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VEIN SPECIALIST NEWSLETTER



HAVE YOU EVER MADE A MISTAKE?



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LETTER FROM THE EDITOR

I Stayed In Mississippi A Day Too Long

Mistakes. We all make mistakes. We are supposed to learn from our mistakes. Sometimes we do, sometimes we don't. An early 14th Century French proverb states: "Mez quant in est la chose fecte, ne peut pas ester defecte." Translated: "But when a thing is already done, it cannot be undone." Isn't this the description of a mistake? No retrieval. Either ignorance or acceptance. Shakespeare co-opted the phrase 3 centuries later. Macbeth, Act 3, Scene 2: "Things without all remedy, should be without regard: what's done is done. Give me your hand. What's done cannot

be undone." Okay. I get it. A mistake is made. Accept it. Face it. Maybe learn from it. In this issue of Vein Specialist, The Mistake Issue, our members anonymously acknowledge and acquiesce to the challenge of airing their mistakes.

Simple, straightforward, uncomplicated patient care issues go awry. A sclerotherapy session leading to a pulmonary embolus. A vena cava filter retrieval ending up with a nephrectomy. A simple balloon angioplasty of a stent resulting in a retained balloon component. A DVT post



Steve Elias, MD

sclerotherapy. Endovascular filter retrieval converted to an open removal. Anticoagulation resulting in a breast infarct and prolonged wound care. How many of us have done sclerotherapy? How many of us have done balloon dilatation of stents? Yes, I do acknowledge that the great majority of us don't attempt difficult filter removal. But most of us who do don't get these complications. A complication doesn't always mean a mistake was made. We at Vein Specialist are grateful to our members for their courage.

Finally, in vein care and in medicine, mistakes are always made. Anyone

who says they have never made a mistake is either lying or is exo-centric. As much as I like Bob Dylan, I disagree with his conclusion in the song Mississippi: "Yeah, the only thing that I did wrong was stay in Mississippi a day too long". If that's the only thing he did wrong, I'm impressed. I have done a lot more wrong. Is he lying or is he exo-centric? You decide. Our members who contributed to this "Mistakes Issue" are neither. They are brave. We thank them. Read on. Learn from their mistakes.









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"One last balloon inflation and we will be done" ... three hours later

CASE PRESENTATION

A 40 year-old male with a history of right lower extremity DVT and iliocaval atresia treated with catheter-directed thrombolysis and thrombectomy presented for endovascular iliocaval reconstruction due worsening lower extremity swelling and discoloration and post-thrombotic syndrome with a Villalta score of 13.

COMPLICATION

The patient underwent successful iliocaval reconstruction from the right common femoral vein and left common iliac vein to the juxta-renal IVC with stents measuring up to a caval stent (20mm) and 14mm iliocaval stents. These stents were fully expanded with a 14mm Atlas (BD, Franklin Lakes, NJ) balloon. Following multiple inflations, there was difficulty advancing the balloon through the IJ sheath and the catheter may have kinked. The balloon was inflated in the iliac stent but could not be fully deflated, leaving it trapped within the IVC.

To retrieve the balloon, the right trans-saphenous sheath was upsized to a 12-French sheath and a snare was used to grasp the balloon and pull it down to the 12-French saphenous vein sheath. However, this was unsuccessful as the balloon failed to deflate sufficiently. A 22 Ga Chiba needle (Cook Medical, Bloomington, IN) was then inserted alongside the snare to perforate the balloon (Figure 1). The balloon successfully deflated and was pulled into the 12-French sheath. The jugular sheath was then pulled into the 12-French saphenous sheath and the balloon was removed after the hub of the balloon was cut to allow passage through the jugular sheath (Figure 2).



FIGURE 1 Fluoroscopic image showing the around the Atlas balloon. A Chiba needle can be seen puncturing the residual inflated portion of the balloon for intentional rupture (arrow).



FIGURE 2 Fluoroscopic image showing successful over-sheathing of the balloon following intentional rupture of the balloon.



"One last balloon inflation and we will be done"... three hours later

SEQUELAE AND OUTCOME

Unfortunately, during grasping of the balloon from the saphenous sheath, the 1mm radiopaque marker at the apex of the balloon was sheared off and was unable to be retrieved, remaining in the IVC post-procedure (Figure 3). However, given its small size, this is of doubtful clinical significance. At 1 year follow-up, the stents are widely patent and the patient has a Villalta score of 3.



FIGURE 3 Fluoroscopic image showing a small radiodensity consistent with the radiopaque marker of the balloon that was sheared off during retrieval (arrow).

Although the package insert for the 14mm Atlas balloon indicates that it will fit through a 7-French sheath, it must be noted that a return to pre-inflation profile will not occur on deflation, particularly after multiple repeat inflations. Here, we were unable to retrieve the balloon through the 8-French sheath. Kinking of the balloon catheter was also of significance. We described our method above for dealing with an unremovable balloon, should this issue happen again. This case highlights the importance of thoughtful inventory selection; in the future, large sheath sizes should be considered, especially when repeat uses of a balloon are planned.



Conflicting Wishes About IVC Filter Removal

A 42-year-old female with ulcerative colitis was admitted to our vascular department. She suffered from a right sided iliac DVT with extension of a flagellating thrombus into the distal 5-7 cm of IVC. The patient had a forthcoming colectomy, and the surgeons from the referring department did not want to postpone the operation and therefore demanded a protection with an IVC filter to avoid PE under their procedure. The patient was kept on a minimum of anticoagulation due to severe colitis complications. An OPTEASE retrievable IVC filter (Cordis) was inserted from the left groin into the proximal part of the infrarenal IVC. We explicitly pointed out in the electronic record that the filter should be retrieved within three to four weeks from insertion, which is recommended for this filter. The patient was relocated and a bowel operation with ileostomy was done uneventful.

Everyone forgot about the retrieval, until we, after four weeks, realized the time for removal. We called upon the patient, who at that time didn't want to participate against given advice. After an additional three weeks, we convinced the patient to be readmitted. Venogram showed mal position of the filter (Fig 1). The top of the filter was located and fixed into the orifice of the left renal vein. It was possible via bilateral groin access to manipulate the filter but only with retracting both the filter and the adjacent vein wall without a release. It was harmful to the patient. However, even after hours of attempts it was impossible to make any progress. Further traction could impose leakage.



FIGURE 1 Venogram showing mal position of the IVC filter.



Conflicting Wishes About IVC Filter Removal

We decided to make an open removal and the patient agreed because she didn't want to continue any medication of anticoagulation for that reason. Via a right retroperitoneal approach, we exposed the IVC including the renal veins and side branches from behind (Fig. 2). Through a 5-6 cm long venotomy the filter was successfully removed, cutting free the point of attachment (Fig. 3). The IVC was sutured without any tendency of stenosis. The patient was discharged after few days.



FIGURE 2 The IVC filter retrieved before the final cut from the orifice of the left renal vein.

The course is quite instructive. A correct communication can be missed when more than one department is involved. Furthermore, it is seldom that IVC filter is used for such indications in Denmark, which decreases the alertness in general. An anchorman is essential. What we don't know is if the outcome for the patient had been easier with a timely removal. The story also highlights the fact that patients have the right to determine. We hypothesized that the filter might have been "pushed and titled" during the intestinal operation.



FIGURE 3 The removed IVC filter with vein wall attached to the top.

The best vein care is not always possible.



Filter Retrieval Gone Wrong

Removal of inferior vena cava (IVC) filters once the patient has lost indication for caval filtration has been encouraged secondary to potential filter-related complications. Chronic filter implants lead to neointimal hyperplasia and dense fibrosis, which tend to make the retrieval difficult. Advanced retrieval techniques are increasingly popular but early experiences have been accompanied by devastating complications that are increasingly underreported.

Mr. X is a 60-year-old male who presented to our office complaining of disabling claudication and leg swelling status post multiple provoked DVTs starting 10 years ago. He had a permanent Simon Nitinol filter (Bryan Corporation, Woburn, MA) and a chronic known iliocaval thrombosis. Following a thorough discussion explaining risks and alternatives the operative plan included an attempt to remove the filter with advanced retrieval techniques followed by an iliocaval endovascular reconstruction.

For the filter removal procedure an 18 Fr sheath was introduced transjuguarly. An in-situ loop snare was formed around the filter apex using a stiff glide wire (Terumo Corporation, Tokyo, Japan) that was snared and externalized through the jugular access ("hangman technique"). Care was taken to form the loop around the filter apex, avoiding passage lateral and around the filter struts, which might distort the filter and increase the difficulty of retrieval. Extraction was attempted with blunt dissection using the sheath, but the filter could not be sheathed.

Following excessive force, the sheath was pulled back a few centimeters before the filter was completely sheathed and retrieved. Immediately after retrieval, the patient's vitals indicated hemodynamic instability. We tried to regain wire access towards the otherwise obliterated infrarenal vena cava but this was not possible.





FIGURE 1

Filter Retrieval Gone Wrong

Patient underwent an emergency midline laparotomy which revealed massive venous bleeding. Massive transfusion protocol was initiated. A right visceral rotation was performed and the IVC was exposed revealing a linear laceration along its right aspect including the right renal vein. The IVC was primarily repaired but the renal vein injury could not be controlled. Right nephrectomy was eventually performed. The patient was transferred to the ICU and following a complicated 40-day hospital stay fully recovered his renal function. A year later he was functionally back to his baseline, fully active and well. On a side note, 5 years now from that event, we are now good friends!

In retrospect this major complication could have been avoided either by being cautious not pulling the sheath back (before completely sheathing the filter) or by using a laser sheath (photoablation) to release scar tissue surrounding the filter. Stenting through an IVC filter rather than removing it remains a viable option with good outcomes and further studies regarding the outcomes and cost-effectiveness of these two techniques is warranted.



FIGURE 2



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SUBMISSION DEADLINE: Friday, August 13th at 5:00 PM ET

Sclerotherapy: What Can Go Wrong?

We perform approximately 60 sclerotherapies weekly with no or mild complications, not meaningful to mention in this document. However, some complications after foam sclerotherapy are life-threatening and worth addressing.

First, a 71-year-old woman presented sudden chest oppression, dyspnea, nausea, and reduced visual acuity after sclerotherapy. These symptoms resolved rapidly, but she had another episode five hours later. At the ER, she had sinus tachycardia and positive troponins compatible with a non-ST elevation myocardial infarction.

Despite the clinical diagnosis, the percutaneous coronary intervention was normal. An echocardiogram evidenced left ventricular dysfunction, confirming Takotsubo Syndrome, known as "the broken heart syndrome." After detailing the patient's medical history, we found out that she had a beloved death one month before and was grieving. This event could explain the stress in the myocardium, mimicking an acute coronary syndrome.

Second, we had a 60-year-old woman with aphasia, severe headache, and rare movements after sclerotherapy with CO2/O2. Our team took her to the emergency department, where they performed a brain CT, showing a bubble in the parietal branch of the middle cerebral artery and an MRI confirming compromise of the brain cortex. The treatment given was a non-rebreathing mask to maintain oxygen saturation at 100%, resulting in complete improvement after six hours. An echocardiogram confirmed a permeable oval foramen, allowing gas to cross to the left ventricle and travel to the brain. This diagnosis is known as a paradoxical embolism post-sclerotherapy. Although it has a low incidence, its prompt attention can reduce the chances of more complex complications.



American Venous Forum

Sclerotherapy: What Can Go Wrong?

The third case was a 38-year-old woman who, three days after undergoing combined therapy (EVLA + polidocanol foam sclerotherapy), presented fever, dyspnea, malaise, and chest pain. The emergency department admitted her and performed a CT Angiography confirming a pulmonary embolism (PE) (figure 1). Although the etiology suggested a thromboembolic event, the lower limb duplex did not evidence thrombi. After autoimmune studies, anticardiolipin antibodies and lupus anticoagulants confirmed an antiphospholipid syndrome. Therefore, even though PE is extremely rare after this procedure, patients with autoimmune symptomatology or antecedents should be treated with extreme care.



FIGURE 1 CT: A) Acute thrombus cast in the trunk of the pulmonary artery. B) Thrombus extending to bilateral lobar branches with complete occupation of its lumen.

Our final case was another female in her 60's who, after 30 seconds of having tumescent anesthesia for an EVLT, presented hallucinations, severe tachycardia, and sudden lapses of unconsciousness. The episode resolved after about 20 minutes, with no sequels. Lidocaine injection dose was below the toxicity limit, being unlikely that the case resulted from lidocaine toxicity.

These severe complications happened over 20 years and more than 12,000 sclerotherapy sessions, meaning that they are extremely unlikely. However, they could be life-threatening if medical personnel do not respond urgently. In the previous events, we identified two common flaws of the team: in the first place, lack of a complete medical history, knowing their comorbidities, and emotional factors that could alter their stress response prevented us from treating the patient integrally. Additionally, in some instances, shortage of time can reduce the quality of the procedure, risking patients.



Slow Down, You Move Too Fast

During residency, being slick in the operating room is associated with comments that you probably are a superior surgeon. But that line of thinking got me into a heap of trouble.

Five years into my practice and things were going well. There were lots of interesting cases and more importantly, my results were also very good. Office work consisted of seeing more patients but invariably there were many vein patients. Years before I would realize that medical students know nothing about varicose veins let alone varicose vein treatment, I was saddled with all these vein patients. The problem was I didn't appreciate what our treatments could do and failed to achieve.

My patient was 42, and had a DVT in her left leg following pregnancy 21 years earlier. At the time she received the standard care of oral blood thinners for three months. But, now she had prominent painful varicose veins on her calf and some swelling. Thinking that it was probably not necessary to recommend surgery I suggested sclerotherapy to treat her varicose veins. Her DVT 21 years ago in the same leg gave me momentary pause but I quickly dismissed it as it happened so long ago.

The procedure was quickly done in my office and I sent her home with the leg fully bandaged. But, instead of coming back in four weeks, she was back in two, complaining of intense pain and swelling in the same leg. When the bandage was removed, her varicose veins were clotted but her leg was swollen and mildly blue. Now fearing that I should have listened to my inner voice, I quickly arranged an ultrasound and to my horror, it proved she had a new DVT in the same leg. My heart sank.

Off to the emergency room she went to get her heparin shot. Not surprisingly she was unhappy and after completing her second course of blood thinners, I received a complaint of negligence from her lawyer. Even though I had been prepped, the Discovery process was gruelling but fortunately no further steps were enacted as she dropped the lawsuit.

Instead of rejoicing, I took time to study everything about varicose veins as my behavior had been so flippantly awful. My approach to varicose vein treatment underwent a complete turnaround. The history was now more focussed especially on any prior clotting problem in either leg, investigations included routine ultrasound for every vein patient I considered treating and a thorough discussion about the procedure, risks, and benefits of treatment explained to every patient. From then on, I have never seen another patient who had a DVT following sclerotherapy but I have also never offered sclerotherapy to any patient with a past history of DVT not matter how remote.

You need to have the living daylights scared out of you to produce a beneficial change in attitude. I tell this story often to my students and residents whenever I see them moving too fast.



We Rescued a Patient

The current patient is a 47-year-old female with a history of venous insufficiency and painful right leg varicose veins. She has a history of hypertension, obesity, GERD, obstructive sleep apnea, and has a 6- pack year history of smoking. She presented with painful right lower extremity varicose veins with associated itching and ankle swelling (see preop imaging, Figure 1).

On vascular laboratory testing, she had significant great saphenous vein (GSV) reflux with valve closure times prolonged for the entire length of the right GSV and proximal right small saphenous vein. Her GSV was dilated to 1.67cm at the groin. She also had isolated deep venous insufficiency with prolonged valve closure times at the common femoral vein and popliteal vein.

She initially was placed into a good vein health program of surgical compression, exercise and intermittent leg elevation and although she noted some mild improvement, she felt that her varicosities remained painful and wished to have some more definitive treatment. She was taken to the operating room where she had a right lower extremity great saphenous vein ablation with radiofrequency ablation and Powered (Trivextm) Phlebectomies/ Stab Phlebectomies; Ligation of GSV and removal of dilated GSV; ligation of large perforator feeding the varicose veins in the low calf. As her Caprini score was 8, she was given an anticoagulant at prophylactic dose for one week (per our standard protocol).

Postoperatively, she did well for the first week but then approximately on postoperative day 13, she returned with cellulitis and purulent drainage from her medial calf, and she was taken back to the operating room where she underwent incision and drainage (I/D) of what appeared to be an infected hematoma (see Figure 2). The wound grew out klebsiella and she was treated with a wound vac and antibiotics.



FIGURE 1 PRE-OP



FIGURE 2 AFTER I/D



We Rescued a Patient

Over a 3-month period, note the healing of the wound from a deep cavity to a wound now closed by secondary intention (see Figures 3, 4, 5). The patient is doing very well at the present time. Our infection rate over the past 6 years is 0.64%, so this type of outcome is very uncommon.







FIGURE 3 5 WEEKS AFTER

FIGURE 4 9 WEEKS AFTER I/D

FIGURE 5 13 WEEKS AFTER I/D

However, we were able to rescue the current patient with timely operative intervention and then complete and persistent wound care, with a wound vac and then transitioned to moist wet to wet dressings, along with surgical compression.



Hard HIT

The patient was a 26-year-old female with a medical history of obesity and polycystic ovarian syndrome on oral contraceptives. She presented with a 3-day history of left leg swelling and pain with radiation towards her back. She also reported more recent fatigue and shortness of breath.

She was found to have thrombosis of the inferior vena cava up to the renal veins. There was also thrombosis of all named veins of the left lower extremity from the common iliac vein to the tibial veins. While her swelling was severe, no phlegmasia was present. On the right there was outflow obstruction due to IVC thrombosis but no further clots. She also presented bilateral pulmonary embolism without right heart strain but with multiple pulmonary infarcts. Heparin was used as an anticoagulant.

Percutaneous aspiration thrombectomy of the IVC, left iliofemoral segment, and veins of the left lower extremity, down to the proximal tibial veins was performed. May Thurner syndrome was identified and stenting of the infrarenal IVC and left iliofemoral segment was undertaken. During the procedure, and in spite of adequate anticoagulation, thrombus developed within the right iliofemoral segment, requiring aspiration thrombectomy as well as iliofemoral stenting. There was also a limited amount of recurrent thrombus development along the left iliofemoral segment after stenting, which was successfully resolved.

The day of surgery her platelet level was 380k/uL. On post-operative day 3 platelets plummeted to 30k/uL. Despite prompt transition from Heparin to Argatroban they dropped further to 10k/uL that very same day, reaching a nadir of 3k/uL on post-operative day 5. Recovery in platelet count above 100k/uL was achieved on post-operative day 16, after multiple doses of intravenous immunoglobulin.

Through this process the patient endured a significant decline in her overall status, re-thrombosis of her bilateral iliofemoral segments and IVC, acute renal failure and consumptive coagulopathy with acute blood loss anemia.

On post-operative day 11, as platelets were slowly on the rise, she developed extensive cyanotic discoloration and pain over the left breast and shoulder area, with a similar, but smaller region over the right chest. Both areas ultimately evolved into full thickness skin necrosis, ultimately requiring multiple debridement sessions, flap advancements and skin grafting for coverage. Following a very prolonged hospital course, further complicated by bacteremia and the psychologic impact of all that happened, she was transferred to a rehabilitation facility nearly four months after her initial presentation.



Hard HIT

While these events were interpreted at the time as a fairly classical presentation of severe heparin induced thrombocytopenia starting on post-operative day 3; the unusually severe extent of her venous thrombosis on presentation, progression to pulmonary infarction and intraoperative thrombosis beg the question of her coagulopathy starting earlier in her course.



While the severity of this case is unparalleled in my experience, it is not the first instance of unexplained IVC thrombosis with pulmonary embolism I have seen progress onto HIT and venous rethrombosis. Going forward, when faced with this scenario I will consider early heparin-PF4 antibody testing and the early use of Argatroban instead of Heparin, even if platelet levels are still normal. I can only wonder if this approach may have produced a better outcome for this unfortunate patient.





Inari Does More Than Remove Thrombus

Just when you thought you knew everything about Inari Medical, they have now added something special: Champion level support for the AVF Foundation's Healthy Veins for Healthy Life initiative in the amount of \$50,000.

From Inari's Chief Medical Officer, Dr. Thomas Tu: "Inari Medical is pleased to be partnering with the American Venous Forum as a Champion supporter of the Healthy Veins Initiative. We look forward to working together to advance our shared goals of increasing education and awareness of venous disease, and supporting cutting-edge research and clinical innovation to better serve venous patients."

"The American Venous Forum Foundation greatly appreciates this extremely generous grant to assist the Foundation in its role of supporting the American Venous Forum and promotion of the Healthy Veins initiative which provides many benefits and opportunities for our patients and members. We look forward to partnering with Inari for many years to come to improve the quality of life in our patients with venous disease." – Dr. Harold Welch, President of the American Venous Forum Foundation.

AVF President Dr. Antonios Gasparis adds, "This generous addition will help us continue our goal as the leader in the science of veins and improving patient outcomes."

The American Venous Forum Foundation (AVFF) was founded to promote venous and lymphatic health by raising funds for the AVF. Our mission is to inspire Healthy Veins for Healthy Life by focusing on four key pillars:

- Increasing education and awareness of venous disease among healthcare professionals.
- Supporting cutting-edge research and clinical innovation in venous and lymphatic disease that will advance patient care.
- Promoting evidence-based best practices to ensure patients have access to the highest quality care.
- Educating those who are unaware of venous and lymphatic disease, increase access to care for the underserved, and reduce DVT in high-risk patients.

Thank you again, INARI MEDICAL, for helping the AVF and AVF Foundation as we pursue these goals on behalf of physicians and their patients.











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