

ULTRASOUND SOLUTIONS

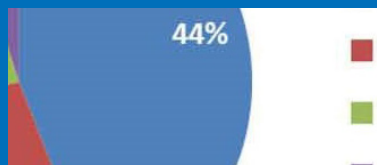
September 2014

High-Risk Population for Cardiovascular Disease and Peripheral Arterial Disease



NAVIX

Patients matter. Results count.



Managing Disease Processes in ESRD Patients **5**



Case Study: Deep Vein Thrombosis Post Ablation **9**

For nearly 20 years, Navix has partnered with physicians to deliver high-quality, cost-effective testing services that achieve the best outcomes for patients. Navix's intense focus on improving outcomes has driven our team to develop more specific programs that lead to earlier disease identification. For the past year, we have worked closely with Dr. Frank Tursi – Chief of Foot and Ankle Surgery for Our Lady of Lourdes Medical Center, Foot and Ankle Specialist for the Philadelphia Flyers & Clinical Instructor at the University of Pennsylvania/ Presbyterian Residency Program – on a comprehensive peripheral arterial disease (PAD) program designed to reduce amputations and save lives. I have been travelling the country with Dr. Tursi to promote awareness of PAD and more importantly help physicians identify at-risk patients.



Caring for thousands of cardiovascular patients every month, Navix has a unique opportunity to support clinical trials. Our success as a site management organization (SMO) is attributed to the commitment of our staff and physician clients who have supported these clinical trials and achieved recognition for high enrollment. Currently, Navix is being considered for more trials and is excited to share this very valuable opportunity with our clients.

In this issue, we focus on diabetes and ESRD patients, a high-risk population for peripheral arterial disease. We share statistics on cardiovascular diseases and risk factors that are important in the identification of patients with potential disease. Our case study is on deep vein thrombosis.

Later in this issue, we discuss how the changes announced by the ARDMS affect physicians seeking their RPVI credential. While Navix supports the ARDMS in their efforts to ensure high standards, it is difficult to ignore the issue it presents for many physicians who have difficulty obtaining the training and experience they need in vascular ultrasound. Physicians participating in Navix's Vascular Ultrasound Interpretation Program have told us that the small group learning environment and mentored cases are invaluable for preparing them to interpret diverse cases and establish higher standards in their vascular lab. Our staff will continue to provide the instruction needed and do our best to support physicians interested in acquiring the skills and experience for achieving high-quality vascular ultrasound interpretation.

The demand for Navix's Vascular Ultrasound Interpretation Preceptorship continues to grow and I am deeply grateful to Anne Marie Kupinski, PhD, RVT, FSVU, Navix's Educational Coordinator, for her leadership and dedication. Anne Marie has recently expanded our faculty with more talented and highly skilled instructors from Harvard, John Hopkins University and ??

Finally, I'd like to acknowledge the efforts of our staff in making the 2014 Society of Vascular Ultrasound (SVU) Conference in Orlando, FL a phenomenal success. I want to congratulate our employees who are also SVU Executive Board Members – Patricia (Tish) Poe, Director of Quality Assurance, and Joseph (JP) Hughes, Director of Clinical & Business Development – for their dedication and contribution to this very important event.

I look forward to learning more from our clients and having the opportunity to share this information with you. We hope that you enjoy this issue and welcome your questions, comments and ideas.

Sincerely,

**Senior VP of Clinical & Business
Development
Navix Diagnostix, Inc.
rkane@navixdiagnostix.com**

Did You Know?

This year, Navix will train nearly 300 physicians to interpret non-invasive vascular ultrasound exams helping many of them obtain their RPVI credential.

Navix's Non-invasive Vascular Ultrasound Interpretation Preceptorship for Physicians is one of the only 4-day courses available that includes hands-on scanning, didactic lecturing and 500 vascular cases covering carotid duplex ultrasound, transcranial Doppler, peripheral arterial physiologic testing, peripheral arterial duplex ultrasound, venous duplex ultrasound and visceral vascular duplex ultrasound. Navix's instructors, expert practitioners in vascular ultrasound, share their knowledge on the most effective methods for obtaining comprehensive ultrasound studies. Physicians attending gain 32 AMA PRA Category 1 Credits™.

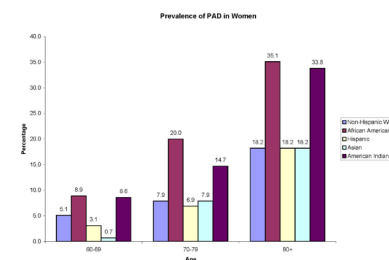
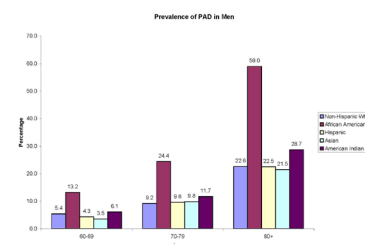
UltraSound Solutions



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Become a Contributing Author

Do you have a case study or idea to share? We'd love to hear about it!

Navix's *UltraSound Solutions* is an information source for physicians, technologists, executives and administrators working in advanced diagnostic imaging. We strive to connect industry experts with practitioners. To become one of our contributing authors, or to share your views on any of the information provided in *UltraSound Solutions*, email or call Dorie Kilduff, Navix Director of Marketing, at dkilduff@navixdiagnostix.com or (508) 977-2807.

High-Risk Populations for CVD & PAD

In the United States, there are 25.8 million people living with diabetes, 10.9 million of those diagnosed are 65 years or older. Adults with diabetes have heart disease rates about 2 to 4 times higher than adults without diabetes, and the risk of stroke is 2 to 4 times among people with diabetes. According to the American Heart Association, at least 65 percent of people with diabetes die from some form of heart disease or stroke.¹

Diabetes patients are also at a higher risk for Peripheral Arterial Disease (PAD). An estimated 1 out of every 3 Americans over 70 years of age have PAD but many are unaware despite warning signs. A simple test, ankle brachial index or ABI, is used to diagnose PAD. ABI compares the blood pressure in the patient's ankles to the blood pressure in the patient's arms. If the blood pressure in the ankles is lower than the pressure in the arms, the patient may have PAD.²

Testing for PAD can reduce the risk of a lower limb amputation. Lower-limb amputation rates are greater among people with diagnosed diabetes compared to those without diabetes. A recent study found that non-traumatic lower limb amputations have declined from 1998-2008. "The significant drop in rates of non-traumatic lower-limb amputations among U.S. adults with diagnosed diabetes is certainly encouraging, but more work is needed to reduce the disparities among certain populations," said Nilka Ríos Burrows, M.P.H., an epidemiologist with CDC's Division of Diabetes Translation and co-author of the study. "We must continue to increase awareness of the devastating health complications of diabetes. Diabetes is the leading cause of lower-limb amputations in the United States."³

The rate of non-traumatic lower-limb amputations in 2008 was still about 8x higher among people with diagnosed diabetes compared to those without it. Non-traumatic lower-limb amputations refer to those caused by circulatory problems that are a common complication among people with diabetes rather than amputations caused by injuries. The study also found that among people with diagnosed diabetes in 2008, men had higher age-adjusted rates of leg and foot amputations than women (6 per 1,000 vs. 1.9), and African Americans had higher rates than whites (4.9 per 1,000 vs. 2.9). Adults aged 75 years and older had the highest rate – 6.2 per 1,000 – compared to other age groups.³

In addition to being the leading cause of non-traumatic lower-limb amputations, diabetes is the leading cause of kidney failure and new cases of blindness among adults, and

the seventh leading cause of death in the United States.³

Navix has developed an effective risk-focused screening process to identify patients with PAD. The process includes a questionnaire and screening exam. Patients showing positive signs for the disease are recommended for further testing.

The combination of the following modifiable risk factors and diabetes, particularly type 2 diabetes, increase the risk of CVD.

High blood pressure (hypertension) is considered a major risk factor for CVD. The risk of CVD doubles when patients have both hypertension and diabetes.

Elevated cholesterol and/or triglycerides are common in patients with diabetes. These patients often have unhealthy cholesterol levels including high LDL ("bad") cholesterol, low HDL ("good") cholesterol, and high triglycerides. This triad of poor lipid counts often occurs in patients with premature coronary heart disease.

Poorly controlled blood sugars (too high) or out of normal range - diabetes can cause blood sugar to rise to dangerous levels.

Obesity is a major risk factor for cardiovascular disease and has been strongly associated with insulin resistance.

Lack of physical activity or inactivity is another modifiable major risk factor for insulin resistance and cardiovascular disease.

Smoking – Smoking puts individuals, whether or not they have diabetes, at higher risk for CVD.

VASCULAR DISEASE STATISTICS⁴

AAA – every year 200,000 people in the U.S. are diagnosed with Abdominal Aortic Aneurysm (AAA).

STROKE – the fourth leading cause of death & the leading cause of adult disability in the U.S.

VENOUS DISEASE – 10 times more people suffer from venous insufficiency than PAD in the U.S. More than 24 million Americans have varicose veins and 6 million have skin changes associated with Chronic Venous Insufficiency,



a condition that causes varicose veins, leg edema, leg pain, chronic skin changes and non-healing ulcers.

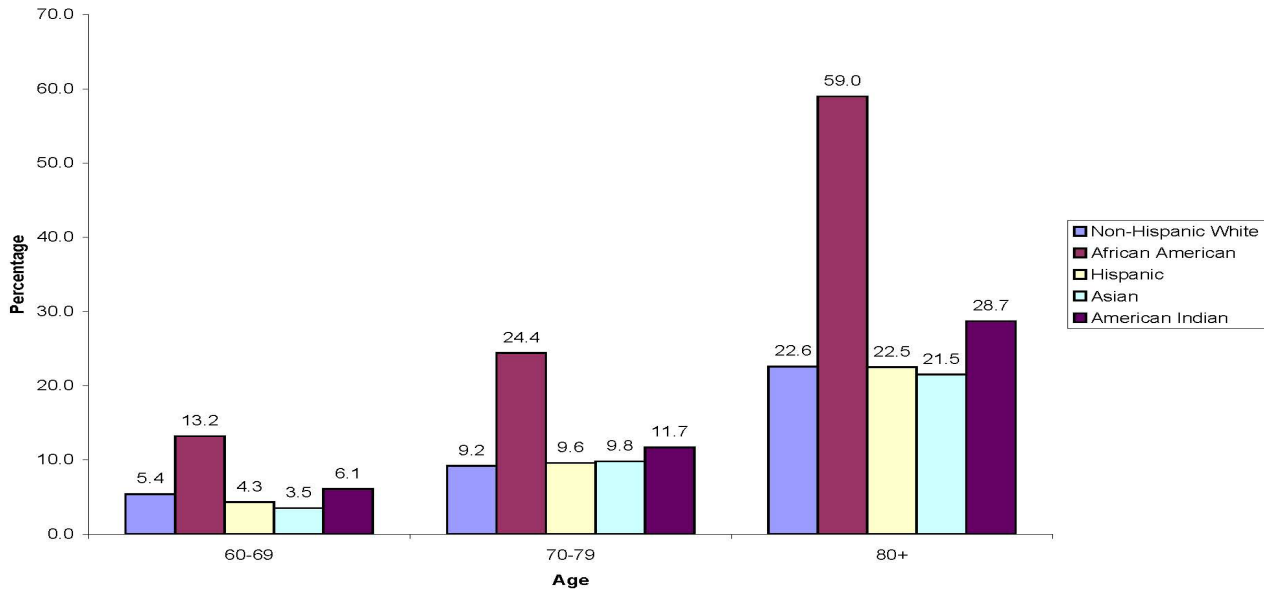
PAD

One in 3 people age 70 or older has PAD. PAD affects at least 8 to 12 million Americans. The disease prevalence increases with age and 12-20% of Americans age 65 and older (4.5 to 7.6 million) have PAD. As the population ages, the prevalence could reach 9.6 to 16 million in those age 65.

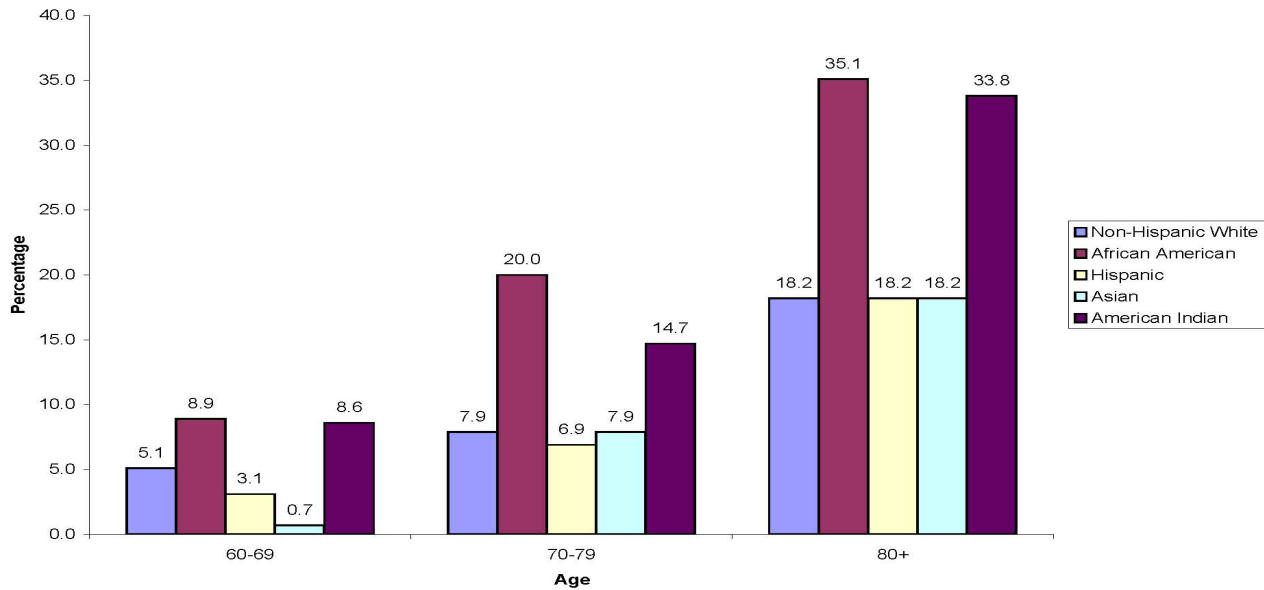
Education is Key in PAD

A survey of adults 50 years or older found that only 26% had expressed any familiarity with PAD. One in 4 of these people knew PAD is associated with increased risk of MI and stroke, and only 14% were aware that PAD could lead to amputation.⁵

Prevalence of PAD in Men



Prevalence of PAD in Women



1. American Heart Association, Cardiovascular Disease & Diabetes, www.heart.org 2. Centers for Disease Control and Prevention, www.cdc.gov 3. National Center for Chronic Disease Prevention and Health Promotion, Diabetes Report Card 2012 4. Vascular Disease Foundation, www.vascular-disease.org, as viewed on 10/23/2013. 5. Hirsch AT, Murphy TP, Lovell MB, Twillman G, Treat-Jacobson D, Harwood EM, Mohler ER 3rd, Creager MA, Hobson RW 2nd, Robertson RM, Howard WJ, Schroeder P, Criqui MH; Peripheral Arterial Disease Coalition. Gaps in public knowledge of peripheral arterial disease: the first national PAD public awareness survey. Circulation. 2007; 116:2086-2094.

Hypertension and End Stage Renal Disease Patients

by Peggy Crowley

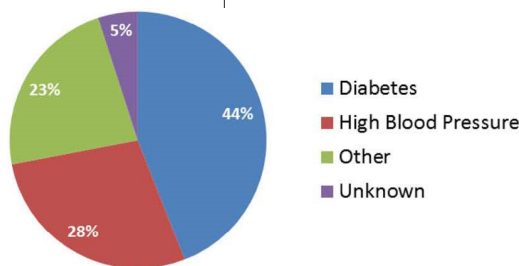
Every year, billions of dollars are spent in the U.S. to help build awareness, educate, research, treat, and manage diabetes and hypertension. More often than not, and for a multitude of reasons, the early warning signs and symptoms that are often associated with these disease processes go unrecognized, unidentified, or are often ignored. However, the consequences for leaving them untreated and unmanaged can be devastating and costly.

Symptoms that are uncontrolled or ignored will continue to manifest themselves until such a point that the amount of destruction to other organs and body systems becomes irreversible. Two well-known areas to be negatively impacted are the cardiovascular system and the renal (kidneys) system.

The use of non-invasive ultrasound technology is known to be a cost-effective means to identify, document, and manage patient outcomes for those diagnosed with diabetes and/or hypertension. For 20 years, Navix has provided these services to private practices, hospitals, freestanding clinics, and academia, assisting physicians in the disease management process.

In 2011, there were 115,643 new End Stage Renal Disease (ESRD) patients. It is known that diabetes and hypertension are the primary causes of ESRD and combined, accounting for 72% of all new cases of kidney failure in 2011. Diabetes leads the way as the primary diagnosis in 44% of new cases of kidney failure (ESRD), with hypertension coming in second with 28%.

New Cases of Kidney Failure by Primary Diagnosis -2011, United States Renal Data System



What is End Stage Renal Disease?

Kidney Disease is a progressive disease that can take years to manifest itself and typically can be identified as to its severity by the different stages, ranging from Stage I or normal kidney function, which is when the kidneys continue to do their work of filtering the blood and helping to eliminate the toxins that could otherwise build up in a person's body, to Stage 5 which is kidney failure or referred to as ESRD. The kidneys

also play an integral part in helping to regulate blood pressures. Most people think their kidneys are just responsible for producing

urine, but there's a lot more to it. In addition to filtering the blood to remove toxins as waste from the body, the kidneys are also responsible for balancing the fluid content in the body and the release of three important hormones:

- Erythropoietin - helps the bones make new red blood cells
- Renin - helps control blood pressure
- Vitamin D which is necessary to maintain calcium for healthy bones and chemical balance in the body

There are many opportunities to improve patient care and quality of life in ESRD patients. Several conditions exist in this population where early diagnosis through the use of non-invasive ultrasound will improve outcomes. These conditions include:

- Cardiovascular Disease - Left Ventricular Hypertrophy Congestive Heart Failure and Cardiac Tamponade/Pericardial Effusion/ Pericarditis

Facts on Diabetes

- 29.1 million people or 9.3% of the U.S. population are considered to be living with diabetes
- In 2012, diabetes was the leading cause of kidney failure for all ages in the United States.

Prediabetes:

- 86 million people or 1 out of every 3 adults have prediabetes. 9 out of every 10 of these people do not know they have prediabetes.

Hypertension (High Blood Pressure) Facts

- 67 million Americans have hypertension (only about half have it under control).
- Nearly 1 in 3 Americans have prehypertension.
- High Blood Pressure costs the nation \$47.5 Billion each year (includes healthcare services, medication, and missed days of work).

In 2009, over 348,000 deaths in the U.S. included hypertension as a primary cause of death.

- ~ 7 of every 10 of people have their first heart attack.
- ~ 8 of every 10 of people having their first stroke.
- ~ 7 of every 10 people with chronic heart failure.

Kidney disease is a major risk factor .

CDC. Vital signs: awareness and treatment of uncontrolled hypertension among adults—United States, 2003–2010. *MMWR*. 2012;61(35):703–9.

Striving for Higher Standards

Joanne Sul, RVT

- Peripheral Arterial Disease - Decrease amputations to improve quality of life and reduce mortality and morbidity
- Vascular Access - mapping/central venous occlusion, surveillance, interventions/placements and decreasing catheters

The USRDS 2013 Annual Data Report, showed that in 2011, there were 711,467 ESRD patients in the U.S. The cost of caring for the treatment of ESRD was \$49.3 billion, of which \$34.4 billion came from Medicare, (ESRD is the only chronic disease diagnosis that is currently covered by Medicare regardless of age).

Patients diagnosed with hypertension (1 in every 3 adults) and diabetes (1 in every 11 have diabetes with only 1 in every 4 diagnosed), have a higher rate of kidney failure, add to this, Guideline 15, Part 7 of the KDOQI Clinical Practice for CKD which states: All patients with chronic kidney disease should be considered in the "highest risk" group for cardiovascular disease, irrespective of levels of traditional CVD risk factors.

It is important to not only identify, but also monitor the vascular outcomes of ESRD patients, long before they are in Stage 5 (kidney failure). Navix is the leader in providing non-invasive, cost-effective vascular services that can enhance many disease management programs including Diabetes, Hypertension, Renal/ESRD, Arterial/PAD, or Venous Disease management. Our turnkey approach and ease of integration can help to support positive patient outcomes and when necessary allow for early interventions.

When it comes to vascular evaluations for venous disease Joanne Sul raises the bar. Joanne has worked at Navix since 1998. In 2000, she received her RVT credential in 2000.

Joanne has been instrumental in developing Navix's venous disease program and ensuring high standards at some of Navix's labs.

Below is an interview with Joanne.

What do you enjoy most about your job?

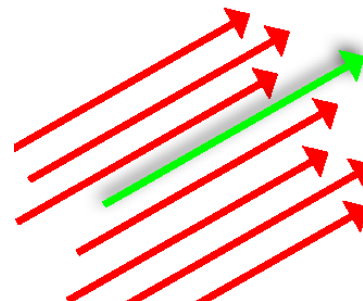
I really enjoy mentoring technologists. Because ultrasound is so technologist dependent, there is a lot of opportunity to improve the quality of the vascular evaluation and information provided to physicians.

What do you consider to be the most critical skill to possess in your field?

Common sense and critical thinking are the two most critical skills. Without common sense, the technologist does not always "do the right thing" which is take care of the patient first. Without critical thinking, the technologist has difficulty putting together the "big picture" and giving the physician the information necessary to decide the proper course of action.

What has been your experience working with Navix clients?

I've learned a lot from working with our clients. The high expectations we set for our clients forces us to work smarter. I have learned that success happens when we communicate frequently and strive to provide the best service. Everyone wins!



As a manager, what do you appreciate most from your team?

TEAMWORK! This is essential when you have a large patient population and we all have multiple responsibilities. When I am running behind on scanning and training new technologists or working on problems with specific studies, I really appreciate when everyone pitches in to help to ensure quality standards are met! Unfortunately, this can be a daily occurrence at our labs which otherwise could be very chaotic and stressful, but all of us working together makes it easier to get through the day and ensures patients get the best care!

Personal information you wouldn't mind sharing – family, hobbies etc.

I've been married 10 years and have 2 rambunctious boys ages 7 (Colin) and 4 (Connor). I also have 2 nephews who spend 90% of their free time with me, so it's like having 4 boys in the house at all times!! They all play lacrosse competitively which means that most of our weekends are dedicated to traveling to different places to support them in their games – usually the WHOLE weekend! Otherwise, my time is mostly spent at work or fighting traffic!

Training in Venous Ablation

This course provides a unique opportunity for vascular surgeons, interventional radiologists, interventional cardiologists, general surgeons, and surgical subspecialists, as well as ultrasound technologists, to learn or advance their training in venous ablation procedures. Participants will observe several live vein ablations performed by Dr. R. Anthony Carabasi III, one of the most respected surgeons in his field.

Through a series of didactic lectures, live observations and hands-on case studies, participants will learn how to successfully incorporate venous knowledge, skills and techniques into their overall practice. Course topics include:

- Venous Anatomy: Relevant Anatomy, Anatomic Variants and Terminology
- Venous Hemodynamics
- Venous Patient: Risk Factors, Symptoms, Diagnosis and Treatment
- Essential Elements of the Venous Ultrasound Exam Including Duplex Ultrasound
- Venous Ablation: VNUS® Closure Procedure (Radio Frequency Vein Ablation)
- Post Ablation: Proper Follow-up and Adjunctive Procedures
- Consultative Strategies for Medical Billing (optional)

Due to the intense learning and live cases, this course is limited to one physician and one technologist per class. For best results, the course is recommended as a two or three day program. Special pricing is offered through December 31, 2013 – physician's course

fees are \$1000 per day and an additional \$500 per day for the physician's ultrasound technologist (optional).

Navix's Vein Ablation Training is offered at the Advanced Vein & Vascular Center, a 3,000 square-foot state-of-the-art facility, located on the Main Line in Wayne, PA. The vascular lab included in this center has achieved the highest standard of quality with its IAC accreditation and Dr. Carabasi has been awarded "Top Doc" by Philadelphia Magazine consistently since 1994. Below is an example of the patient cases for a week at the Advanced Vein & Vascular Center:



Tuesday: 4 new patients w/ bilateral ultrasound, 3 new patients w/out ultrasound, 3 new cosmetic patients (to evaluate for sclerotherapy), 2 sclerotherapies, 5 various short follow up visits
Wednesday: 8 RFC's, 1 Clarivein
Thursday: 5 Phlebectomies
Friday: 3 RFC's, 3 Phlebectomy, 9 follow-up to ablation ultrasound, 4 post Phlebectomies
Saturday: 2 Phlebectomy, 2 new patient w/out ultrasound

ABOUT DR. ANTHONY CARABASI, III

Dr. Carabasi is a board certified vascular surgeon who practiced for over 20 years at the prestigious Thomas Jefferson University Hospital and Medical school in Philadelphia, serving as Chief of Vascular Surgery for 16 years before opening his own private practice on the Main line. He has been listed as a "Top Doc" in Philadelphia Magazine or as a "Top Doc" for Castle Connelly Medical, consistently since 1994. He is also listed in Castle Connelly's "Americas Top Doctors".

After graduating Summa Cum Laude from Villanova University, Dr. Carabasi completed his general surgery internship at Jefferson Medical College, and Columbia University College of Physicians And Surgeons, Presbyterian Hospital in New York. Following his general surgery residency at Thomas Jefferson University in Philadelphia, he went on to study at Pennsylvania Hospital and completed his Vascular Fellowship program. He then went into academic practice, where he has been until recently, when he opened the private practice of "The Advanced Vein & Vascular Center Center, Inc", to concentrate on his vein practice.



Dr. Carabasi has been very active in the Vascular community over the years. Some of his activities include the involvement in:

NATIONAL COMMITTEES

SESAP VII, American College of Surgeons, 1998-1991

Executive Committee, Society for Clinical Vascular Surgery 1988-1997

Chairman, Constitution and Bylaws Committee, Society for Clinical Vascular Surgery, 1988-1990

Member, Admissions Committee, Society for Clinical Vascular Surgery, 1990-1993

Chairman, Membership Committee, Society for Clinical Vascular

CERTIFICATIONS

American Board of Surgery

General Surgery

American Board of Surgery

General Vascular Surgery

How will the Changes to the RPVI Pre-Requisites Affect You?



While the rules for obtaining RPVI credentialing have changed, the need for a mentorship program in interpretation has not.

Earlier this year, the ARDMS announced a clarification to the B2 and C2 prerequisites that allow a physician to sit for the Registered Physician in Vascular Interpretation (RPVI) examination. At the close of 2014, the requisite 500 cases that must be logged prior to taking Physician Vascular Interpretation (PVI) exam can no longer be gathered outside of your place of employment. You must make arrangements to read Vascular Laboratory studies in your workplace to qualify for taking the RPVI exam in 2015.

This leaves many physicians with a true dilemma. Most institutions do not offer adequate instruction that enables physicians to begin to accurately interpret the wide variety of cases that are typically seen in the reading room. In this very competitive diagnostic market, acquiring cases without establishing expertise may not launch your practice with the best odds for success.

After surveying physician attendees of Navix's Preceptorship in Vascular Interpretation, we have found that their initial goal for taking our four-day intensive, case-based education is to gain experience in a variety of cases that allows them to meet the case log requirement for the RPVI exam. Most physicians also state that the ability to read vascular laboratory studies is an expected part of the work in their current practice or a future practice. After these physicians experience the small group setting which is typical of Navix's program, their statement on the value of this type of program predictably changes to knowledge and learning on how to evaluate the images and data produced in an environment where the quality of these images is highly dependent on the technologist performing the study.

Both for the studies you read yourself and for the reports that may be part of your patient's records from an outside facility, your ability to formulate a care plan that includes an understanding as to how the data was obtained and how

interpretive conclusions were derived is crucial. This ongoing need takes you far beyond the immediate goal of achieving the credential that verifies minimal competency to interpret vascular laboratory tests.

The ultimate outcome expected from patient care providers is accuracy and sound advice that is based on education and experience in every area of clinical expertise offered by a medical practice. Navix Vascular Preceptorship courses provide the educational basics along with a course design that provides mentorship in a small group setting. This method of mentoring by experts in the field has a proven track record of success.

So, how to begin in a new specialty? Personalized training that includes a wide variety of case types, protocols and a thorough review of the diagnostic criteria that result in accurate interpretation in the vascular laboratory is an excellent place to start.

Tish Poe, BA, RVT, RDCS, FSVU

Vascular Ultrasound Interpretation Preceptorship

Sept. 11-14, 2014 Philadelphia, PA	Sept. 29 - Oct. 2, 2014 Philadelphia, PA	Oct. 27 - 30, 2014 Philadelphia, PA	Nov. 10 - 13, 2014 Philadelphia, PA
Sept. 15 - 18, 2014 Bronx, NY	Oct. 6 - 9, 2014 Bronx, NY	Nov. 3 - 6, 2014 Bronx, NY	Dec. 1 - 4, 2014 Bronx, NY
Sept. 15 - 18, 2014 Philadelphia, PA	Oct. 13 - 16, 2014 Bronx, NY	Nov. 3 - 6, 2014 Philadelphia, PA	Dec. 8 - 11, 2014 Bronx, NY
Sept. 22 - 25, 2014 Bronx, NY	Oct. 20 - 23, 2014 Philadelphia, PA	Nov. 3 - 6, 2014 Bronx, NY	Dec. 15 - 18, 2014 Bronx, NY

Onsite programs are available! For more details, please contact Gillian Stott at 508-977-2807 or gstott@navixdiagnostix.com.

Case Study

Joanne Sul, RVT

Deep Vein Thrombosis Post Ablation

Nearly one in every two adults 50 years or older develop varicose veins, which usually appear as swollen, twisted clumps of blue or purple blood vessels near the surface of the skin in the legs or pelvis. The condition is most common among women and older adults, but obesity, prolonged standing or sitting, trauma to the legs, family history of venous disease, and pregnancy may increase the risk for developing varicose veins. Common symptoms include leg swelling, achiness, heaviness, itching, muscle cramps, soreness, pain, tiredness and skin discoloration and ulcers.

While varicose veins and venous insufficiency may not be life threatening disease, they can be life-limiting diseases. To treat these diseases, Endovenous thermal ablation (RFA-Radiofrequency Ablation and EVLT-Endovenous Laser Treatment) has become a preferred treatment method and have been proven to be safe and effective treatment for superficial venous reflux with a relatively low incidence of procedure-related complications.

Case Report:

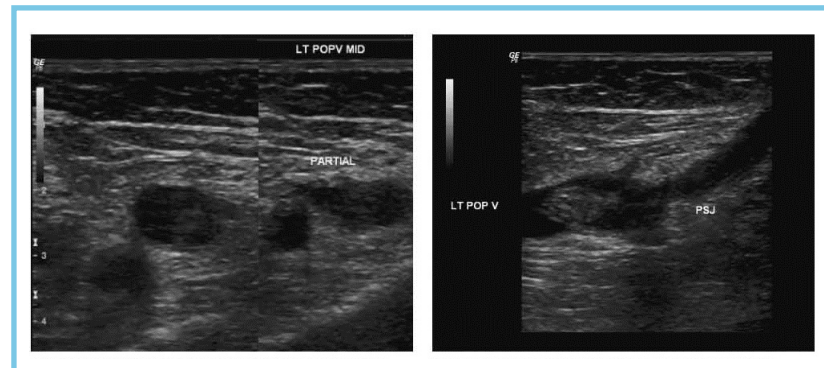
- 72 Year old Woman
- Well built with no significant medical history
- Presenting with: pain in left leg; swelling in left leg; bulging varicose veins in both legs, left > right
- Symptoms occurring for many years

sapheno-popliteal junction with measurements from 5.0mm to 5.8mm and reflux duration of 2.5-3 seconds.

*Surgery was scheduled for Small Saphenous vein Closure

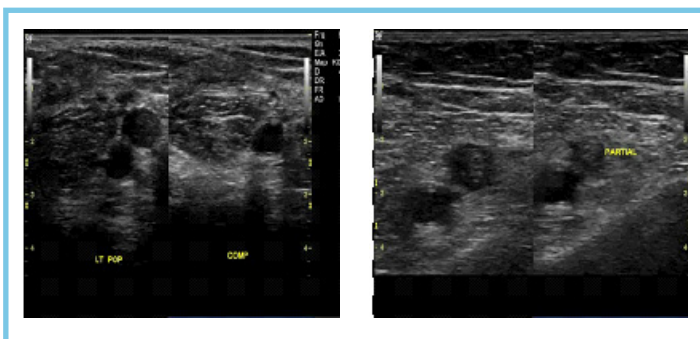
Post-op Duplex Ultrasound (Exam 2) was performed 72 hours post-ablation. The results found:

- Evidence of successful small saphenous vein closure- mid calf to sapheno-popliteal junction
- Evidence of partial popliteal vein thrombosis



Transverse picture of sapheno-popliteal junction into popliteal vein. Partial compression seen in popliteal vein.

Sagittal view of the sapheno-popliteal junction into popliteal vein shows bright echos with partial extension of the clot into the Popliteal vein from sapheno-popliteal junction. The thrombus is stable.



Initial Scan Compression

Post-op Scan Partial Compression

Imaging Findings: Initial Duplex Ultrasound (Exam 1) was performed to evaluate for Venous Insufficiency with findings of:

- Deep venous reflux in left popliteal vein >1.0 seconds.
- Left great saphenous vein (GSV) reflux from mid calf to proximal calf 1.5 seconds.
- Left small saphenous vein (SSV) reflux from mid calf to

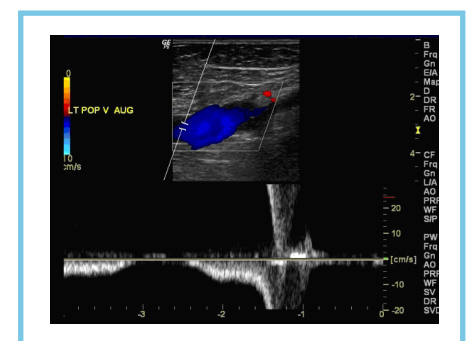
Color and spectral Doppler demonstrates normal spontaneous and phasic flow pattern with good augmentation.

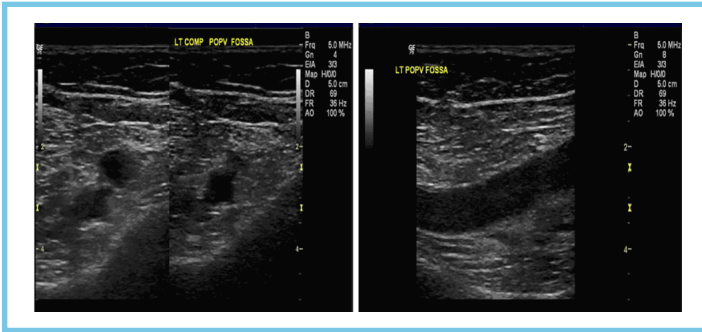
**Patient placed on Lovenox treatment for 1 week

Post-op Duplex Ultrasound Exam 3 after anticoagulation was performed.

Results:

- Still successful closure in small saphenous vein
- Resolved partial DVT in left Popliteal vein





Post 1 week Lovenox Treatment –Resolved Popliteal thrombus.

Discussion:

Grading valvular incompetence severity is difficult. Reversal of venous flow or reflux for more than 500 milliseconds (ms) is indicative of valvular incompetence in the superficial system, 1000 ms in the deep system, with 4.5-5.0 mm or greater in vein size. Endovenous thermal ablation (RFA-Radiofrequency Ablation and EVLT-Endovenous Laser Treatment) is an accepted method of safe and effective treatment for superficial venous reflux with a relatively low incidence of procedure-related complications. A new system, Clarivein-The Non-Thermal Vein Ablation System, ablates the veins without heat, however, with very similar results and complications.

Deep venous thrombosis (DVT) is the formation of a thrombus within the deep venous system and is a recognized complication associated with <3% of endovenous ablation procedures. Endovenous heat induced thrombus (EHIT) is an expected result of endovenous ablation of an incompetent superficial vein. During the thermal ablation, the endothelial lining of the vein is damaged, thus causing inflammation to the vessel walls. With the Clarivein, endothelial lining damage is caused by a Mechanical agitation of the vessel of the endothelia by the rotating catheter tip. Thrombotic occlusion occurs, which then leads to fibrosis and effective closure within the superficial venous system. In less than 0.5%-3% of endovenous ablation procedures, the thrombus extends into the deep venous system and the EHIT is then classified according to the thrombus extension. The classification for EHIT extension within a superficial vein to a deep vein is as follows:

- Class I: Venous thrombosis to superficial deep junction (SFJ of SPJ), but not extending into deep system.
- Class II: Non-occlusive venous thrombosis, with an extension into deep system of a cross sectional area less than 50%.
- Class III: Non-occlusive venous thrombosis, with an extension into deep system of a cross sectional area greater than 50%.
- Class IV: Occlusive deep vein thrombosis of common femoral /popliteal vein.

All patients at Advance Vein & Vascular Center or Society Hill Vascular Center undergo routine duplex imaging within 2-14

days post endovenous ablation procedure. If EHIT I or II is identified (generally in <65 y.o.), serial duplex imaging weekly with observation will be performed until thrombus retraction into superficial vein is noted. If EHIT III or IV is identified on duplex scan, low molecular weight heparin (LMWH) is initiated and continued, along with weekly duplex imaging and evaluation, until thrombus retraction or complete resolution is noted. The potential for further thrombus propagation after the initial post procedure documentation of EHIT is low. In most patients, the thrombus usually remains stable initially and retracts or completely resolves within 7-14 days.

Conclusions:

Deep venous thrombosis (DVT) formation of a thrombus within the deep venous system post endovenous procedures is recognized as a complication associated with less than <3% of endovenous ablation procedures of incompetent superficial veins. Usually the large vein diameter, male sex, and multiple phlebectomies are risk factors for development of deep venous thrombus post ablation.

This is easily detected by Duplex Ultrasound. When this happens, depending on the classification of the extension of the thrombus, it is easily treatable and in most cases the thrombus in the deep system is completely resolved.

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Deep venous thrombosis after saphenous endovenous radiofrequency ablation: is it predictable?

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Management of Endovenous Heat-Induced Thrombus using a classification system and treatment algorithm following segmental thermal ablation of the small saphenous vein.



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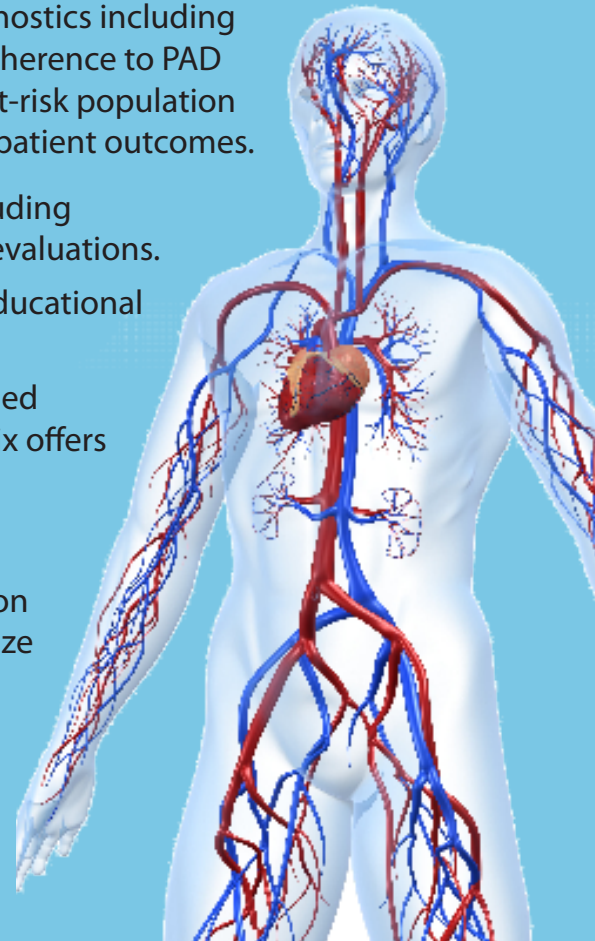
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