

Latest Computer Assisted Vacuum Thrombectomy Designed to Enhance Efficiency and Blood Loss Reduction

Vascular Disease Management spoke with vascular surgeon Marc Salhanick, MD, from Complex Vascular in Dallas, Texas, about treating pulmonary embolism (PE) with the Penumbra Lightning Flash® 2.0 computer assisted vacuum thrombectomy (CAVT™) system and how his practice has evolved.

For a patient receiving endovascular treatment for PE, what is your primary objective for a PE case?

That is a hotly debated topic right now. As proceduralists, we're all struggling to concretely define what our endpoints are going to be. I think most clinicians would agree that you want to see a drop in pulmonary artery pressure and a drop in heart rate.

If the patient can communicate with you and is literally able to tell you, "I can breathe better now," this is an objective means of providing endpoints. But for patients with intermediate high-risk PE, it's hard to determine your endpoint because they'll come in and have a pulmonary artery (PA) pressure that's not particularly high, you might only see a drop of maybe 5 or 10 mm Hg, but you can angiographically identify that you've fully cleared the PA.

The clinical endpoint is what we're striving for because we can objectively say that we have taken a patient who has acute right heart failure because of outflow obstruction and relieved that.

Is blood loss really a concern when treating PE?

Blood loss is a concern for any procedure, open or endovascular. I'm a vascular surgeon by training and was trained initially to do open surgical thrombectomy, which comes with an inherent blood loss. Moving to current endovascular thrombectomy options, the question is now how do we decrease the amount of blood loss while achieving an optimal procedural outcome.

There's been a new wave of returning unwashed blood to the body, especially post-thrombectomy. What are your thoughts on autotransfusion?

In medical school, we were routinely performing autotransfusions of unwashed pleural blood to trauma patients and we wanted to figure out what exactly the composition of that blood was. What we found was that unwashed blood was not qualitatively similar to circulating blood. Our further work



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identified actual microparticles in that autologously collected blood that had an effect of creating massive activation of the coagulation cascade while also inhibiting platelet function.

That leads to the question that you asked regarding concerns around blood loss during PE. Some would say they want to give unwashed blood back so the patient has "less blood loss." However, this practice isn't a simple arithmetic equation. Once that blood has been removed from the body, we don't know the oxygen-carrying capacity or its ability to function as a viable blood product. My research indicates this unwashed blood likely is not a viable blood product and only increases the risk of inflammatory cytokines and hypercoagulable microparticles.

Recent single-center experiences have not really seen any clinically meaningful difference in post-procedural hemoglobin for patients that were treated with autotransfusion devices versus the patients that were not. We need to reframe and focus on options that decrease intraprocedural blood loss by helping the proceduralist operate faster.

In your practice, what is your current go-to PE thrombectomy device and what does your decision-making process look like?

CAVT has been a valuable addition to my practice. The introduction of Penumbra's Lightning Flash 2.0 has allowed me quick and efficient clearing of a large volume of thrombus with ineffectual blood loss that you might see with non-computer assisted devices. The computer microchip senses the pressures and flow within the vessel and can tell if the catheter is engaged in thrombus or in patent flow. The device's ability to give that feedback has really helped me be able to effectively thrombectomize without the concern of removing large volumes of blood.

From a profile perspective, the Flash catheter is an optimized 16Fr bore. The deformation of the heart can be very severe in the use of large-bore devices and that likely has some hemodynamic consequences on the patient. Being able to deliver a catheter that can aspirate effectively without having that impact on cardiovascular anatomy is tantamount to the ability to return blood that may be compromised.

As innovation advances, I hope we will continue to see new technologies that will help improve the treatment of these conditions so that they are even more efficient and autotransfusion would be a distant memory.

Interview sponsored by Penumbra, Inc. Dr. Marc Salhanick is a consultant for Penumbra, Inc.

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