 Improved Algorithm for Ostium Size Assessment in Watchman Left Atrial Appendage Occlusion Using Three-Dimensional Echocardiography
Maximilian Schmidt-Salzmann, MD*; Felix Meincke, MD*; Felix Kreidel, MD; Tobias Spangenberg, MD; Alexander Ghanem, MD, PhD; Karl-Heinz Kuck, MD, PhD; Martin W. Bergmann, MD, PhD *Joint first authors.
Correct sizing of the ostium is a crucial step in left atrial appendage occlusion procedures. We hypothesize that area-derived and perimeter-derived diameters from 3D transesophageal echocardiogram can facilitate this step of the procedure.

Transcatheter Aortic Valve Replacement
239 Comparison of Non-Contrast Cardiovascular Magnetic Resonance Imaging to Computed Tomography Angiography for Aortic Annular Sizing Before Transcatheter Aortic Valve Replacement
Jing Wang, MD; Dinesh H. Jagasia, MD; Yamuna R. Kondapally, MD; Howard C. Herrmann, MD; Yuchi Han, MD, MMSc
Accurate measurement of aortic annulus is crucial before transcatheter aortic valve replacement. We compare the clinical feasibility and accuracy of non-contrast cardiovascular magnetic resonance to computed tomography angiography in order to provide a non-contrast alternative to annular sizing.

Coronary Artery Disease
246 Factors Determining Left Main Coronary Artery Luminal Area
Konstantinos Dean Boudoulas, MD; Peter M. Bittenbender, MD; Haikady N. Nagaraja, PhD; Omar Kahaly, MD; Jennifer A. Dickerson, MD; Subha V. Raman, MD; Ernest L Mazzaferri Jr, MD; Charles A. Bush, MD
A certain minimal luminal cross-sectional area has been traditionally used as a cut-off value to determine severity of left main coronary artery (LMCA) stenosis. The severity of stenosis, however, depends on the baseline luminal area (ie, area prior to stenosis), which may vary among individuals. Our aim was to define normal LMCA luminal area using current technology.
in vivo using multislice computed tomography coronary angiography in 86 subjects with normal coronary arteries and calcium score of zero. Left ventricular mass and volumes (systolic, diastolic) were also measured.

Rapid Communications

250 Novel Method for Exchange of Impella Circulatory Assist Catheter: The “Trojan Horse” Technique

Colin T. Phillips, MD; Hector Tamez, MD; Thomas M. Tiu, MD; Robert W. Yeh, MD; Dianne S. Pinto, MD, MPH

Patients with an indwelling Impella device may require escalation of hemodynamic support or exchange to another circulatory assistance platform. Challenges exist in avoiding bleeding and loss of wire access in these patients. We describe a single-access “Trojan Horse” technique that minimizes bleeding while maintaining arterial access for rapid exchange of this percutaneous ventricular assist device.

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CLINICAL IMAGES

E77 Coronary Artery Aneurysm After Biodesorbable Scaffold Implantation in a Woman With an Acute Coronary Syndrome

Alberto F. Cereda, MD; Paolo A. Canova, MD; Jacopo A. Oreglia, MD; Francesco S. Soriano, MD

Optical coherence tomography highlighted “frame by frame” the mechanism of a late biodesorbable scaffold thrombosis due to a coronary aneurysm and provided further knowledge on the behavior of biodesorbable scaffolds in an unusual complex lesion that was percutaneously treated.

E79 Coronary Artery Aneurysm After Biodesorbable Scaffold Implantation

Rodrigo V. Wainstein, MD, PhD; Gustavo N. Araujo, MD; Felipe H. Valle, MD, PhD; Marco V. Wainstein, MD, PhD

Intravascular imaging was shown to be useful in accurately assessing the results of biodesorbable stent deployment and apposition.

E81 Coronary Artery Aneurysm After Mini-Crush Drug-Eluting Stent Technique in a Chronic Total Occlusion

Alfonso Jurado-Román, MD, PhD; María. T. López-Llueva, MD; Ignacio Sánchez-Pérez, MD; Fernando Lozano Ruiz-Poveda, MD

To the best of our knowledge, this is the first case of coronary artery aneurysm affecting a bifurcated chronic total occlusion treated with a two-stent technique.

E83 Premature Ventricular Contractions Producing Brockenbrough-Braunwald Sign in Obstructive Cardiomyopathy

Gaurav K. Sharma, MD; Angie Tripathi, MD; Paul A. Jones, MD

Increased dynamic flow in hypertrophic obstructive cardiomyopathy depicts a classic sign on invasive pressure tracings of the aorta and left ventricle, simultaneously known as the Brockenbrough-Braunwald sign.

E84 Utility of 3D-OCT Imaging With Angiographic Co-Registration in Acute Coronary Syndrome With Normal or Near-Normal Coronary Arteries

Santiago Jesús Camacho Freire, MD; Javier León Jiménez, MD; Antonio Enrique Gómez Menchero, MD; Jessica Roa Garrido, MD; Rosa Cardenal Piris, MD; José Francisco Díaz Fernández, MD

The utility of optical coherence tomography with co-registration for the guidance of percutaneous coronary intervention could be considerable in the management of patients with acute coronary syndromes.

E86 Twin Hearts in Identical Twins

John Papakonstantou, MD, PhD; Nikolaos Platogiannis, MD; Nikolaos Nikolaouls, MD; Athanasios Tsiamalis, MD; Nikitas Karavidas, MD; Dimitrios Platogiannis, MD, PhD

When premature coronary artery disease is found in one of a monozygotic twin pair, evaluating the other twin is a reasonable approach.
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Coronary Artery Disease
253 One-Year Clinical Outcomes of Patients Presenting With ST-Segment Elevation Myocardial Infarction Caused by Bifurcation Culprit Lesions Treated With the Stentys Self-Apposing Coronary Stent: Results From the APPOSITION III Study
Maik J. Grundeken, MD, PhD; Huangling Lu, MD; Nicola Vos, MD; Alexander Jsselmuiden, MD, PhD; Robert-Jan van Geuns, MD, PhD; Rainer Wessely, MD, PhD; Thomas Dengler, MD; Alessio La Manna, MD; Johanne Silvain, MD, PhD; Gilles Montalescot, MD, PhD; René Spaargaren, MD; Jan G.P. Tijssen, PhD; Robbert J. de Winter, MD, PhD; Joanna J. Wyckrzykowska, MD, PhD; Giovanni Amoroso, MD, PhD; Karel T. Koch, MD, PhD
The self-expanding, nitinol Stentys facilitates a provisional strategy by accommodating its diameter to both the proximal and distal reference diameters and offering an opportunity to “disconnect” the interconnectors, opening the stent toward the side branch. We investigated outcomes in STEMI patients after Stentys treatment for bifurcation culprit lesions.

Peripheral Vascular Disease
259 Contrast Minimization With the New-Generation DyeVert Plus System for Contrast Reduction and Real-Time Monitoring During Coronary and Peripheral Procedures: First Experience
Nicola Corcione, MD; Giuseppe Biondi-Zoccai, MD, MStat; Paolo Ferraro, MD; Stefano Messina, MD; Gennaro Maresca, MD; Raffaella Avellino, BS; Giovanni Napolitano, MD; Elena Cavaretta, MD, PhD; Arturo Giordano, MD, PhD
Contrast-induced nephropathy remains the main adverse effect of contrast administration. We appraised the DyeVert Plus system inclusive of contrast reduction and real-time monitoring in a consecutive series of coronary or peripheral procedures.

Chronic Total Occlusion
264 The Impact of Proximal Vessel Tortuosity on the Outcomes of Chronic Total Occlusion Percutaneous Coronary Intervention: Insights From a Contemporary Multicenter Registry
Judit Karacsonyi, MD; Dimitri Karmpaliotis, MD; Khaldoon Alaswad, MD; Farouc A. Jaffer, MD, PhD; Robert W. Yeh, MD; Mitul Patel, MD; Elfesham Mahmud, MD; Anthony D’Onofrio, MD; Catalin Toma, MD; Barry Uretsky, MD; James Choi, MD; Jeffrey W. Moses, MD; Ajay Kirtane, MD; Manish Parikh, MD; Ziad Ali, MD; William L. Lombardi, MD; David E. Kandzari, MD; Nicholas Lembo, MD; Santiago Garcia, MD; Michael R. Wyman, MD; Jose R. Martinez-Panchini, MD; Aris Kanasakis, MD; Barbara A. Danek, MD; Aya J. Alame, BA; Erica Resendes, MS; Barbara V. Rangan, BDS, MPH; Imre Ungi, MD, PhD; Craig A. Thompson, MD, MMS; Subhash Banerjee, MD; Emmanouil S. Brilakis, MD, PhD
We examined the impact of proximal vessel tortuosity on the outcomes of 1618 consecutive chronic total occlusion percutaneous coronary interventions performed between 2012 and 2016 at 14 United States centers.

Coronary Artery Disease
271 Safety and Feasibility of Rotational Atherectomy in Elderly Patients With Severe Aortic Stenosis
Matthew Lippmann, DO; Jigar Patel, MD; Jared Knupil, MD; David Westover, PhD; Michael Pierpoline, DO; Peter Tadros, MD; Mark Wiley, MD; George Zorn, III, MD; Greg Muehlbach, MD; Ashwani Mehta, MD; Eric Hockstad, MD; Matthew Earnest, MD; Kamal Gupta, MD
In many patients with severe aortic stenosis, the coronary arteries are severely calcified, but rotational atherectomy (RA) is not routinely performed due to safety concerns. We studied the safety and feasibility of RA in this population.

Transcatheter Aortic Valve Replacement
277 Arterial Cutaneous Femoral Fistulous Tract Closure Using Surgiflo Hemostatic Matrix: A Novel Adjunct for Post-TAVR Access-Site Management
Eileen Gajo, MD; Omer Iftikhar, MD; Paul J. Pearson, MD; Ted Feldman, MD; Mayra Guerrero, MD; Justin Levisay, MD; Michael H. Salinger, MD
We describe safe utilization of Surgiflo hemostatic gel matrix under fluoroscopic guidance against an inflated balloon in order to achieve closure of a fistulous tract from a femoral artery access site during TAVR.
Coronary Artery Disease
280 Propensity-Score Matched Comparison of the Cera PFO Occluder With the Amplatzer PFO Occluder for Percutaneous Closure of Patent Foramen Ovale Without Echocardiographic Guidance
Mirjam Ulmi, MD; Fabien Praz, MD; George C.M. Siontis, MD; Andreas Wahl, MD; Stephan Windecker, MD; Heinrich P. Matti, MD; Bernhard Meier, MD

We performed a propensity-score matched comparison in patients undergoing percutaneous PFO closure using either the Cera or Amplatzer PFO occluder examining complications and closure rate at 6 months.

Coronary Artery Disease
285 Complete Versus Incomplete Angiography Prior to Percutaneous Coronary Intervention in ST-Elevation Myocardial Infarction
Kevin Stiver, MD; Xu Gao, MD; Satya Shirenavva, MD; Konstantinos Dean Boudoulas, MD; Ernie Mazzaferrri, MD; Nader Makki, MD; Scott M. Lilly, MD, F.D.

We sought to determine whether those with STEMI who underwent incomplete angiography prior to PCI had different preprocedural characteristics or post-PCI outcomes.

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BRIEF COMMUNICATIONS
E88 Transradial Coronary Angiogram in a Sitting Position
Konstantinos Marmakiolis, MD, MBA; Mehmet Cilingiroglu, MD; Cindy Grines, MD

To our knowledge, this is the first reported case of coronary angiogram in a patient in a sitting position.

CLINICAL IMAGES
E90 Incidental Detection of Arteria Lusoria During Transradial Coronary Intervention
Nagaraja Moorthy, DM; Natraj Setty, DM; Jayashree Kharge, DM; Thagachagere R. Raghu, DM; Manjunath C. Nanjappa, DM

Transradial coronary angiography and interventions in patients with arteria lusoria, while technically challenging, are feasible without crossover to femoral approach. Interventional cardiologists should be aware of this rare entity when guidewire or catheter repeatedly enter the descending thoracic aorta rather than the ascending aorta during transradial coronary intervention.

E92 Cavotricuspid-Isthmus Dependent Flutter or Left-Sided Atrial Tachycardia?
Kevin Ming Wei Leong, MBBS, MRCP; Fernando Guerrero, BSc; Phang Boon Lim, MA, MRCP, PhD

This image highlights a potential pitfall in interpreting RA activation maps with previous CTI block during a tachyarrhythmia and underscores the need for careful inspection, especially when using other electroanatomical navigation systems that do not readily provide high-density mapping.

E94 Inappropriate ICD Shock From Perceived Ventricular Fibrillation During Balloon Manipulation at the Time of Percutaneous Coronary Intervention
Ali Pourdjabbar, MD; Michael J. Wilkinson, MD; Lawrence Ang, MD; Ryan R. Reeves, MD; Ehtisham Mahmud, MD; Mitul P. Patel, MD
Images demonstrate that device manipulation during PCI can result in “noise,” which can be perceived as an arrhythmia and result in an inappropriate shock.

E96 Handle With Care: A Ductus Arteriosus Aneurysm in an Elderly Patient
Sebastiano Gilli, MD; Fulvio Orzan, MD, PhD; Fabrizio D’Ascenzo, MD; Antonio Montefusco, MD; Pierluigi Omedé, MD

Ductus arteriosus aneurysm is a rare finding, with sporadic cases reported in children and infants. In the elderly, it poses serious therapeutic challenges, as the risk of rupture is counterbalanced by the high risk of its correction.

E98 Thrombolysis: A Useful Tool in the Primary PCI Cupboard
Konstantin Schwarz, MD, MRCP, PhD; Deepak Goyal, MBBS, MRCP, MD; Helen Routledge, MBChB, FRCP, MD

Our image demonstrates the rarely utilized niche role for intracoronary thrombolyis in STEMI treatment in the modern angioplasty era.
Coronary Artery Disease
290 Impact of PCI Appropriateness in the Long-Term Outcomes of Consecutive Patients Treated With Second-Generation Drug-Eluting Stents
Ana Cristina Seixas, MD, PhD; Amanda Sousa, MD, PhD; Jose de Ribamar Costa, Jr, MD, PhD; Adriana Costa Moreira, MD, PhD; Ricardo Costa, MD, PhD; Lucas Damiani, MS; Cantidio Campos Neto, PhD; Galo Maldonado, MD; Manuel Cane, MD, PhD; J. Eduardo Sousa, MD, PhD

Appropriate use criteria (AUC) for coronary revascularization were developed to deliver high-quality care; however, the prognostic impact of these criteria remains unclear. We sought to assess the outcomes of patients treated with second-generation drug-eluting stent implantation classified according to the updated American College of Cardiology Foundation/American Heart Association/Society for Cardiac Angiography and Intervention AUC for percutaneous coronary intervention.

Peripheral Vascular Disease
297 Distal Cuff Occlusion: A Novel, Simple Approach for Distal Embolic Protection in Peripheral Vascular Intervention
Shwan Jalal, MD; Jihad A. Mustapha, MD; Howard S. Rosman, MD; Rajendra H. Mehta, MD, MS; Thomas P. Davis, MD

Our aim was to evaluate the feasibility, effectiveness, and safety of using a blood pressure cuff method for distal embolic protection in peripheral artery disease.

Coronary Artery Disease
301 Feasibility and Safety of Right and Left Heart Catheterization Via an Antecubital Fossa Vein and the Radial Artery in Patients With Heart Failure
Domenico D’Amario, MD, PhD*; Francesco Burzotta, MD, PhD*; Antonio M. Leone, MD, PhD; Italo Porto, MD, PhD; Giampaolo Niccoli, MD, PhD; Cristina Angieman, MD, PhD; Aureliano Ruggio, MD; Josip A. Borovac, MD; Massimo Masetti, MD; Carlo Tiani, MD; Filippo Crea, MD; *Joint first authors

To determine the feasibility and safety of full arm-arm catheterization access, we aimed to compare this approach with other established catheterization approaches. We studied 493 consecutive patients with heart failure requiring right and left heart catheterization according to catheterization approach used: arm-arm, hybrid femoral-arm, and femoral-femoral access.

Coronary Artery Disease
309 Percutaneous Mechanical Circulatory Support for Cardiac Disease: Temporal Trends in Use and Complications Between 2009 and 2015
Bradley W. Ternus, MD; Jacob C. Jentzer, MD; Abdallah El Sabagh, MD; Mackram F. Eleid, MD; Malcolm R. Bell, MD; Joseph G. Murphy, MD; Charanjit S. Rihal, MD; Gregory W. Batsness, MD

We present the indications for use, temporal trends, complications, and 1-year clinical outcomes for 778 patients who underwent single-access percutaneous mechanical circulatory support device placement from 2009-2015 at our institution.

Transcatheter Aortic Valve Replacement
315 Transfemoral Transcatheter Aortic Valve-in-Valve Implantation for Aortic Valve Bioprosthesis Failure With the Fully Repositionable and Retrievable Lotus Valve: A Single-Center Experience
Neil Ruparelia, MD; Katharine Thomas, MD; James D. Newton, MD; Kate Grebenik, MD; Amar Keinalla, MD; George Krasopoulos, MD; Rana Sayered, MD; Adrian P. Banning, MD; Rajesh K. Kharbanda, MD

Valve-in-Valve aortic valve implantation is an established management option for surgical aortic bioprosthesis failure. Despite proven efficacy, complications relating to suboptimal valve implantation have been reported in approximately 5% of patients. The Lotus valve (Boston Scientific) is fully repositionable and retrievable, and therefore enables complete
assessment of valve function prior to definitive deployment. However, data supporting its use for this indication are limited. We report a first case series using the Lotus valve for the treatment of surgical aortic bioprosthesis failure.

**Coronary Artery Disease**

320 Comparison of the American College of Cardiology/American Heart Association and the European Society of Cardiology Guidelines for the Management of Patients With Valvular Heart Disease

Aja J. Alame, BA; Aris Karatasakis, MD; Judit Karasonyi, MD; Barbara A. Danek, MD; Paul Sovaja, MD; Mario Gössl, MD; Santiago Garcia, MD; Hani Jneid, MD; Nikolaos Kakouros, MD; Jose Roberto Martinez-Parachini, MD; Erica Resende, MS; Pratik Kalsara, MD; Michele Roesele, RN; Banana V. Rangan, BDS, MPH; Subhash Banerjee, MD; Emmanouil S. Brilakis, MD, PhD

The American College of Cardiology/American Heart Association and the European Society of Cardiology have developed guidelines to assist clinicians in making evidence-based decisions. This study compares the two guidelines for the management of patients with valvular heart disease.

E105 Percutaneous Closure of Two Acquired Aorto-Right Ventricular Fistulae Following Right Ventricular Outflow Tract Surgery

Sofia A. Horvath, MD; Saqib Ali Gowani, MD; Christian Koelbl, MD; John F. Rhodes, Jr, MD; Esteban Escolar, MD; Orlando Santana, MD

Successful transcatheter closure of an unusual double aortic root-to-right ventricular outflow tract fistula with two Amplatzer duct occluder II devices.

E102 Coronary Intervention Complicated by Pressure Wires Caught Within Stent Struts

Ozan M. Demir, MBBS, MRCP; Neil Ruparelia, DPhil, MRCP; Masood Khan, MA, FRCP; Christopher Baker, PhD, FRCP

Two cases of pressure wire entrapment that may be related to wire design, with both instances occurring at the level of the pressure transducer.

E104 Multimodality Imaging of Anomalous Origin of Right Coronary Artery from Pulmonary Artery (ARCAPA)

Sanjay S. Mehta, MD and Srinivasan Sattiraju, MD

The diagnosis and management of an exceedingly rare anomalous right coronary artery from pulmonary artery are described.

E105 Treatment of Severe Native Left Pulmonary Artery Stenosis with Coronary Stent Implantation in a 2.4 kg Neonate

Matthew C. Schwartz, MD; T. Curtis Alford, ARNP; Matthew Saxenhouse, MD; David Ohmsted, MD; Joseph Pauillo, MD

Transcatheter stent placement is an appealing option to treat discrete branch pulmonary artery stenosis in small, premature neonates in whom surgical treatment with arterioplasty can be challenging.

E107 Percutaneous Balloon Dilation of Discrete Subaortic Stenosis: A Futile Exercise

Nagaraja Moorthy, MD, DM; Rajiv Ananthakrishna, MD, DM; Dattatreya P.V. Rao, DM; Satvic C. Manjunath, DM; Manjunath C. Nanjappa, MD, DM

The response to balloon dilation of discrete subaortic stenosis (DSS) is transient and may complicate with chordal or papillary muscle rupture. Hence, balloon dilation of DSS should be discouraged.
Coronary Artery Disease
328 Comparison of Hemostasis Times With a Kaolin-Based Hemostatic Pad (QuikClot Radial) vs Mechanical Compression (TR Band) Following Transradial Access: A Pilot Prospective Study
Jonathan S. Roberts, MD; Jianli Niu, MD, PhD; Juan A. Pastor-Cervantes, MD
Hemostasis following transradial access (TRA) is usually achieved by mechanical compression. We investigated 30 patients undergoing TRA coronary angiography and/or percutaneous coronary intervention, and randomized patients to either the QuikClot Radial hemostasis pad (Z-Medica) or the TR Band (Terumo). Significantly shortened hemostasis times were seen with the QuikClot Radial pad.

Peripheral Vascular Disease
336 Long-Term Follow-up After Retrograde Recanalization of Superficial Femoral Artery Chronic Total Occlusion
Zoltan Ruzsa, MD, PhD; Joanna Wojtasik-Bakalarz, MD; Andras Nyerges, MD; Tomasz Rakowski, MD, PhD; Paweł Kleczynski, MD, PhD; Stanisław Bartus, MD, PhD
Chronic total occlusion of the superficial femoral artery (SFA) occurs in >50% of the patient population with peripheral artery disease. This study assesses the safety of the retrograde procedure with long-term follow-up of 86 patients; our results show a high technical success rate and low percentage of reinterventions with the retrograde technique.

Coronary Artery Disease
340 Contemporary Trends and Outcomes Associated With the Preprocedural Use of Oral P2Y12 Inhibitors in Patients Undergoing Percutaneous Coronary Intervention: Insights From the Blue Cross Blue Shield of Michigan Cardiovascular Consortium (BMC2)
Devraj Sukul, MD; Milan Seth, MS; Simon R. Dixon, MBCaB; Akshay Khandelwal, MD; Thomas A. LaLonde, MD; Hitinder S. Gurm, MD
Oral P2Y12 inhibitors are ubiquitously used medications; however, the specific timing of initial P2Y12 inhibitor administration remains intensely debated. This study describes trends in the use of preprocedural P2Y12 inhibitors and their clinical impact in patients undergoing percutaneous coronary intervention (PCI). The study population comprised 74,053 consecutive patients undergoing PCI at 47 hospitals in Michigan from January 2013 through June 2015.

Transcatheter Aortic Valve Replacement
353 Clinical Relevance of Baseline TCP in Transcatheter Aortic Valve Replacement
Anna Sannino, MD; Robert C. Stoler, MD; Robert E Hebeler, Jr, MD; Molly Szerlip, MD; Michael J. Mack, MD; Paul A. Grayburn, MD
The aim of this study is to investigate the influence of baseline thrombocytopenia (TCP) on short-term and long-term outcomes after transcatheter aortic valve replacement (TAVR). A total of 732 consecutive patients with severe, symptomatic aortic stenosis undergoing TAVR from January 2012 to December 2015 were included. Our results indicated that baseline TCP is a strong predictor of mortality in TAVR patients.

Coronary Artery Disease
359 Outcomes of Patients With a History of Coronary Artery Bypass Grafting Who Underwent Orbital Atherectomy for Severe Coronary Artery Calcification
Michael S. Lee, MD; Evan Shlomfritz, DO; Ansh Nayeri, MD; John Hollowed, MD; Richard A. Shlomfritz, MD
We assess the angiographic and clinical outcomes of patients with a history of coronary artery bypass graft (CABG) surgery who underwent orbital atherectomy (OA) for the treatment of severely calcified coronary lesions. Despite a higher-risk baseline profile, patients with a history of CABG had similar angiographic and clinical outcomes vs non-CABG patients.
The Journal of Invasive Cardiology®

SCIENTIFIC ABSTRACTS
E109 13th Annual Complex Cardiovascular Catheter Therapeutics: Advanced Endovascular and Coronary Intervention Global Summit [C3] • June 2017

CLINICAL IMAGES
E147 Percutaneous Stenting for Unprotected Left Main Chronic Total Occlusion
Nagaraja Moorthy, MD, DM; Rangaraj Ramalingam, DM; K. Subramanyam, DM; Shivanand S. Patil, DM; Manjunath C. Nanjappa, DM
PCI of a left main coronary artery chronic total occlusion followed by PCI of the right coronary artery was performed in a patient refusing CABG surgery.

CLINICAL IMAGES
E149 Embolization of a Large Intracoronary Thrombus During ST-Segment Elevation Myocardial Infarction
Nathaniel R. Smilowitz, MD and Claudia Serrano-Gomez, MD
Aspiration thrombectomy was performed to retrieve intact thrombus in a 69-year-old woman. Bradycardia and hypotension rapidly resolved. Balloon angioplasty was performed at the site of proximal RCA in-stent restenosis with improved angiographic appearance and TIMI 3 flow in the major branches.

CLINICAL IMAGES
E151 Bi-Atrial Compression Due to Ascending and Descending Aortic Aneurysms
Saqib Ali Gowani, MD; Sofia A. Horvath, MD; Bernard Ashby, MD; Juan Carlos Brenes, MD; Orlando Santana, MD
Aortic aneurysms compressing an atrium causing symptoms are uncommon. We describe a case of bi-atrial compression due to ascending and descending aneurysms leading to dyspnea.

CLINICAL IMAGES
E153 Intracoronary Administration of Thrombolysis for Severe Coronary Artery Ectasia Presenting as an Acute Inferior ST-Segment Elevation Myocardial Infarction
Avadhesh Saraswat, MBBS; Atifur Rahman, MBBS, FRACP, FCANZ; Ravinder Batra, MBBS, MD, DM, FRACP
We present a 75-year-old male with acute inferior ST-elevation myocardial infarction, severe coronary artery ectasia, and large thrombus burden in the right coronary artery to support the use of intracoronary thrombolysis as a second-line therapy for a large thrombus burden in primary percutaneous coronary intervention.

CLINICAL IMAGES
E154 Acute Severe Mitral Stenosis Immediately After Transcatheter Aortic Valve Implantation
Johann Auer, MD; Michael Grund, MD; Rudolf Puschmann, MD; Robert Berent, MD
An 86-year-old female patient was referred for treatment of symptomatic severe aortic stenosis. The heart team decided to perform transfemoral transcatheter aortic valve implantation. A 25 mm transcatheter aortic valve was implanted, but the valve migrated low into the left ventricular outflow tract. The subsequent removal and replacement procedures are described.
Coronary Artery Disease
364 Excimer Laser With and Without Contrast for the Management of Under-Expanded Stents
Murugupathy Veerasamy, MD; Amr S. Gamal, MD; Avais Jabbar, MD; Javed M. Ahmed, MD; Mohaned Egred, BSc(Hons), MBChB, MD, FRCP

Under-expanded and under-deployed stents carry a high risk of restenosis and thrombosis, with inherent serious clinical complications. The management of under-expanded stents is a difficult clinical entity. We performed a retrospective analysis of prospectively collected data on all under-expanded, under-deployed stents that were managed by excimer laser, with and without contrast, performed at a large tertiary cardiac center.

Coronary Artery Disease
371 Clinical Decision-Making for the Hemodynamic “Gray Zone” (FFR 0.75–0.80) and Long-Term Outcomes
Shiv Kumar Agarwal, MD; Srikanth Kasula, MD; Mohan M. Edupuganti, MD; Sameer Raina, MD; Fnu Shailesh, MD; Ahmed Almomani, MD; Jason J. Payne, MD; Naga V. Pothineni, MD; Barry F. Uretsky, MD; Abdul Hakeem, MD

Fractional flow reserve (FFR) value between 0.75 and 0.80 is considered the “gray zone” and outcomes data relative to treatment strategy (revascularization vs medical therapy alone [deferral]) are limited for this group. We followed a total of 238 patients with gray-zone FFR for the primary endpoint of major adverse cardiovascular event for a mean duration of 30 ± 17 months.

Coronary Artery Disease
378 Outcomes After Successful Percutaneous Coronary Intervention of Calcified Lesions Using Rotational Atherectomy, Cutting-Balloon Angioplasty, or Balloon-Only Angioplasty Before Drug-Eluting Stent Implantation
Björn Redfors, MD, PhD; Akiko Machara, MD; Bernhard Witzenbichler, MD; Giona Wéiz, MD; Thomas D. Stuckey, MD; Timothy D. Henry, MD; Thomas McAndrew, PhD; Roxana Mehran, MD; Ajay J. Kirtane, MD, SM; Gregg W. Stone, MD; Philippe Généreux, MD

Percutaneous coronary intervention (PCI) of calcified lesions is increasingly common and is associated with a high risk of adverse events. Our objective was to report adverse event rates after rotational atherectomy (RA) with contemporary drug-eluting stent (DES) implantation and compare RA to cutting-balloon angioplasty and balloon-only angioplasty in the all-comers ADAPT-DES trial.

Review
387 Damped and Ventricularized Coronary Pressure Waveforms
Lloyd W. Klein, MD and Divya Korpu, MD

Although the terms ventricularization and damping are commonly used in the cath lab and are widely recognized as indicating possible flow limitation due to catheter position, their hemodynamic origins and mechanism have not been well studied. Often, they are thought to be synonymous terms. In this review, we describe and differentiate each pattern.

Transcatheter Aortic Valve Replacement
391 Early Transcatheter Aortic Valve Function With and Without Therapeutic Anticoagulation
Pramoni G. Hiremath, MD; Kathleen Kearney, MD; Bryn Smith, MD; Creighton Don, MD; Danny Dvir, MD; Gabriel Aldea, MD; Mark Reisman, MD; James M. McCabe, MD

Prosthetic leaflet thrombosis is a growing concern in transcatheter aortic valve replacement (TAVR). Given the uncertainty of best practices for antiplatelet and anticoagulation therapies in the post-TAVR period, additional evidence regarding the impact of anticoagulation on prosthetic valve function after TAVR is needed. To that end, we analyzed patients undergoing native-valve TAVR between 2012 and 2015 based on anticoagulant use at hospital discharge.
Coronary Artery Disease

397  Comparison of Heparin and Bivalirudin in Patients Undergoing Orbital Atherectomy

Michael S. Lee, MD; Evan Shlofmitz, DO; Arash Nayeri, MD; John Hollowed, MD; Jeremy Kong, MD; Richard A. Shlofmitz, MD

Severely calcified coronary lesions are associated with increased ischemic complications. Orbital atherectomy modifies calcified plaque, thereby facilitating stent delivery and stent expansion. The ideal antithrombotic agent during orbital atherectomy is unknown. We compared the angiographic and clinical outcomes of heparin and bivalirudin in patients who underwent orbital atherectomy for severely calcified coronary lesions.

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BRIEF COMMUNICATION

E155  Immediate Thrombolysis Followed by PCI for Left-Main Stem STEMI if Presenting Out of Hours: Should We Go “Back to the Future”?

Mohammed Javed Sheriff, MBBS, PhD; Christopher Yu, MBBS; Harry C. Lowe, FRACP, PhD

A case of left-main stem STEMI presenting “out of hours” is discussed, wherein an excellent result was achieved with acute thrombolysis.

LETTER TO THE EDITOR

E157  Bioresorbable Vascular Scaffold Coronary Aneurysm and Thrombosis: Farewell to the Current Bioresorbable Vascular Scaffolds?

Nicholas G. Kounis, MD, PhD; Ioanna Koniali, MD, PhD; Grigorias Tsigkas, MD, PhD; George D. Soufras, MD, PhD; Emmanouil Chourdakis, MD; Anastasios Roumeliotis, MD; George Hahalis, MD, PhD

We suggest that before implanting bioresorbable vascular scaffolds, further improvements in technical procedures and technology are warranted.

CLINICAL IMAGES

E159  The GuideLiner-Sleeve Technique: A Novel Technique for High-Risk PCI Using Two Left Main Guides for Orbital Atherectomy of Two-Vessel Calcified Ostial Coronary Artery Disease

Abdul Moiz Hafiz, MD; Craig Smith, MD; Nikolaos Kakouros, MBBS, PhD

Our novel GuideLiner-sleeve technique enabled use of atherectomy in calcific ostial lesions of the LAD and LCX.

CLINICAL IMAGES

E161  Abdominal Neointimal Healing by Optical Coherence Tomography Assessment After Drug-Eluting Stent Implantation on Organized Recanalized Thrombus

Santiago Jesús Camacho Freire, MD; Bruno Límpo, MD; Javier León Jiménez, MD; Antonio Enrique Gómez Menchero, MD; Jessica Roa Garrido, MD; Rosa Cardenal Piris, MD; José Francisco Díaz Fernández, MD

At 6-month PCI follow-up, angiography showed patent LAD and CX stents. However, OCT revealed almost all abluminal cavities were completely filled, which we surmise was due to a neointimal healing process.

CLINICAL IMAGES

E163  Imaging and Physiology to Guide Venous Graft Interventions Without Contrast Administration in Advanced Renal Failure

Yasir Parviz, MBBS, MRCPh; Khady Fall, MD; Gregg W. Stone, MD; Akiko Maehara, MD; Ori Ben-Yehuda, MD; Gary S. Mintz, MD; Ziad A. Ail, MD, DPhil

We describe step-by-step “zero-contrast” saphenous vein bypass graft intervention using a modified technique.

CLINICAL IMAGES

E166  Electrophysiology Study and Catheter Ablation With Superior Vena Cava Stump

Blavanesh Makanjee, MD; Paul Galiwango, MD; Subodh Verma, MD, PhD; Bobby Yanagawa, MD, PhD

We report the complete absence of an SVC in a patient without prior history of cardiac surgery or device implantation. This is a very rare congenital cardiac abnormality, which if unrecognized, may lead to complications in patients undergoing electrophysiological studies.
Adjunctive Pharmacology

401 Patient Factors But Not the Use of Novel Anticoagulants or Warfarin Are Associated With Internal Jugular Vein Access-Site Hematoma After Right Heart Catheterization

Osama Dasa, MD; Qaiser Shafiq, MD; Mohammed Ruzieh, MD; Luai Alhazmi, MD; Maen Al-Dabbas, MD; Zaid Ammari, MD; Samer Khouri, MD; George Moukarbel, MD

Right heart catheterization is routinely performed to assess hemodynamics. Generally, anticoagulants are held prior to the procedure. At our center, anticoagulants are continued and ultrasound guidance is always used for internal jugular vein access. In a retrospective analysis, we investigated the risk of bleeding complications associated with right heart catheterization via the internal jugular vein in patients with and without full anticoagulation.

Review

404 Alcohol Septal Ablation for Hypertrophic Obstructive Cardiomyopathy: Indications, Technical Aspects, and Clinical Outcomes

Marco Spaziano, MD; Fadi J. Sawaya, MD; Thierry Lefèvre, MD

While surgical myomectomy was considered the gold standard for the treatment of hypertrophic obstructive cardiomyopathy until the end of the 1990s, alcohol septal ablation (ASA) has recently gained popularity and acceptance, especially in Europe. In this review, we describe indications and contraindications to ASA, along with technical considerations related to the procedure.

Coronary Artery Disease

411 Improvement in Aortic Valve Area in Patients With Aortic Stenosis Through Use of a New “Hourglass-Shaped” Valvuloplasty Balloon

Elizabeth Goldenberg; Wesley Pedersen, MD; Emmanouil S. Brilakis, MD, PhD; Michael Mooney, MD; Mario Gössl, MD, PhD; Anil Poulse, MD; Bilal Murad, MD; James Kolbeck, MD; Paul Sorajja, MD

The study aim was to assess the effect of hourglass-shaped V8 and TAV8 balloons (InterValve, Inc) on aortic valve area and other outcomes in patients with severe aortic stenosis undergoing balloon aortic valvuloplasty. Use of the novel balloons was not associated with an increase in aortic insufficiency, permanent pacemaker, or major adverse events.

Coronary Artery Disease

417 Classification for Assessing the Quality of Diagnostic Coronary Angiography

Philippe Généreux, MD; Roxana Mehran, MD; Martin B. Leon, MD; Nicolas Bettinger, MD; Gregg W. Stone, MD

Coronary angiography remains the gold standard for diagnosing obstructive coronary artery disease. However, no standardized, objective, and quantitative classification to assess the quality of coronary angiography exists. In the present report, we sought to establish a novel standardized quantitative classification for the quality of coronary angiography, taking into consideration two main parameters: coronary contrast filling and coronary sinus contrast reflux.

Coronary Artery Disease

421 Device Motion Indication: A Novel Image-Based Tool to Measure Relative Device Motion During Coronary Intervention

Rami Abu Fanne, MD, PhD; Simcha Ron Meisel, MD, MS; Avraham Shotan, MD; Aharon Frimerman, MD

Movement of the stent delivery system in the coronary bed as a result of the cardiac cycle is a well-known clinical observation that usually is either under-estimated or ignored. This effect may potentially jeopardize precise stent deployment. We used a novel technology to objectively measure the relative intracoronary device motion in the different coronary segments throughout the cardiac cycle. A total of 193 patients undergoing coronary angiography were enrolled and their studies were analyzed for device movement using the SyncVision System (Philips Volcano).
Peripheral Vascular Disease
425 Transpedal Access for the Management of Complex Peripheral Artery Disease
Konstantinos Marmagkiolis, MD; Partha Sardar, MD; Jihad A. Mustapha, MD; Miguel Montero-Baker, MD; Konstantinos Charitakis, MD; Cezar Iliescu, MD; Dmitriy N. Feldman, MD

Critical limb ischemia is associated with high risk of limb loss, as well as cardiovascular and all-cause mortality. Transpedal access is a novel, increasingly utilized technique for the management of complex peripheral artery disease (PAD). In order to evaluate the safety and efficacy of transpedal access for PAD, we performed a literature search using PubMed from January 2003 to December 2016 and evaluated patient sample demographics, procedure indications, access and target vessel, procedural characteristics, outcomes, and complications.

Transcatheter Aortic Valve Replacement
431 Thirty-Day Outcomes in 100 Consecutive Patients Undergoing Transfemoral Aortic Valve Replacement With the Portico Valve on an All-Comer Basis
Silvia Mas-Peiro, MD, MSc*; Mariuca Vasa-Nicotera, MD, PhD*; Helge Weiler, MD; Nestoras Papadopoulos, MD, PhD; Roberta De Rosa, MD; Andreas M. Zeller, MD, PhD; Stephan Fichtlscherer, MD, PhD [Joint first authors]

Transcatheter heart valves such as the self-expandable Portico valve (St. Jude Medical) are being developed to overcome limitations of first-generation devices. Since clinical experience with this valve is still limited in a real-world setting, we investigated its use on an all-comer basis. Our immediate and 30-day post-TAVR results support favorable survival comparable to other studies, and significant clinical improvement with the Portico valve in non-selected patients in a real-world setting, with short-term complications being uncommon.

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CORONARY ARTERY DISEASE/ORIGINAL CONTRIBUTION
E167 A Meta-Analysis of Contemporary Lesion Modification Strategies During Percutaneous Coronary Intervention in 244,795 Patients From 22 Studies
Barbara Anna Danek, MD; Aris Karatasakis, MD; Judit Karacsonyi, MD; Waleed Alharbi, MD; Michele Roesle, RN, BSN; Banana V. Rangan, BDS, MPh; M. Nicholas Burke, MD; Subhash Banerjee, MD; Emmanouil S. Brilakis, MD, PhD

We conducted a meta-analysis of 22 studies published between 2004-2016 reporting outcomes after use of rotational atherectomy, cutting-balloon, and scoring-balloon angioplasty to better understand use of lesion-modification strategies in the drug-eluting stent era.

CORONARY ARTERY DISEASE/ORIGINAL CONTRIBUTION
E177 Nitroglycerin-Derived Pd/Pa for the Assessment of Intermediate Coronary Lesions
Ze’ev Israel, MD; Rodrigo Bagur, MD, PhD; Dorian Murariu, MSc; Sabrina Wall, BSc; Mirete Alemayehu, MSc; Yasar Parviz, MBBS; Pantelis Diamantouras, MD; Shahar Lavi, MD

In order to assess the predictive value of Pd/Pa after nitroglycerin administration [Pd/Pa(N)] as compared with standard fractional flow reserve (FFR), consecutive patients with intermediate coronary lesions assessed by FFR were included. Pd/Pa at baseline, Pd/Pa(N), and Pd/Pa after incremental doses of intracoronary adenosine were measured.
*E184* Differences in Approaches and Outcomes of Defibrillator Lead Implants Between High-Volume and Low-Volume Operators: Results From the Pacemaker and Implantable Defibrillator Leads Survival Study (“PAIDLESS”)

Zohrab A. Shaikh, BS; Jessica A. Chung, BS; Daniel J. Kersten, BA; Alyssa M. Feldman, MS; Wilbur J. Ashfeld, DO; Joseph Germano, DO; Shahidul Islam, MPH; Todd J. Cohen, MD

The purpose of this study was to investigate the relationship between operator volume and implantable defibrillator lead failure and patient mortality at a single large implanting center. We analyzed the differences between high-volume and low-volume defibrillator implanters in the Pacemaker and Implantable Defibrillator Lead Survival Study (“PAIDLESS”) between February 1, 1996 and December 31, 2011.

*E190* Subadventitial Advancement of a Mother-and-Child Catheter to Allow Successful Recanalization of a Complex In-Stent Chronic Total Occlusion: Testing the Resistance of the Adventitia

Luciano Candillo, MD(Res); Satoru Mitomo, MD; Mauro Carlini, MD; Antonio Colombo, MD; Lorenzo Azzalinii, MD, PhD, MSc

In-stent chronic total occlusion (CTO) represents a challenging lesion subset for percutaneous coronary intervention (PCI), and although a true-to-true lumen crossing is the first-line strategy, a subadventitial approach may become necessary. Herein, we describe a case of successful in-stent right coronary artery CTO-PCI performed with subadventitial crossing, crushing of the occluded stents, and advancement of a mother-and-child catheter to the distal right coronary artery through the subadventitial space to allow stent delivery.

*E195* The Reverse T-Stenting and Small Protrusion Technique: A Novel Technique for Coronary Bifurcation Lesions

Ioannis Tsiafatous, MD, PhD; Theodoros Zografos, MD, PhD; Athanasios Antonakopoulos, MD, MSc; Michael Koutouzis, MD, PhD; Grigoris Tsigkas, MD, PhD; Nikolaos Bourboulis, MD, PhD; Apostolos Katsivas, MD, PhD

Bifurcation lesions may be encountered in approximately 15%-20% of percutaneous coronary interventions. A 2-stent approach is required in up to 30% of these procedures. We describe a novel technique based on a modification of TAP stenting, suitable for procedures where a 2-stent strategy is predetermined.

*E197* Young Athlete With Complex Aneurysmal Coronary Stenosis

Eric F. Stahl, MD; Farshad Forouzandeh, MD, PhD; Brent P. Little, MD; Habib Samady, MD

Kawasaki disease is an acute vasculitis that occurs predominantly in infants and children younger than 5 years old. If undiagnosed and untreated, the risk of developing coronary artery aneurysms increases to about 20%. In patients who present with angina and are found to have coronary artery aneurysm on imaging and angiography, Kawasaki disease should be considered as one of the leading diagnoses.

*E199* A Bleeding Heart: Coronary-Cameral Fistula After Septal Myomectomy

Daniel Walters, MD; Ryan Reeves, MD; Lawrence Ang, MD; Ali Pourdjafari, MD; Ehtisham Mahmud, MD

Coronary-cameral fistulas are relatively rare communications arising within the coronary vasculature entering into one of the four cardiac chambers. This case highlights a striking angiographic example of coronary-cameral fistula occurring after septal myomectomy, a complication occurring somewhat frequently with typical spontaneous resolution.

*E201* Caught in Time: When IVC Filters Save Lives

Anwar Zaitoun, MD; Nikhil Ambulgekar, MD; Andrew Boshara, MD; Saroj Neupane, MD; Antonious Attallah, MD

 Inferior vena cava filters are indicated in patients with venous thromboembolic disease in whom anticoagulation is a contraindication. This case highlights the importance of inferior vena cava filter placement in patients with extensive proximal deep vein thromboses in order to prevent massive pulmonary emboli, possibly associated with sudden cardiac death.

*E202* Catheter-Induced Coronary Spasm: Serious But Preventable

Farshad Forouzandeh, MD, PhD and Olexandr V. Smolensky, MD

While catheter-induced spasm is considered to be rare, it needs to be ruled out (especially in cases of left main stenosis) to avoid unnecessary revascularization. We present a patient where the underlying tendency for coronary spasm was so high, the severe spasm was possibly the underlying cause of a prior cardiac arrest episode.

*E203* A Novel, Simple, and Safe Technique for Retrieving a Crushed Stent From the Coronary Artery: Balloon-Assisted Stent Retraction

J. Eichhofer, PhD; B. Patel, PhD; Hesham K. Abdelaziz, MRCP, PhD

Various percutaneous methods have been described for the retrieval of damaged stents; however, these methods can be complex and carry a risk of stent embolization or vascular damage. We present a simple and safe technique using a compliant balloon for stent retrieval.