So venous disease really represents a full spectrum. Many people have seen on themselves or their wives, husbands, parents these small spider veins, this really represents the most mild form of them. This is a pretty dramatic pictures of varicose veins but really does show how severe this can be. We see edema and then the worst, and what I want to focus on toward the end of this talk is on ulceration. We’ll talk about the epidemiology, pathophysiology, the diagnostic evaluation, treatment and how we can get a large ulcer to heal.

So varicose veins it’s estimated at about 5% of our population actually has an issue with varicose veins. This encompasses more than 12 million individuals, most of which don’t even realize that they have severe disease. And about 40% of women over age 40 have abnormal veins, I’m sorry over age 50. You can see by this picture they have varicose veins which are visible, there is an early ulceration and clearly edema throughout the whole leg. So this is definitely hereditary or the mom factor as we call it. Female gender the progesterone/estrogen balance as it changes throughout a woman’s lifetime can lead to varicose veins, history of pregnancy, obesity and prolonged sitting and standing. A lot of people come to us with – that are nurses that are standing long periods of time, this can absolutely have an effect on it.

So just a bit about the venous anatomy. What we focus on is obviously the two systems, the deep system which as everybody knows is really pivotal to the leg, but also what we focus on more in our vein practice at this point is the superficial system, or the axial system which is composed of the great saphenous and the small saphenous veins. Also an important component of this are the perforators or the connections between the superficial and deep system. For a long time we treated
just the saphenous veins and we missed this perforators not understanding the pathophysiology and how they can really lead to ulcerations. So vein reflux as we call it in the vascular world is really the root of all evil. This is a picture of a normal vein and clearly when you have normal veins this is what your legs look like. Unfortunately most people that come to our office this is what they suffer from, and this is essentially just from refluxing veins with vein walls that don’t coapt appropriately.

Spider veins, they are very common, a lot of insurance companies don’t believe this but we have seen a fair number of patients that have symptoms from this, they can point to an area that over the course of the day become symptomatic, aching, burning, itching and they can be present in sites of past trauma, so a lot of patients come to us and say it’s only my left leg, and interestingly enough I was kicked by a mule or a car or something like that back in the day. And a lot of times we do see that. And it also more importantly may be the signs of underlying disease.

With varicose veins we see the heavy aching legs, always worse toward the end of the day. There are a lot of people that say to me I have restless legs at night and it drives my husband or wife crazy. In the presence of varicose veins once these are properly treated a lot of these symptoms do go away, swelling, tenderness over the varicosities, itching, easy bruising and importantly bleeding.

Lipodermatosclerosis is essentially a inflammation of the subcutaneous fat, and this is a chronic process, this is the next step in severity after the kind of symptomatic varicose veins. It’s represented with skin induration, increased pigmentation, swelling and redness as we’ve seen a lot of patients come in with that thick brawny skin, this is one of the signs of severe venous disease. And
then finally ulceration. Essentially the most simple way of thinking about this is with enough swelling eventually there is a tear in the epithelium and without reducing the amount of swelling it’s next to impossible to get this to heal. This is some pictures of patients we’ve seen in our clinic.

So the evaluation and classification, importantly every patient obviously gets a physical exam. We use what’s called the CEAP classification, we then go into a history and it’s important, we can’t fix somebody’s symptoms if their symptoms are not from their veins. So it’s always important to ferret out exactly what these symptoms are and we can then figure out are these from the veins and really establishing a upfront, an idea that we can help them or we cannot help them is imperative to getting good patient care. And then we undergo testing. This is reflux testing with an ultrasound and we are looking also too at the perforators that we missed.

So classically the CEAP classification it can be very confusing, for a long time we would get people that would say you know I’m a C3a,Ep,As,Pr and for people outside of the few vascular surgeons that find this interesting that really became prohibitively difficult to understand. So what we essentially do now is focus on just the C, which is the clinical signs. We look, we class this basically with 0 as no visible venous disease, no palpable signs, with 1 as small spider veins or reticular veins, 2 is the varicose veins. So someone comes to us and says I’m a C2 in our mind that tells us a lot about what disease they have. 3 is when they start getting edema, 4 is when they get the skin changes and this is the lipodermatosclerosis or the skin staining. 5 is anybody that’s had an ulcer that has healed in conjunction with skin changes is a 5, so my goal, our goal as a vascular surgeon is
somebody that comes to us as a 6 with an ulcer, we want to get them to a 5. So that’s kind of the, the paradigm of how we can identify these patients with a simple, with a consistent verbiage.

Everybody gets a duplex that comes in our office. I mean if you deliver pizza at our office you get a duplex. This is done with the patient standing and essentially what we do is we are looking for reflux and we are looking for size of these veins. It’s covered by insurance and it’s very well tolerated and fast.

Normal valve function, as we all know blood flows in one direction, when you stop the flow by either stop moving or lay down the calf veins close and it stops blood. When we have – when we essentially have abnormal flow what happens is you squeeze the calf, blood flows in one direction and then flows backwards and we can test that. In this situation and we will see here is this picture right here shows us the blood flow in the wrong direction, and that’s measured in a length of time. You can see up here that’s measured right three, 4 seconds. So that’s a pathologic number, so anything really over a half second to a second we consider to be severe disease.

We also record the size of the vein, which is important. And then aggressive identification of these, of any refluxing perforating veins is important. So we look at the anterior accessory, the small saphenous, the great saphenous, importantly a duplicated saphenous which is not that uncommon but someone can have a one component saphenous and the other, the duplicated system is causing a problem. We also have, we look for perforators and then we look for the deep veins. Just a quick word about deep vein thrombosis, it’s after a patient is treated with Heparin or however we treat the
DVT the issue is there is damage to the deep vein themselves, and even after the clot recanalizes there is still an issue with the deep veins, meaning that they valves never recover. They essentially become ineffective and people can get reflux within the deep system, this cause postthrombotic syndrome that so many of us have seen. This is an incredibly morbid and difficult thing to take care of.

So again one of the things that we have now offered and our new guidelines talks about people with ileofemoral DVTs getting rid of that, so that’s one of the things that we see. A young patient with a big huge DVT, one of the things that we can do is actually be very aggressive and lyse this, in doing that we improve the chances that they will not get this, this postthrombotic syndrome. You can see, this is just a picture, this is a large clot and once we get done with it you can see the clear flow channel here. And then we manage this mostly with compression stockings and I’ll tell you a bit more about that later. So ultrasound findings does it explain the patient’s symptoms and does this also explain what we see on physical exam?

So the question is how do we get from these legs to these legs? And everybody that leaves our clinic looks just like this. So compression stockings were really the mainstay for quite a long time. They always came, they all looked exactly the same. The nice thing in today’s world is you can get it all sizes and shapes. The key is if you like green, I had a woman come in my office with leopard skin, you can get whatever you want. And the nice thing about it is if they are comfortable or more importantly if the patient thinks they look nice they are a little more compliant. We now offer chemical ablation with sclerotherapy and then I’ll talk a bit about the heat ablation which we offer
many patients. You can’t forget stripping, stripping still has a place in our practice today but it’s used much less frequently.

So spider veins, a patient with spider veins comes to us we typically once we rule out the fact that there is not a deeper vein issue, we can then treat these with a chemical ablation using something called Polidocanol which has been used in Europe for a long time and actually was FDA approved here I believe in 2010. Our success again on these veins is often predicated on treating anything underlying, so if there is a small deeper vein and this is the failure that we see of a lot of patients that come in, they say I was injected, it just didn’t work. The truth is a lot of times we just didn’t treat the underlying problem appropriately.

So Polidocanol as we talked about approved in 2010, we ran on the model that we left the Europeans use it and if not a lot of people died over there then we’ll bring it over here. It’s less likely to ulcerate, it’s more effective than saline and people say it hurts a little bit less than saline. It can be used in a solution or foam format and a form format when we use foam it actually sticks to larger – the endothelium in the large veins so it’s actually used more commonly for veins that are slightly larger than these spider veins. And then patients wear compression stockings.

Symptomatic varicose veins are any superficial perforating vein with reflux causing symptoms. It’s been shown to aid with symptoms that they have, edema, heaviness and pain. Important to note that edema is the one thing that’s more difficult to treat. So it’s having an open conversation with patients about this is incredibly important that they know all of their swelling may not improve. But
it also helped, more importantly, to prevent the progression to the next step, to that staining and ulceration.

So in our current practice any patient with large refluxing varicose vein walks in they get treated in 1 of 3 ways; Number one Foam Ablations, number two Stripping again much more rare and what we do most commonly in our practice is the thermal or the heated treatments. Just a note about the ultrasound guided sclerotherapy when we inject foam into a patient, if foam is essentially 1cc of Polidocanol and 4ccs of air, it’s mixed back and forth between 2 syringes and this creates a relatively uniform sized bubble. These bubbles then can stick to the endothelium on the inside of on the inside of the venous wall. The issue is some people, I was asked the question last night, you’re injecting 4ccs of air into a patient, how does that work? It’s actually relatively well powered, there have been instances of not only TIAs but myocardial infarctions and the most severe in my world is a stroke. Very, very rare but if people’s PFOs especially, some people in our practice will do an echo prior to injecting foam, and I think that’s a very safe, and very smart way of dealing with this.

Just a quick picture, so this is superficial varicosity with perforator, you can see here the needle tip is the small white dot in the center. When we inject foam it reflects the echo wave which is why it looks white here and there’s shadowing behind it and we can fill that entire area. You see here it’s called the spasm of the vein as well as allowing the foam to just continue to work on that locally.

Heat Ablation. So heat ablation has become a mainstay it’s really supplanted the stripping that we used to do in so many patients. After 5 years is less than a 10% recurrence rate and this is actually
compared to about a 40% recurrence rate after stripping in some series. It’s usually performed as an office procedure, it’s done under local anesthesia, most patients-I actually prefer if a patient brings their husband or wife into their procedure room with them, I find it helps some of these patients and I avoid giving them any sort of valium things like that, because I’ve seen patients that to great with Valium and then as we’ve all known, you have the patient that has the opposite effect. And nothing can strum up business like a woman screaming in your room, so we try to avoid that if we can. The procedure lasts from start to finish about 30-60 minutes and they really can resume activity that day.

So this is just a quick how we do it. So this is us, and this is a small saphenous she’s laying on her stomach here, we access the vein after a small wheel of Lidocaine we access the vein under ultrasound guidance. You can actually see the tip of the needle right, it’s a little difficult to see, right in there. A wire is then placed in and this wire serves as a placeholder within the vein itself. Once we do that, we put a sheath in and you can see we always celebrate with thumbs up, I think it’s important for everybody to be on the same page. So once we put the sheath in this is our placeholder within the vein itself. The catheter is then put and fed all the way up in this situation it goes to the saphenopopliteal junction, if we’re doing the great saphenous we go up to the saphenofemoral junction and we place the catheter within about 2 centimeters from the saphenofemoral junction or saphenopopliteal. The reason is there is a heat, the heating element can advance clot distally and we don’t, we want to make sure that we stay away from the deep system for that reason.

Once this happens, once we’re done with this you see all this black here, this is actually tumescent solution which is really for the most part it acts as a heat sink but more importantly there’s Lidocaine
in it, so when we turn on either the laser or the RFA there’s no collateral damage or minimal collateral damage from the heating element. The catheter is then turned on and this is pulled back, an RFA is pulled back in a series of really 20 seconds segments, the EVLT is pulled back very slowly, the laser, both of which are equally as effective. The leg is then bandaged and the patient can return to normal activity that day.

Looking at a recent meta-analysis of ablation, the most important thing in my mind, DVTs, so you see it’s very rare and then the other thing, one of the things the patients come back and complain most about is the persistent numbness and this is because where the saphenous nerve lies or the sural nerve, is very near to the small saphenous or great saphenous. If we were to not use enough tumescent or you go too low where the vein and the nerve run together you can actually have persistent numbness.

Again just a word about perforators, this is incredibly important for identification in patients that have ulcers, treatment of this, of the ulcer a lot of times keeping it healed is paramount and we have to treat the underlying perforator first. So you can do this in many ways. We’ve done sclerotherapy, in our practice we are recently using a lot more heat ablation and I think the key to this is going to be the heat ablation, I think it’s – these are short segments and relatively high flow. What happens when we inject foam into them? It washes out very, very quickly. The heat ablation is much more directed, we are able to actually cause a burn right where we want it and it’s much more controlled.
So most of these treatments are paid by insurance, especially anybody with an ulcer, every – as everybody knows the system, the healthcare system in Pittsburgh there is a number of different insurance companies all of which need different things. So we are able to do this in our office, we kind of ferret out all these things but most of the time unless it’s spider veins that patients just don’t like the way they look, most of the time these are treated or paid by insurance. Symptomatic reflux and the saphenous veins are almost always covered, injections it’s variable and again surgery is still an option but less comfortable and less effective.

So just a word about venous ulcerations or the C6s. A lot of patients come to the primary care physician, medical doctor and they have an ulcer; the question is what’s the etiology of this ulcer? Would Care Centers actually see 41% of what they see is venostasis ulcers, 27% diabetic neuropathy, 13 ischemic. Most of the patients that land in our office the assumption is it’s an ischemic ulcer whereas just looking at the numbers here we do see almost three times the number of venostasis ulcers than ischemic ulcers. We do see pressure ulcers, thermatologic diseases, but again focusing on that 41%. And I would argue if we can get to the patients with bad veins earlier we can decrease this number. So not only is it a therapeutic approach but it’s also a preventative approach.

So this boggled my mind that with the baby boomer generation surging through our population that 1% of the elderly patients are going to be getting a venous ulceration, 1%. I mean that’s a huge number. 50% of these ulcers may not close at one year, and I think it kind of goes without saying that larger, deeper ulcers are more difficult to heal. What we do is we want to treat the cause of it, and again this is essentially skin tearing. Until you get rid of the edema this doesn’t improve. So the
– it’s paramount that we compress all these patients. There is death of these cells and this leads to the ulceration and there is relative ischemia in this location. This is really the whole pathophysiology of the ulceration itself. We want to find out the history, what ointments, what compressions, you know people come to us and they say you know I sprinkled eye of newt or whatever on it, and it’s amazing what people do try out there. We want to know what their venous surgical history is, what their ultrasound looks like, do they have reflux, is there a proximal obstruction and then we want to look at the wound. Is it infected? How much nonviable tissue is on it and where is it? This tells us kind of the location will kind of lead us to what veins are the cause, or if it’s a vein problem at all.

The anatomic criteria, again we want to correct anything that’s wrong. So if there is big superficial veins that are refluxing or perforators we want to treat those. We want to débride any infector to vitalized tissue and I can’t say it enough, compression is important. So this is really the cornerstone of any patient that comes in. These ulcers don’t heal unless they are compressed. Classically the Unna’s Boot was used for nonelastic compression. We have a whole cadre of different things that have come along, importantly manufacturers realize that you have this many patients with ulcers and all you’d have to do is come up with a good compressive stocking, now we’ve come up with a whole bunch of them. So the number of things, of treatment options that we have is huge.

So ace wraps work, but they don’t work – they work very well in a nonambulatory patient, but it needs to be changed often, more importantly as the leg starts to shrink from the compression they should be rewrapped tighter. And we don’t like to compress anybody that has peripheral vascular
disease. So this is one of those things, it’s why it’s important that they come to our office for a full evaluation.

So deep venous reflux again this is something that has come to a lot of our literature over the past 10 to 15 years but it’s far less likely the reason that people come with bad veins, but this picture is actually a venogram and what you are seeing here is it’s a syndrome called May-Thurner and essentially what it is it’s the vein being compressed, the iliac vein being compressed by the overlying artery. The treatment for this, it was unrecognized for quite some time and it’s interesting blood should flow briskly up this way, what you see is these big collaterals crossing to the other side through the pelvis and then draining the contralateral leg. This was unrecognized for some time. There has been a lot of literature over the past 10 to 15 years showing how well patients do, even young patients with a stent in this location. Putting a stent here opens up that vein and actually will improve symptoms below it.

We have a number of different ways of treating things like big clots, this is actually called a trellis device, there is two balloons, one is inflated distally, one is inflated proximally, I should say the other one, and then in between this we inject TPA and there is a little metal element that whips around and actually grinds up the clot. Young patients, patients with a good life expectancy that have had clot less than really 2 weeks they do really well with this, and in fact we can avoid a lot of the symptoms down the line just by getting them early. So again benefits include increased ulcer healing, decreased leg swelling, decreased pain.
So in summary, venous ulcers are treated with compression, but more importantly we also have to correct the underlying cause. The deep veins we have to look at, the saphenous veins, perforators and we have to be aggressive. We have to make sure that there is nothing on that wound bed that is going to prohibit healing. There is a bunch of different wound substrates we can use, Graftskin, Apilgraf, skin grafting for certain patients although this is once you get good compression and treat the actual reflux they do get better. So in summary vein problems are very, very common and there are a bunch of new strategies that we use in the treatment centers around the country but more importantly here at Shadyside Hospital.

Thank you very much.