December 2023

VEITH SYMPOSIUM® BULLETIN

CONNECTING THE VASCULAR COMMUNITY

Cleveland Clinic 50th Annual Symposium including AIMsymposium and AVIDsymposium

International Society for Women Vascular Surgeons (ISWVS)

Empowering women vascular surgeons: a global call to action

Lorena Grillo, MD, Kathryn Bowser, MD, RPVI, FACS
Co-Chairs, Communications Committee, ISWVS

In 2023, the International Society for Women Vascular Surgeons (ISWVS) emerged as a beacon of fellowship, mentorship, and leadership, recognizing the imperative need for a dedicated space for women and gender minorities in vascular surgery. Rooted in a mission to advance representation and professional development globally, the ISWVS envisions a future with equitable opportunities, aligned with delivering quality healthcare and pioneering research. Here we share the society's mission, vision, and the dynamic outreach strategies employed to create a global impact. The society is an extension of the Women's Vascular Health Summit, initially developed by Dr. Linda Harris, who currently leads with Drs. Palma Shaw, Kathleen Oszvath, and Tahlia Weis as founding officers. All committees are co-led by US and international members.

> *"The ISWVS envisions a future with equitable opportunities, aligned with delivering quality healthcare and pioneering research."*
>
> **Lorena Grillo, Kathryn Bowser**

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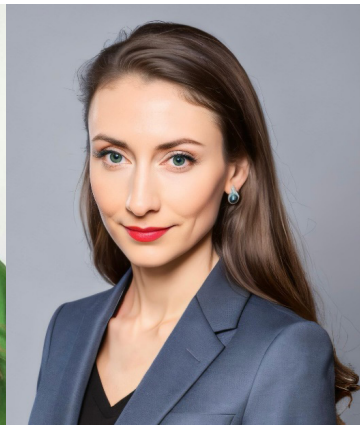
Linda Harris, President

Palma Shaw, Vice President

Lorena Grillo, Communications Committee Co-chair



Kathryn Bowser, Communications Committee Co-chair

Tahlia Weis , Treasurer

Kathleen Oszvath, Secretary

International Society for Women Vascular Surgeons (ISWVS)

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Mission and vision: a guiding light for change

Mission

The ISWVS' mission is a resounding commitment to advancing the representation and professional development of women vascular surgeons globally. It echoes dedication to preventing and managing vascular diseases, while actively contributing to the knowledge and research on vascular diseases in women. At its core, the mission is a call to action, inviting women from diverse backgrounds to join a community that transcends geographical boundaries. We also invite men interested in the care of women with vascular disease – and in the development of a more diverse leadership in all of our organizations – to partner with us.

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Vision

The society's vision is to build a future where women in vascular surgery enjoy equal opportunities, contributing to quality healthcare and research for diverse patient populations. This vision extends beyond professional realms, embodying a transformative force that envisions a world where barriers are dismantled, and every woman in vascular surgery is empowered to thrive. We are hopeful that this society will be a springboard for women leaders throughout the world to further hone their expertise in leadership, affording them further opportunities in other organizations.

Global outreach: breaking boundaries

The ISWVS stands as a global force, breaking traditional boundaries, and fostering a community that reaches every corner of the world. Through a multifaceted approach, the society ensures that its impact is not confined by geographical constraints.

Invitation to join: your global journey begins now

To women vascular surgeons around the world, the ISWVS extends an invitation: be part of a movement that transcends borders, a community that values your expertise, and a society that actively shapes the future of vascular surgery. Regardless of your membership level, the ISWVS offers a platform where your voice is heard, your contributions are celebrated, and your aspirations are realized.

We also welcome associate members – those who are not vascular surgeons but are active in the care of women with vascular disease – to participate and contribute to the growth of this society. This includes other medical specialists, nurses, scientists, nurse practitioners, physician assistants, and technologists.

Global perspective: a collective force for change

In embracing the global perspective, the ISWVS transcends national borders, fostering an environment where expertise is shared, collaborations flourish, and a collective force for change emerges. The society's non-profit status underscores its commitment to the common good, ensuring that resources benefit the collective advancement, rather than individual interests. We intend to continue fostering more granular research and initiatives to improve healthcare in women with vascular disease via research grants.

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>
> **Lorena Grillo, Kathryn Bowser**

A future unbounded

As co-chairs of the Communications Committee, we invite you to embark on this extraordinary journey with the ISWVS. Let your voice resonate in a chorus of change, where women in vascular surgery lead, innovate, and inspire. Join us, and together let's redefine the narrative of women in vascular surgery. The ISWVS awaits you – a global family of trailblazers shaping the future of vascular surgery. Your journey begins now, and the possibilities are limitless.

Please join us by visiting https://womensvascular.org/, sign up to become a member, and plan to attend the annual meeting in Chicago, May 3–4, 2024.

The MGH visits the VEITHsymposium

The VEITHsymposium welcomes Massachusetts General Hospital

On December 15, 2023, the VEITHsymposium was proud to welcome experts from the Massachusetts General Hospital (MGH) in Boston, MA, USA, to share their insights on a range of topics including superficial vein thrombosis, pelvic venous insufficiency, vascular training, pushing the limits in endovascular treatments, carotid artery disease, and novel strategies in the management of critical limb-threatening ischemia.

In these pages you will be able to read short written accounts of each of the talks presented, but to watch the webinar in full, **please click here**. You will be able to access a wealth of recorded webinars from past years. Registration is complimentary, and you will also be able to see upcoming webinars which you can tune into live.

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MGH WEBINAR

Introduction

Matthew J. Eagleton, MD

The MGH was established in 1811 when the state's legislature granted a charter for its incorporation. Following a period of time directed toward raising philanthropic support and subsequent construction of the Bullfinch building (the original hospital), the MGH opened its doors to the public in 1821 in the West End neighborhood of Boston on a four-acre plot of land previously known as Prince's Pasture. One of the initial missions of the hospital was to provide medical care to the poor. At the time of its opening, the MGH also became affiliated with Harvard Medical School, and maintains that relationship to this day, highlighting the system's early and persistent dedication to medical education. In addition to patient care and medical education, the MGH has established itself over the past century as a leader in medical research, boasting some tremendous world-changing advancements such as the early use of anesthesia.

In this setting, the MGH contributed significant advancements leading to the evolution of vascular surgery and care for those afflicted with vascular disease. In 1928, Dr. Arthur W. Allen was appointed as the first chief of the vascular clinic – the very first clinic of its kind in the United States. In parallel to contributing toward the establishment of vascular surgery as a specialty, Dr. Allen also helped to establish the Society for Vascular Surgery. Dr. Allen's protégé, Dr. Robert Linton, drove to develop the MGH as a leading center in the emerging specialty of vascular disease. In particular, Dr. Linton focused his early research and clinical efforts on the medical and surgical management of venous disease. Since the early days, the MGH has continued to foster experts, leading the way in developing and providing quality vascular care. Dr. Clem Darling was dedicated to training vascular surgeons, and early on demanded quality from those involved in vascular care. For those training to be vascular surgeons, he stressed the importance of being knowledgeable about the pathophysiology of vascular disease, and

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"I have the privilege of working at this historic institution and helping my colleagues develop their ideas and participate in their evolution into vascular surgical leaders."

Matthew J. Eagleton

The MGH visits the VEITHsymposium

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developing technical excellence when providing a patient's operative care.

Since that time, the MGH has been home to world-renowned vascular surgeons who have helped pioneer continued advancements in the treatment of vascular disease, and nurtured the training of our vascular leaders. These historic contributions have spanned vascular pathology including venous disease, peripheral arterial disease, carotid artery disease, aortic aneurysmal disease and aortic dissections, and vascular surgical education. New ideas, driven by clinical care needs and translation research, have shaped advancements in surgical/endovascular procedures and vascular imaging. Leaders such as Drs. William Abbott, Richard Cambria, David Brewster, Glenn LaMuraglia and Michael Watkins have contributed significantly to what we view as vascular surgery today.

It is hard to walk through the halls of the MGH without feeling the weight of its history. Architectural remnants provide subtle reminders of the original missions of the hospital – providing quality clinical care to patients, medical education, and a dedication toward research that will advance medicine. While the names have changed at the MGH over the years, the focus remains the same. Many of the faculty highlighted in this Bulletin may not yet be 'household' names in vascular surgery, but their energy, drive and dedication are enhanced in the MGH environment, offering them the opportunity to excel.

I have the privilege of working at this historic institution, and helping my colleagues to develop their ideas and participate in their evolution into vascular surgical leaders. As a team we strive to provide the best vascular care to our patients. We work together to identify and develop new and better treatment modalities for those afflicted with vascular disease, and we are actively engaged in the training of our future vascular surgeons. These were the missions of those practicing here historically, and they remain our focus today. The future of vascular surgery is bright and exciting.

Personalizing thromboprophylaxis therapy in patients post-revascularization using viscoelastic testing

Anahita Dua, MD, MS, MBA

"The issue with a 'one size fits all' approach to thromboprophylaxis is that it often results in a subset of our patients getting thrombosis or hemorrhage."

Anahita Dua

Vascular surgery as a surgical discipline has been innovative and positively disruptive for decades. This has resulted in incredible technological advances and novel techniques that have helped acute life- and limb-preservation for our peripheral artery disease (PAD) patients. However, in post-revascularization of the lower extremities, specifically, we continue to fall short in terms of optimal post-procedure antiplatelet/anticoagulant strategies. While a lot of data has been published regarding thromboprophylaxis, no advancements have been made in personalizing antiplatelet regimens for individualized patients.

The issue with a 'one size fits all' approach to thromboprophylaxis is that it often results in a subset of our patients getting thrombosis or hemorrhage, with under- or over-administration of antiplatelet/anticoagulant medications. We have all anecdotally experienced a situation where two patients following the same lower-extremity revascularization procedure have come to the hospital with vastly different presentations: one complaining of frequent nose bleeds, the other with a completely thrombosed stent, even though both were taking the same antiplatelet

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medications. This is presumably because patients react to medications differently, hence individualization of thromboprophylaxis therapy has been a key innovation to reduce thrombosis and subsequent amputation rates in 2023.

Furthermore, it takes approximately 200 days of adequate blood flow to heal a wound in a diabetic patient, so unless both revascularization and maintenance of the newly established blood flow are given equal attention, the wound may never heal, and amputation may ensue.

To that end, the collaborative research we conduct here at the MGH in our National Institutes of Health (NIH)-funded lab is focused on personalizing antiplatelet therapy for patients post lower-extremity revascularization. We previously discovered through a prospective observational analysis of over 160 post-revascularization PAD patients that platelet inhibition is inversely correlated with thrombosis. To be specific, a platelet inhibition level of 30% is associated with a substantial decrease in thrombotic potential post-procedure.[1] However, what it takes, medically, to get one patient to a level of 30% platelet inhibition may be different for another, and this is especially true of men and women. For instance, post-menopausal women continue to display hyperreactivity of platelets even on the same medications as their male counterparts.[2]

> *"Patients react to medications differently, hence individualization of thromboprophylaxis therapy is a key innovation to reduce thrombosis and subsequent amputation rates."*
>
> **Anahita Dua**

Once we established the 30% platelet inhibition cutoff point, we developed the Distinctive Utilization of Antiplatelet (DUA) protocol which incorporated this threshold to provide subject-specific antiplatelet therapy, guided by thromboelastography with platelet mapping (TEG-PM) point-of-care testing. As per the protocol, patients have blood samples tested pre-operatively, and post-operatively on Day 7, and at 1, 2, 3 and 6 months. We adjust their antiplatelet medications based on the TEG-PM results to achieve a platelet inhibition goal of 30%. In the DUA protocol, if a patient starts on aspirin alone, for example, we add clopidogrel and re-test the blood at seven days if the TEG-PM showed a platelet inhibition <30%. If the patient does not meet the cutoff point seven days later upon re-testing with TEG-PM, we send them for clopidogrel resistance testing and replace the clopidogrel with ticagrelor.

Thus far we have collected interventional data on 23 patients and compared it to the rate of stenosis/thrombosis at 6 months in our institution in 203 patients treated with standard of care. In short, there appears to be a significant decrease in thrombotic/stenotic rates in patients subjected to the DUA protocol compared to standard of care (Figure 1). We ultimately aim to include a total of 107 patients in this prospective, single arm, interventional study. We have not had any bleeding events so far in the interventional arm.

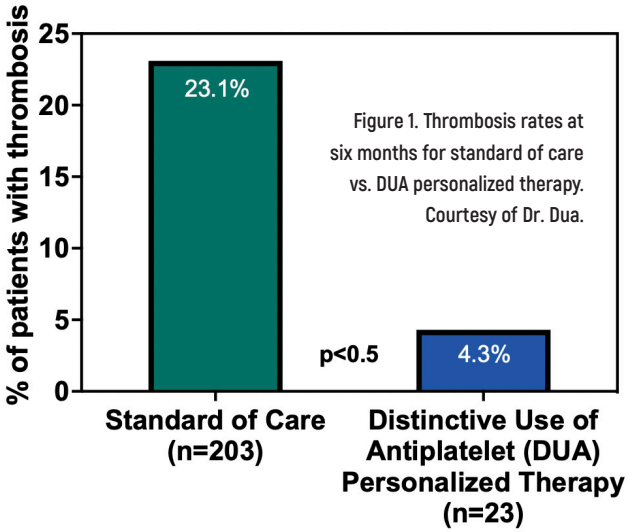

Figure 1. Thrombosis rates at six months for standard of care vs. DUA personalized therapy. Courtesy of Dr. Dua.

References

1. Majumdar M, Hall RP, Feldman Z, et al. Predicting Arterial Thrombotic Events Following Peripheral Revascularization Using Objective Viscoelastic Data. J Am Heart Assoc. 2023;12(1):e027790.
2. Majumdar M, McElroy I, Waller HD, et al. Identifying Sex Dimorphism in Peripheral Artery Disease with Platelet Mapping. Ann Vasc Surg. 2023;88:42–50.

The MGH visits the VEITHsymposium

Encroaching on the heart: implications of pushing the endovascular limits in aortic repair

Jahan Mohebali, MD, MPH

With the birth of aortic stent-grafting in the late 1980s and early 1990s,[1] the world of aortic surgery was forever changed. A few decades' worth of progress and innovation by many brilliant pioneering surgeons, paired with industry, have brought us to the modern era whereby a nearly total aortic endovascular solution exists for most patients. These devices have allowed us to encroach in proximity to the heart, so much so that endovascular aortic root repairs (Endo-Bentall) have now been successfully executed.[2] However, have we considered the effects of said encroachment?

In 2016, Dr. Eagleton – who currently leads our division, and has brought a physician-sponsored investigational device exemption (PS-IDE) program to MGH – published the largest series of endovascular extent II and III thoracoabdominal aneurysm repairs with a 30-day mortality of only 4.8%.[3] And yet, what these investigators found was that the same patient cohort, when followed in the long-term, tended to fare worse than an age–race–sex matched cohort of the US population, or patients who had undergone successful open repair.[4] Most importantly, cause of death was not aneurysm-related, and there were higher rates of congestive heart failure seen in these patients.[4]

One hypothesis for these findings is the potential loss of the aortic Windkessel effect. The term originates from German, meaning 'air chamber'. These devices could be placed in series, with a pump, and convert pulsatile flow to continuous flow (Figure 1).[5] The air in the chamber would compress and re-expand, serving as a shock absorber of sorts. The unique mechanical properties of the aorta allow it to function similarly as a capacitance chamber for the circulatory system. During systole, elastic fibers in the wall mechanically and energetically offload the left ventricle as it ejects. During diastole, this stored potential energy propels the blood forward as the aorta recoils, ensuring continuous flow at the end-organ level, despite a pulsatile pump. There is a modulatory shock absorber effect, similar to that of the aforementioned air chamber, that dampens pressure variation in the capillary bed.

"While current stent-graft devices effectively exclude and treat aneurysmal disease, designs have been built upon the premise that the aorta is a passive tube, with existing synthetic materials behaving very differently than the native aorta when subjected to typical hemodynamic perturbations."

Jahan Mohebali

While current stent-graft devices effectively exclude and treat aneurysmal disease, designs have been built upon the premise that the aorta is a passive tube, with existing synthetic materials behaving very differently than the native aorta when subjected to typical hemodynamic perturbations.[6,7] While several studies have documented morphologic changes in the left ventricle following aortic stent-grafting,[8] less is known about changes in physiologic function of both the aorta and the ventricle, as well as alterations in their interaction. Furthermore, most existing studies have focused on isolated stent-grafting of either the infrarenal or descending thoracic aorta and may be limited to non-representative patient populations.[9]

Having trained at the MGH for both general and vascular surgery, I was fortunate to have gained the skills necessary for complex open aortic repair. Under the guidance and

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mentorship of Dr. Eagleton, I have been able to expand my practice to participate in the PS-IDE, allowing me to offer patients with aortic disease the best solution (open vs. endo vs. hybrid) tailored to their unique condition. The disappointing long-term data for patients with endovascular repair, however, combined with my previous knowledge from working in a large animal cardiac physiology laboratory have pushed me toward seeking definitive answers to the problems listed above.

Furthermore, I hope to understand why some patients seemingly tolerate extensive stent-grafting, while others do not. Could it be that there are compensatory myocardial and residual aortic changes, and if so, how would we quantify these? When do the changes occur, and do they evolve over time? Are these changes ultimately adverse or beneficial? Are they reversible?

Through the PS-IDE, we have access to patients experiencing the full spectrum and extent of aortic stent-grafting, allowing us to answer these complex questions. Additionally, by employing both invasive (pressure-volume loop analysis, intravascular ultrasound, pressure-decay analysis) and non-invasive (echocardiography and ex-vivo material testing) analyses, we hope to gain greater insight into this critical problem in order to improve patient selection, to better tailor therapy, to increase long-term survival, and perhaps (eventually) develop novel devices.

References

1. Ivancev K, Vogelzang R. A 35 Year History of Stent Grafting, and How EVAR Conquered the World. Eur J Vasc Endovasc Surg. 2020;59(5):685–694.
2. Ghoreishi M, Chahal D, Shah A, et al. First-in-Human Endovascular Aortic Root Repair (Endo-Bentall) for Acute Type A Dissection. Circ Cardiovasc Interv. 2023;16(10):e013348.
3. Eagleton MJ, Follansbee M, Wolski K, et al. Fenestrated and branched endovascular aneurysm repair outcomes for type II and III thoracoabdominal aortic aneurysms. J Vasc Surg. 2016;63(4):930–42.
4. Beach JM, Rajeswaran J, Parodi FE, et al. Survival affects decision making for fenestrated and branched endovascular aortic repair. J Vasc Surg. 2018;67(3):722–734.e8.
5. Westerhof N, Lankhaar JW, Westerhof BE. The arterial Windkessel. Med Biol Eng Comput. 2009;47:131–141.
6. Singh C, Wong CS, Wang X. Medical Textiles as Vascular Implants and Their Success to Mimic Natural Arteries. J Funct Biomater. 2015;6(3):500–25.
7. Sultan S, Acharya Y, Soliman O, et al. TEVAR and EVAR, the unknown knowns of the cardiovascular hemodynamics; and the immediate and long-term consequences of fabric material on major adverse clinical outcome. Front Surg. 2022;9:940304.
8. van Bakel TMJ, Arthurs CJ, Nauta FJH, et al. Cardiac remodelling following thoracic endovascular aortic repair for descending aortic aneurysms. Eur J Cardiothorac Surg. 2019;55(6):1061–1070.
9. Kamenskiy A, Aylward P, Desyatova A, et al. Endovascular Repair of Blunt Thoracic Aortic Trauma is Associated With Increased Left Ventricular Mass, Hypertension, and Off-target Aortic Remodeling. Ann Surg. 2021;274(6):1089–1098.

Superficial vein thrombosis: medical management is not enough

Sherry Scovell, MD

Superficial vein thrombosis (SVT) is a common thrombotic disease with an annual diagnosis rate of 0.64%.[1] That translates to being half as common as deep vein thrombosis (DVT), and on par with pulmonary embolism (PE). Over the past several decades, we have seen a paradigm shift from considering SVT as a benign entity to recognizing it as an essential component of venous thromboembolism. This is largely because SVT is associated with thrombotic risks.

SVT carries a 25% chance of concurrent DVT, and a 5% chance of concurrent symptomatic PE at the time of diagnosis of the SVT.[1,2,3] Furthermore, about 40% of the DVTs are proximal in location, and 40% are not contiguous with the SVT. These facts stress the importance of obtaining a venous duplex ultrasound at the time of diagnosis.

> *"My research is focused on defining the role of ablation in patients with SVT once the acute thrombotic period has resolved."*
>
> **Sherry Scovell**

But even with acute, isolated SVT, there are future thrombotic risks, such as future symptomatic DVT and PE, as well as extension or recurrence of the SVT. The long-term incidence of venous thromboembolism (VTE) in this population of patients is 14.3%,[4] with recurrent SVT being around 10% to 20%.[5]

All of these factors need to be taken into consideration when treating patients with SVT. The overlying goal is treating the acute event, in conjunction with reducing future thrombosis. For this purpose, medical management is the initial step. I would suggest that further work-up for superficial venous insufficiency (SVI) and subsequent surgical management should be part of the algorithm for complete treatment.

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We have data on the medical management of SVT with prophylactic-dose anticoagulation, as highlighted by the CASLITO trial.[6] This large, multicenter trial randomized patients to prophylactic doses of fondaparinux for 45 days versus placebo, with a primary efficacy outcome measure including a composite of thrombotic risks. Due to the placebo arm, this trial enrolled low-risk patients. Fondaparinux performed better than placebo both at Day 47, just after anticoagulation was stopped, and that benefit was maintained out to Day 77 for an 85% relative risk reduction in the composite outcome.

When we look at high-risk patients, such as was done in the SURPRISE trial comparing a prophylactic dose of rivaroxaban to fondaparinux for 45 days, we see that both drugs performed similarly at Day 45 and Day 90.[7] However, the primary efficacy outcome was higher at both time points, with a substantial increase once the drug was stopped. This signifies that a longer duration of anticoagulation is likely warranted in patients at high risk for thrombosis.

These recommendations are clearly outlined by the SVS (Society for Vascular Surgery), AVF (American Venous Forum), and AVLS (American Vein and Lymphatic Society) Clinical Practice Guidelines.[5] However, there is also a consensus statement attached, which is important. It suggests that once the acute inflammatory period has decreased, patients with SVT should be evaluated for evidence of SVI, and consideration for endovenous therapy should be given.

Indeed, as SVI is a known risk factor for SVT, when we perform follow-up venous duplex examinations, approximately 80% of patients will be noted to have saphenous reflux – the underlying etiology for the SVT.[2] Occurring more often in the great saphenous vein than the small saphenous vein in earlier studies, the anterior accessory saphenous vein seems to also have a high rate of SVT.[8]

Similar to SVI being a risk factor for the development of SVT, prior SVT is a risk factor for recurrent SVT. We strongly believe that patients should be considered for endovenous ablation to prevent future episodes of SVT. Currently available methods of ablation are effective, from thermal techniques to chemical ablation for those that have incomplete recanalization (or the presence of webbing or synechiae within the lumen).

At MGH, my research is focused on defining the role of ablation in patients with SVT once the acute thrombotic period has resolved, in an attempt to define whether it does decrease the risk of recurrent SVT when coupled with antecedent medical management. Hopefully, this will help to further our understanding of this thrombotic disease.

"Over the past several decades, we have seen a paradigm shift from considering SVT as a benign entity to recognizing it as an essential component of venous thromboembolism."

Sherry Scovell

References

1. Frappe P, Buckmuller-Cordier A, Bertoletti L, et al. Annual diagnosis rate of superficial vein thrombosis of the lower limbs: the STEPH community-based study. J Thromb Haemost. 2014;12(6):831–838.
2. Decousus H, Quere I, Presles E, et al. Superficial venous thrombosis and venos thromboembolism: A large, prospective epidemiologic study. Ann Intern Med. 2010;152:218–224.
3. Galanaud J-P, Genty C, Sevestre M-A, et al. OPTIMEV SFMV investigators. Predictive factors for concurrent deep-vein thrombosis and symptomatic venous thromboembolic recurrence in case of superficial venous thrombosis. The OPTIMEV study. Thromb Haemost. 2011;105:31–39.
4. Rabe E, Hoffmann U, Schimke A, et al. Determinants of the late venous thromboembolic events after acute isolated superficial vein thrombosis in daily practice: 12 month results of the INSIGHTS-SVT study. Eur J Vasc Endovasc Surg. 2023;66:697–704.
5. Gloviczki P, Lawrence PF, Wasan SM, et al. The 2023 Society for Vascular Surgery, American Venous Forum, and American Vein and Lymphatic Society clinical practice guidelines for the management of varicose veins of the lower extremities. Part II. J Vasc Surg Venous Lymphat Disord. 2023. PMID: 37652254. Online ahead of print.
6. Decousus H, Prandoni P, Mismetti P, et al. Fondaparinux for the treatment of superficial-vein thrombosis in the legs. N Engl J Med. 2010;363(13):1222–1232.
7. Beyer-Westendorf J, Schellong SM, Gerlach H, et al. Prevention of thromboembolic complications in patients with superficial-vein thrombosis given rivaroxaban or fondaparinux: the open-label, randomized, non-inferiority SURPRISE phase 3b trial. Lancet Haematol. 2017;4(3):e105–e113.
8. Schul MW, Vayuvegula S, Keaton TJ. The clinical relevance of anterior accessory great saphenous vein reflux. J Vasc Surg Venous and Lymphat Disord. 2020;8:1014–1020.

The MGH visits the VEITHsymposium

Vascular training in an endovascular era: what does the MGH open surgery exposure look like?

Sunita Srivastava, MD, shared her expertise on vascular surgery training in an endovascular era. Treatment options for abdominal aortic aneurysms fall into two categories: open aortic reconstruction, and endovascular therapies, she began, noting that there is an early survival benefit with endovascular aneurysm repair (EVAR), and a lower 30-day morbidity or mortality rate described by a few excellent trials.

Endovascular repair for aneurysms has become the new gold standard, she went on. This has been seen with the decline of open aortic reconstruction, and with the growth of endovascular therapy for aneurysms. "As program directors, and in training programs, we felt the impact with the decline of open aortic surgery and exposures," said Dr. Srivastava. "This has led to a shift in focus – and training paradigms – to meet the challenges of endovascular durability. Endovascular therapy is marked by the presence of endoleaks, with 20–30% of patients developing these in the lifespan of their aortic exclusion, thus requiring secondary or additional interventions."

There needs to be a resolute decision-making process for these treatment options. In the endovascular armamentarium, there are several tools that can be utilized, depending on the type of endoleak. However, in the open category there is only open laparotomy and conversion. Open and endovascular salvage options require a thoughtful endoleak strategy. This requires an assessment of the risk of open surgery as these patients are older with more comorbidities. Indeed, evaluation of the mechanism of EVAR failure is essential for correct endoleak identification and treatment, and the ability to access fenestrated and branched endografts needs to be balanced with the urgency of repair for these patients.

"Operator familiarity and training in these sophisticated open and endovascular techniques are critical in managing complex dilemmas," continued Dr. Srivastava. "Our faculty here at the MGH have considerable experience in EVAR failure treatment options, ranging from complete and total explantation, to conversion, to a finished or even branched option in these scenarios. Our colleague Dr. Mohapatra has described and documented the actual growth of open conversion in EVAR failure in his own training program."

> *"Our program emphasizes and focuses on competency and training in complex endovascular open techniques that we feel are needed to address the future of aortic challenges."*
>
> **Sunita Srivastava**

Open conversion decision-making can be complex and challenging. This is because of the technical challenges in securing the proximal clamp site, and proper control, balanced with the fragile aortic wall after removal of some extensive hardware. Considerations also include the need to preserve visceral and renal flow, sometimes with concomitant bypasses, and the hazards of an extensive pelvic dissection, which is required with iliac limb removal.

"Therefore, we have reviewed and considered the role of partial endograft explantation," noted Dr. Srivastava. "We examined our own institution here at the MGH in a 10-year retrospective series, looking at 73 patients who underwent EVAR conversion. Fifty-four of these patients were explanted, with over 50% of them undergoing a partial explantation of their endograft. We found that there were no differences in 30-day survival, long-term survival, or readmission rates in the complete- versus partial-explant patients. We have altered our strategy when we talk about explantation in our patients at the MGH, with a preference now for partial explantation in the last seven years. We have also managed endoleak options with other open strategies.

"Several of our patients in that series underwent exploratory laparotomy and sac exploration. We've noted (as longitudinal providers and surgeons) the result of the EVAR-1 trial,

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demonstrating an early benefit in EVAR for the first six months. This is tempered by the observation that there were no long-term survival advantages in the EVAR group. There was also a marked increase in aneurysm-related mortality in the EVAR group after four years. This has altered our training paradigm for aneurysm therapy. We advise our trainees to be thoughtful, and individualize the management of open- versus endovascular options for patients to assess the physiologic risk, the anatomic feasibility, and to consider the life expectancy of the patient."

Patient preferences also need to be considered, stressed Dr. Srivastava, with prioritization of the early survival benefit seen with EVAR carefully balanced with the durability and freedom from interventions that is documented with open surgery. "Our training program encompasses two paradigms: the seven-year vascular surgery residency, and the independent two-year vascular surgery fellowship," she noted.

> *"Operator familiarity and training in these sophisticated open and endovascular techniques are critical in managing complex dilemmas."*
>
> **Sunita Srivastava**

"We graduate three to four trainees a year. Our graduates exceed the aortic endovascular and open case minimums, often meeting those numbers by the early summer/fall of their second senior clinical year. Our program emphasizes and focuses on competency and training in complex endovascular open techniques that we feel are needed to address the future of aortic challenges."

Diagnosis and management of pelvic venous insufficiency

Luis Suarez, MD, presented on the diagnosis and management of pelvic venous insufficiency. Pelvic venous disorders affect about 8% of the population, yet they are usually poorly understood, and when treated, have poor results, he noted. The reason for this is multifactorial, but it starts with the poor understanding that we have of the connection and interaction that the multiple venous plexuses have, affecting the pathophysiology and patient presentation.

"Pelvic venous disorders are defined as the spectrum of signs and symptoms arising from veins of the pelvis, and the primary drainage pathways secondary to reflux or obstruction," said Dr. Suarez. "In the past, traditional nomenclature was used to name them; Nutcracker syndrome, May-Thurner Syndrome, and pelvic congestion syndrome."

What these definitions failed to define was the complex interactions between all these venous plexuses and how they affect the symptomatology and the possible treatments for these patients, including their outcomes. Thus, the American Vein and Lymphatic Society International Working Group came up with the SVP classification, looking into the symptoms (S), varices (V), and pathophysiology (P) of pelvic venous disorders. The goal of this classification is to define a more homogeneous patient population to facilitate clinical communication, and allow for directed treatment and better outcomes. The SVP classification divides the anatomy of the veins of the pelvis into four zones. Zones 1–3 are the most relevant, and zone 4, which is the most distal, falls into the realm of the C-classification, or the lower semantic classification for venous insufficiency.

Dr. Suarez presented three cases that he had encountered at the MGH:

1. A 43-year-old woman with post bilateral ablations of the greater septum vein presented with persistent edema of the lower extremity, and venous claudication. According to the SVP classification, this represents an S3 patient with venous claudication, but also a C3 patient on the C-classification. It is important when a patient's symptoms fall into the lower extremities that they are also classified on the C-classification.

> *"When used by many [the SVP approach] will lead to improvements in communication, research, and outcomes for our patients."*
>
> **Luis Suarez**

The patient had a pelvic ultrasound performed that showed a significant stenosis of the common iliac vein

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(S) SYMPTOMS		(V) VARICES		(P) PATHOPHYSIOLOGY	
S_0	No symptoms	V_0	No abdominal, pelvic, or pelvic origin extra-pelvic varices	**Anatomy**	IVC Left renal vein Gonadal vein Common iliac vein External iliac vein Internal iliac vein Pelvic escape vein
S_1	Renal symptoms of venous origin	V_1	Renal hilar varices		
S_2	Chronic pelvic pain of venous origin	V_2	Pelvic varices		
S_3	Extra-pelvic symptoms of venous origin	V_3	Pelvic origin extra-pelvic varices	**Hemo dynamics**	Obstruction (O) Reflux (R)
a	Localized symptoms associated with veins of the external genitalia	a	Genital varices (vulvar varices and varicocele)		
b	Localized symptoms associated with pelvic origin non-saphenous leg veins	b	Pelvic origin lower extremity varicose veins arising from pelvic escape points, extending into the thigh.	**Etiology**	Thrombotic (T) Non-thrombotic (NT) Congenital (C)
c	Venous claudication				

The SVP classification. Courtesy of Dr. Suarez (left).

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at the compression site, with increased velocities. This patient was no longer classified as having May-Thurner Syndrome, but classified as an S3V0 patient, where the vein that's involved is the left common iliac vein with an obstructive nature, and non-thrombotic. In the operating room (OR), the patient was found to have some stenosis at the level of the common iliac vein, with some collateralization. This was confirmed with intravascular ultrasound, with a significant decrease in diameter at the compression site. The patient was treated with a stent, with resulting increase in the velocity of flow, and a decrease in collateralization.

2. The second patient case study may be similar, but the patient presented with completely different symptoms. A 39-year-old woman presented with complaints of pelvic pain that extended to her vulvar area, exacerbated with prolonged standing. On examination, she had multiple varices at the posterolateral region that failed previous sclerotherapy treatment. This patient was classified as S2, S3A. The pelvic venous ultrasound showed compression of the iliac vein, primary reflux of the ovarian vein, mild renal venous stenosis, and very large pelvic varicosities. The computed tomography venogram showed that the compression of the renal vein was mild, with a large ovarian vein, suggestive of primary reflux and multiple pelvic varicosities.

   The classification was easy to read, remembering that the patient was an S2-3, V23, and the veins affected would help with planning of treatment. The patient was taken to the OR, where multiple significant pelvic varices were found, with significant compression of the common iliac vein. The pelvic varicose was treated first, using an occlusion balloon to prevent reflux into the common iliac vein. Next was stenting of the iris of the common iliac vein, resulting in significant decrease in the collateralization at the pelvis. The patient experienced a good outcome.

3. A 38-year-old woman presented with a history of left flank pain, chronic pelvic pain (which was exacerbated during menstruation), and dyspareunia. Her urinary analysis showed hematuria. The patient had an S1, S2 presentation. She had significant left renal vein compression. Interestingly, the ovarian vein was not well-formed, and she had a significant plexus of varicose at the renal level. On the venogram, significant compression on the renal vein with reflux into the ovarian and lumbar veins was seen.

   The classification was S1, S2 disease, V1, V2 with the left renal vein affected by obstruction. The patient was a good surgical candidate; the left renal vein transposition was a great solution for this patient. It does have the drawback of requiring an extensive surgery, however, so there's work being done in trying to do this surgery with a smaller approach at the pelvis with the transposition of the gonadal vein.

"In conclusion, our institution has adopted this SVP approach for our patients with pelvic venous disorders," said Dr. Suarez. "There will be growing pains, I'm sure, and possible revisions to this classification, but I know as a society we can do it. It was difficult to adopt the C-classification at the beginning, but now it is the way we communicate.

"When used by many this will lead to improvements in communication, research, and outcomes for our patients. There are multiple endovascular options for treatment, but we should remember that open surgery is still an option."

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CEA, TCAR and future challenges in the management of carotid artery disease

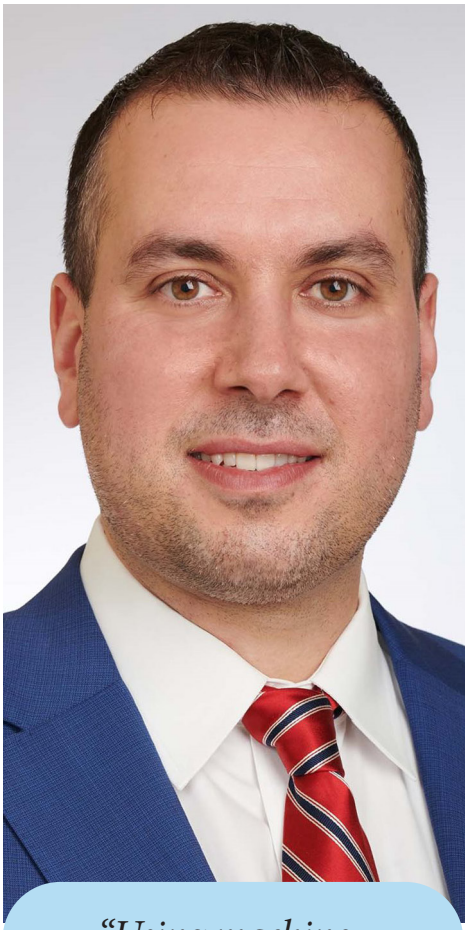
Nikolaos Zacharias, MD

Transarterial carotid artery revascularization (TCAR) with a flow reversal neuroprotection system is a carotid stenting technique developed over the past decade – one which many of us have adopted in our everyday practice. The MGH participated in the original Roadster trial where TCAR demonstrated promising results. In the Roadster-2 trial, TCAR had a perioperative combined stroke/myocardial infarction (MI)/death rate that was similar to carotid endarterectomy (CEA), and in the one-year follow-up study using the Vascular Quality Initiative (VQI) database, TCAR exhibited a 0% stroke/MI rate and 2.6% one-year mortality.

TCAR patients with high surgical risk include patients with previous CEA, previous neck dissection, radiation therapy, presence of stoma such as tracheostomy or esophagostomy, high lesions (C2 and above) and contralateral cranial injury.

Factors indicating a high medical risk for TCAR patients include age >75 years, two-vessel carotid artery disease, history of angina, congestive heart failure, left ventricular ejection fraction <30%, recent MI, severe chronic obstructive pulmonary disease, or chronic renal insufficiency.

On a propensity score-matched analysis of one-year outcomes of the VQI database, TCAR and CEA had comparable risks of 30-day stroke and death. However, 30-day risk of MI was significantly lower in the TCAR group compared to the CEA group (0.55% vs. 1.12%). The combined 30-day stroke/MI/death risk was also lower in the TCAR group (2.3% vs. 3.25%). In addition, patients undergoing TCAR did have a lower 30-day combined stroke and death risk compared to transfemoral carotid artery stenting (TFCAS).



"Using machine-learning algorithms, we were able to identify novel predictors of adverse events after carotid interventions."

Nikolaos Zacharias

In a recent study published in the *Journal of Vascular Surgery*, patients with high-risk anatomic factors benefited more from TCAR than those with physiologic factors, showing lower perioperative MI rates (0 vs. 1.7%). The combined stroke/MI/death rate was lower in patients with high-risk anatomic factors (2.2% vs. 4.2%), but was not statistically significant.

We have conducted several research projects focusing on our data. We have had 3,231 carotid interventions over the past decade with a perioperative stroke rate of 0.8%, and a combined stroke/MI/death rate of 1.2%.

Using machine-learning algorithms, we were able to identify novel predictors of adverse events after carotid interventions (particularly a composite of stroke/MI/death). Analyses (generalized linear model, random forest, and elastic net) were used to inspect our dataset, and novel predictors of adverse outcomes were identified such as level of activity and exercise, as well as preoperative stroke scales like the National Institutes of Health Rankin scale. The thirty-day readmission rate was also associated with the level of activity and exercise, as well as preoperative stroke scales.

Calcified lesions are challenging to treat with TCAR, particularly if circumferential or representing >50% in diameter. There are a lot of reports of using lithotripsy balloons to treat the calcium burden, but I always offer CEA to patients with heavy calcium burden. There are data published on the topic from the VQI database where patients with >50% circumference calcifications do have acceptable outcomes with TCAR. Again, TFCAS does demonstrate a higher incidence of perioperative stroke.