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INTERVIEW

Latest Advancements in Thrombectomy With Lightning Flash

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Vascular Disease Management spoke with vascular surgeon Patrick Muck, MD, from Primary TriHealth Heart Institute in Cincinnati, Ohio, about the latest advancements in mechanical thrombectomy and his use of the advanced mechanical thrombectomy system Lightning Flash™ (Penumbra) for pulmonary embolism (PE).

Can you talk about how large thrombus burden in the pulmonary arteries are generally treated? What are the outcomes like? About how many patients with PE do you typically treat in a year?

Large-volume pulmonary emboli, for decades, were treated with standard anticoagulation, unless patients were in dire straits where they received systemic thrombolysis via IV. In the last 10 to 20 years, numerous studies have looked at the benefits of systemic thrombolysis.

This evolved into catheter-directed thrombolysis, which then turned into ultrasound-assisted thrombolysis through catheters directly into the pulmonary arteries. Reduction in thrombus burden improved as we went from anticoagulation to catheter-directed thrombolysis. However, lytics have inherent complications, namely hemorrhagic complications, such as bleeding at the access site or spontaneous retroperitoneal bleeding or, in its most severe cases, intracranial hemorrhages.

In the last 5 to 8 years, devices that avoid thrombolysis altogether by employing mechanical thrombectomy have shown tremendous benefit to patients. As it relates to myself and the partners in my group, we cover 2 of the 3 biggest hospitals in Cincinnati, seeing between 800 to 900 PE patients a year. We intervene on about 15% of our PE patients, which is somewhere between 80 to 110 patients a year. We now do more mechanical thrombectomy than ever before; a decade ago, our definition of intervention meant ultrasound-assisted thrombolysis.

How has mechanical technology advanced over the past decade? How is Lightning Flash unique?

Mechanical thrombectomy has really come of age. When it started, it was aspiration thrombectomy; in layman's terms, vacuuming out the pulmonary emboli with a syringe. The next generation of that was “continuous aspiration” with a pump as a vacuum source.

In the last few years, when the Lightning technology came out, the field has changed dramatically. It has a unique computer-aided clot detection technology that can sense the difference between thrombus (high aspiration power is delivered) and patent flow (intermittent aspiration power is delivered) so it is designed to dramatically decrease the blood loss associated with the procedure. Now, since its launch in January 2023, Lightning Flash is even better, because its catheter has a more optimized profile for larger thrombus burden and has the most powerful aspiration on the market.

When the algorithm detects low flow, i.e. the catheter has an immense amount of thrombotic material, it will increase aspiration to clear out the system. When the algorithm detects higher flow, i.e. patent flow through the system, it kicks into “sampling” mode to intermittently aspirate and minimize potential blood loss.

What are the outcomes of patients using Lightning Flash? How are they doing after the procedure?

They're awesome. My patients get out of the ICU and the hospital a lot quicker. We’ve done 14 of them now for PE and venous thrombus. We've had 2 patients who were on an extracorporeal membrane oxygenator (ECMO), which means the right heart failed and you're supporting it with ECMO, that have come off it because the results have been so incredible.

Do you have any additional thoughts about the latest advancements in mechanical thrombectomy?

As somebody who's been using Penumbra since 2014, and watched the changes to technology, I think what's sometimes overlooked is the maneuverability of the new Lightning Flash. At the end of the day, it's a large tube, right? And it's just vacuuming out. Well, you still have to get from either your neck or your leg, through the right heart to the pulmonary arteries in your lungs. And the new Flash catheter is so much easier to direct and track out to where the thrombus is. In my opinion, it's way easier and better than anything that's been used before or that's even remotely out there.

When you put a stiff and oversized device through the heart into the pulmonary artery especially in people who are unstable, large bore devices can really alter the geography, and thereby the function, of the right heart. Five percent of patients coded during the procedure with other devices. But with Lightning Flash due to the optimized 16Fr size, you can leave a sheath out of the heart yet still track the catheter all the way to where the thrombus is. ■

Interview sponsored by Penumbra, Inc. Dr. Patrick Muck is a consultant for Penumbra, Inc.

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