

## WHAT'S INSIDE?

New Treatment  
Options for Patients  
with Deep Venous  
Thrombosis

Case Study:  
19 year old Female  
with Acute DVT

New IR Physicians:  
S. Douglas Brown, MD  
Mark S. Asay, MD

DVT Management  
Strategy

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## New Treatment Option for Patients with Deep Venous Thrombosis

Combination drug-device techniques rapidly restore venous blood flow providing symptom relief and a lower risk of long-term vein damage associated with DVT

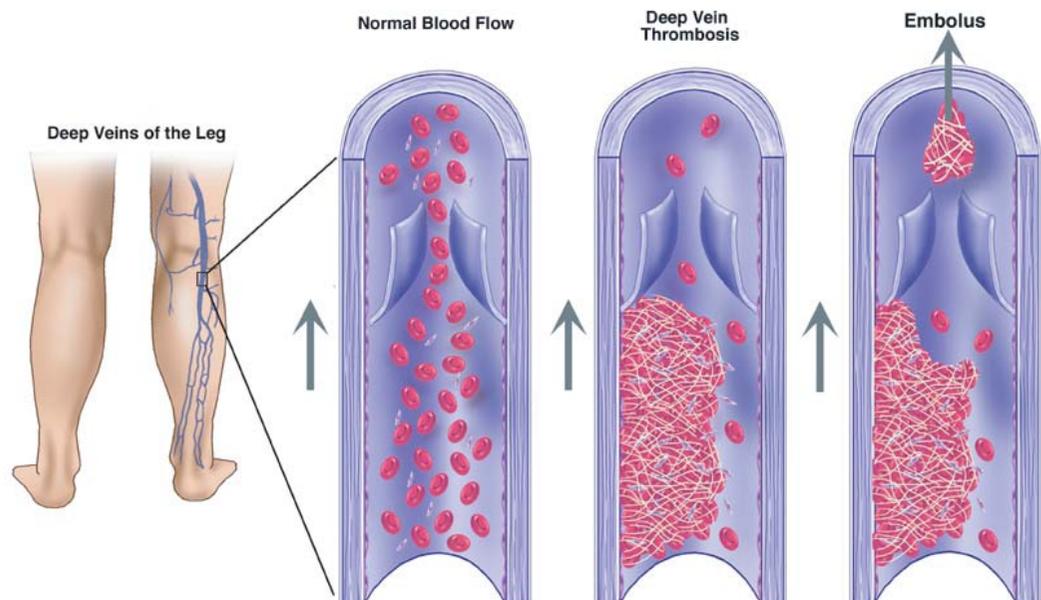
Venous Thromboembolic disease remains a serious and prevalent problem in the United States with 800,000 cases of Deep Vein Thrombosis (DVT) and 60,000 patients dying of pulmonary embolism annually. Traditional DVT therapy effectively reduces the risk of embolic complications. Unfortunately, the long-term morbidity associated with the development of Post-thrombotic Syndrome (PTS) remains costly, painful, and disabling. New, non-surgical DVT procedures that combine clot busting drugs and devices rapidly restores venous patency with less risk, less medication and less cost.

DVT occurs in the deep veins of the leg or hip. The primary treatment is anticoagulation therapy using a combination of heparin and warfarin.

The rationale for anticoagulation is to prevent thrombus propagation, decrease the risk of recurrent DVT, and prevent pulmonary emboli. Contrary to popular belief, heparin and warfarin do not dissolve thrombus. Rather, thrombus dissolution and restoration of blood flow is left to the body's natural processes. Unfortunately, veins have limited capacity to break down thrombus. For patients with extensive DVT above the knee and into the thigh, anticoagulation therapy will oftentimes not remove the offending thrombus, reduce limb swelling, or alleviate pain. Blood flow and vein function rarely return to their normal state and patients develop Post-Thrombotic Syndrome (PTS).

"Post-thrombotic syndrome is an under-recognized, but common sequela of extensive DVT" says Carl Black, MD, interventional radiologist. An estimated 50-80% of symptomatic DVT patients develop permanent obstruction and venous valve damage resulting in chronic leg pain, fatigue, swelling, and potentially ulceration. Clinical studies of thrombolysis techniques indicate that early removal of thrombus and restoration of blood flow maintains vein integrity, improves patient outcomes and reduces the incidence PTS.

### Deep Vein Thrombosis (DVT)



## ...New Treatment Cont.

“Thrombolysis offers the hope of a reduction in the number of patients who develop post-thrombotic syndrome.” says Black. “Patients with successful DVT thrombolysis oftentimes experience an immediate reduction in leg pain and swelling”.

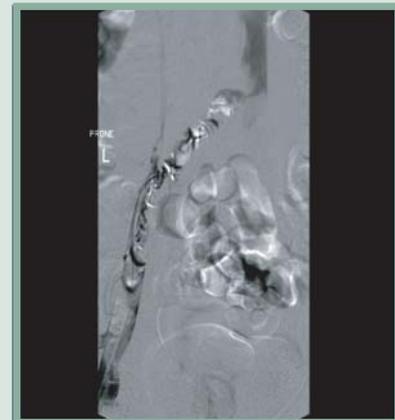
New technology has streamlined DVT thrombolytic therapy from several days in the ICU to oftentimes a single procedure. Historically, a prolonged infusion of a thrombolytic drug (ie. t-PA) has been the preferred method for DVT thrombolysis. This technique involves an infusion of 24-72 hours in the ICU. Despite the effectiveness of thrombolytic infusions; expense, patient discomfort, and perceived risk, this technique has been reserved for DVT patients that fail anticoagulation therapy or suffer phlegmasia cerulea dolens. Now, advanced pharmaco-mechanical techniques that combine thrombolytic infusion with mechanical energy are being offered in Interventional Radiology. Thrombolytic delivery is targeted, lower dose and shorter duration compared to a traditional thrombolytic infusion. Isolated thrombolysis with the TRELIS catheter is the most common pharmaco-mechanical technique (described below). These nonsurgical procedures are performed in a special procedures lab using imaging guidance and typically require a small incision behind the patient's knee. Procedure duration typically is 1-2 hours. Patients with extensive or more chronic venous disease may require additional use of a removable vena cava filter, angioplasty, stenting, or additional thrombolytic infusion.

It is important to note that pharmaco-mechanical thrombolysis is an adjunctive, not a substitute, to anticoagulation therapy. Optimal candidates are active patients who seek therapy within 14 days from the onset of DVT symptoms. The more acute, or “fresh,” the thrombus, the more effective the thrombus removal. Thrombus should be located above the knee or in the upper extremity. Patients with symptoms longer than 14 days may also be considered, but the composition of the thrombus changes and is less amenable to thrombolytic therapy. Vein patency may be monitored with a non-invasive ultrasound follow-up.

## Recent Case Study

### 19 YEAR OLD FEMALE WITH ACUTE ILIOFEMORAL DVT

**Patient:** 19 year-old female with acute, progressive lower extremity edema. She was otherwise healthy, but had recently started oral contraceptives. Venous duplex showed extensive left lower extremity deep venous thrombosis involving the femoral and common femoral veins. Despite systemic anticoagulation, her edema and lower extremity pain progressed. Interventional radiology was consulted for catheter-directed thrombolysis.



19 year old DVT patient. Baseline venogram shows complete iliofemoral thrombotic occlusion.

**Technique:** Diagnostic venography revealed extension of thrombus into the left common iliac vein to the level of the inferior vena cava. Following placement of a temporary IVC filter, isolated pharmaco-mechanical thrombolysis was initiated. Following complete clearance of thrombus, repeat venography demonstrated an underlying stenosis of the left common iliac vein (May-Thurner Syndrome), which was successfully stented. The patient was started on a six-month course of systemic anticoagulation.



Same patient with normal venous outflow post pharmo-mechanical thrombolysis.

**Outcome:** Lower extremity pain and edema quickly resolved. Venous duplex at five months post-procedure showed no residual thrombus or venous compromise. The patient remains asymptomatic.

## New Physicians join Utah Valley Interventional Associates

### S. Douglas Brown, MD



Dr. Stephen Douglas Brown loves medicine because he loves helping people.

Born in Inglewood, California, Dr. Doug Brown has long-time ties to Utah where he began his college studies at Brigham Young University.

After finishing an undergraduate degree in biochemistry, he enrolled at the University of Utah School of Medicine where he focused on a combined medical degree and doctorate program because of his interest in science and research. He quickly realized that he preferred interacting with people more than pursuing pure research, so he decided to devote himself to the clinical side of medicine. He obtained his medical degree, followed by an internship in transitional medicine at LDS Hospital in Salt Lake City. He then completed his residency in diagnostic radiology and a fellowship in interventional radiology at the prestigious Duke University Medical Center in North Carolina.

Dr. Brown is physically active and loves tennis and long-distance running. He has run in over ten marathons and no doubt will enter more. Dr. Brown also loves spending time with his wife and four children, ages four through fourteen.

Dr. Brown has been part of Utah Valley Interventional Associates for over a year and has enjoyed his time working with the group. He comes to Utah Valley from Washington, where he worked with the Seattle Radiologists at the Swedish Medical Center.

His expertise includes treatment of disorders of the arterial and venous circulation, acute stroke intervention, and carotid artery stenting. He also performs spine intervention for pain management, including treatment of vertebral body compression fractures. Recently, Dr. Brown has focused on the latest techniques of minimally invasive diagnosis and treatment of both vascular and nonvascular disease.

From A to Z, a list of clinical interests and special procedures performed by Dr. Brown includes: Abnormal Uterine Bleeding, Aneurysmal Arterial Disease, Angioplasty, Aortic Aneurysm, Aortic Stent Grafts, Arterial Disease, Arterial Insufficiency, Atherosclerosis, Biliary and Kidney Stents, Biopsy, Bleeding Internal, Brain Tumor/AVM Embolization, Carotid Artery Disease, Endovascular Aneurysm Therapy, Endovascular Surgery, Epidural Steroid Injection, Fibroids, Interventional Radiology, Minimally Invasive Procedures, Peg Tube Insertion, Radiofrequency Ablation, Stent.

### Mark S. Asay, MD



Dr. Mark S. Asay has been part of Utah Valley Interventional Associates since the fall of 2006 and finds the work very satisfying. Not only does he enjoy the high level of expert-

ise and wide range of the interventional radiology practice, he also enjoys the collegiality of the group.

Dr. Asay did not come to practicing radiology along a direct path. He grew up as the son of a large-animal veterinarian in Northern Wyoming. Receiving several academic scholarships, he pursued undergraduate work in the field of economics at Brigham Young University. His studies were interrupted for two years while he served an LDS mission in The Republic of China, resulting in his ability to speak, read, and write Mandarin Chinese. Graduating from BYU magna cum laude, Dr. Asay entered the BYU Graduate School of Management to pursue an MBA. With degrees in economics and business administration, Dr. Asay began his medical career. He obtained his M.D. from the School of Medicine at the University of Utah. He then completed a rotating internship at the Tucson Hospitals Medical Education Program. This was followed by a residency in diagnostic radiology and a fellowship in vascular and interventional radiology at the University of Arizona Health Sciences Center.

After ten years of practice with the Rocky Mountain Medical Imaging in Longmont, Colorado, Dr. Asay has come to Utah Valley Interventional Associates with much experience. He also continues as a clinical instructor at the University of Arizona Health Sciences Center.

His research work during his schooling also adds depth to his knowledge base. In medical school, Dr. Asay received a Dean's Student Research Fellowship to study the three-dimensional determination of lung water distribution using an MRI. He later authored two papers in conjunction with

others in the Department of Ophthalmology: "Squamous Cell Carinoma of the Lacrimal Gland and "Evaluations of Small Incision Intraocular Lenses in a Rabbit Model." Within the field of radiology, he co-authored "Intraoperative Angiography with Balloon Occlusion in Cerebral Aneurysm Repair" and "Indications and Benefits of Angiography and Embolization in Acute Pelvic Trauma." During his residency and fellowship years, he worked as an urgent care physician at the Thomas-Davis Medical Centers, GHMA Medical Centers, and St. Joseph's Hospital in Tucson, Arizona. He also provided diagnostic radiology coverage for the Holy Cross Hospital in Nogales, Arizona, and for Tucson General Hospital.

Dr. Asay and his wife, Kristin, have four children: two sons, Spencer and Cameron, ages 11 and 7 years, bookended by two daughters, Madison age 13 and Ellie age 1. Dr. Asay says, "I enjoy spending time with my family and doing a little bit of just about everything." That includes enjoying the outdoors, the mountains, skiing, fishing, comedy, and reading. And it is not surprising, that as a longtime Colorado resident, he is an avid Denver Broncos fan. "I even enjoy work," he adds, "especially interventional radiology."

Dr. Asay is certified by the American Board of Radiology. He also completed a Certificate of Added Qualification in interventional radiology.

### Utah Valley Interventional Associates

Utah Valley Interventional Associates combine state-of-the-art, minimally invasive technology and expertise with compassion to provide exceptional patient care. Our board certified interventional specialists have trained at the nations' leading institutions. We provide comprehensive minimally invasive treatment options in vascular and non-vascular disease. Interventional treatments include endovascular management of abdominal aortic aneurysms, peripheral arterial angioplasty and stenting, venous thrombolysis for deep venous thrombosis, comprehensive treatment of superficial venous reflux disease, catheter-based stroke intervention, carotid artery stenting, cement augmentation of symptomatic acute and subacute vertebral compression fractures, uterine fibroid embolization, treatment of pelvic venous congestion syndrome, varicocele embolization, image-guided biopsies, central venous access, and regional cancer therapy. We can be reached at 801 357 8776, day or night, for consultation.

# Acute DVT Management Strategy

Evaluate for Hypercoagulable Risk Factors

Risk/Benefit Assessment: Anticoagulation vs. Pharmacomechanical Thrombolysis (PMT)



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