Mapping the PE Patient Journey: Dr Suhail Dohad on STRIKE-PE, STORM-PE, and the Evolution of Mechanical Thrombectomy

As pulmonary embolism (PE) care continues to evolve, new data are shedding light not only on treatment effectiveness, but also on the patient journey from presentation through recovery. In this interview, interventional cardiologist Suhail Dohad, MD, from Cedars-Sinai Cardiology in Los Angeles, California, discusses insights from the STRIKE-PE and STORM-PE studies, highlighting how workflow, timing, and therapeutic choice impact outcomes. From real-world delays in care to advances in computer-assisted vacuum thrombectomy (CAVT) technologies such as Lightning Flash 3.0 (Penumbra), Dr. Dohad explores how emerging evidence is shaping a more standardized, data-driven approach to PE intervention that will improve recovery, quality of life, and long-term patient outcomes.

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Can you give us an overview of the STRIKE-PE study?

The STRIKE-PE study was initially imagined as a real-world study of patients who typically present with what we call an intermediate-risk or high-risk PE. Prior to STRIKE-PE, there was no formal study understanding what would happen to these patients as they came to the hospital and how long it would take them to be assigned to a certain therapy. Once they were assigned to the therapy, in this case CAVT, what were their immediate outcomes? How many patients went to the ICU? What was the length of stay? We also started measuring their clinical outcomes, which included not only a computed tomography scan and echocardiogram at 48 hours, but their quality-of-life (QoL) analysis and a 6-minute walk test before they left the hospital. We also assessed at 90 days and again at 1 year, because we wanted to follow longitudinally these patients in a very systematic way to figure out what happens to them in the short term and in the long term. We would like to hear from our patients and understand how they are recovering from the therapy they received and how much they benefited from it.

Initially, it was a trial with about 600 patients, then we further expanded globally adding additional sites in Europe and other countries like Australia and New Zealand and increased enrollment to 1500 patients. We are going to have an entire encyclopedia of data on these patients to truly understand that journey.

Why is this study important when it comes to PE intervention and care? How is large thrombus burden in the pulmonary arteries generally treated? What are the outcomes like?

Unfortunately, depending on where you go and where you initially get treated, the therapy assigned to you may be different. We don't have a systematic way of saying which patients get this therapy. Generally, we subscribe to all centers having some form of formal communication between the interventionalists and the non-interventionists taking care of this PE. A large thrombus burden doesn't initially qualify you to be treated beyond anticoagulation unless you have additional dysfunction of the right ventricle, and elevated biomarker (such as troponin, BNP, or lactate) or some other factor such as elevated heart rate or low blood pressure, or a requirement for a lot of oxygen. Once you have that comprehensive set of data, we decide which patients with a large thrombus burden will get intervened upon beyond routine standard of care therapy, which is almost always immediate anticoagulation.

What has the interim analysis found so far? What are the outcomes that will be presented at this year's SIR conference?

What we have found so far is that we know these patients present approximately 3 days after their symptoms begin. So, for 48 to 72 hours, they wait and then present to the hospital. Once they get evaluated, it still takes an additional day before they get their therapy assigned by their team. In this case, mechanical thrombectomy using CAVT. After that, the length of stay is about 5 days.

When we started doing this with the previous generation of Penumbra catheters, it took us about 37 minutes. But today, with the latest generation of the Lightning Flash 3.0 catheter, thrombectomy times have been dramatically reduced and are as low as 25 minutes at an average.

At SIR, we presented the 1-year data for the 595 patients, specifically evaluating if there was a difference in outcomes between males and females, which outlines in detail the QoL and functional outcome analysis for these patients at discharge, 90 days, and 1 year. There are a whole host of QoL and functional measures, which is basically what we call dyspnea score, or how they feel when they are at rest and if they have shortness of breath or not. Then we measure total 6-minute walk test, which is how many meters a patient can walk in 6 minutes on a predefined course. We

also measure QoL through a validated general QoL tool and PE-specific tool. There is something called a vascular analog score, which is a QoL rating between 1 and 100. Then we have EQ-5D-5L, which is 5 dimensions and 5 levels that patients rate their level of mobility, their self-care, their usual activities, their pain/discomfort, and their anxiety/depression. There are also what we call PE-specific QoL analyses, which help us understand what they have done from an activities standpoint and how much they recovered at 1 year relative to 30 days, at discharge, and at 90 days.

Then we factor in how they felt at the time of their PE event, then at 90 days and 1 year.

Can you talk about STORM-PE—how is that different from STRIKE-PE and what that study found?

STORM-PE is the first randomized clinical trial for intermediate-high-risk PE patients who were randomized 1:1 to either receive CAVT with anticoagulation or anticoagulation alone. We measured what we call the right-to-left ventricle (RV/LV) ratio, because that gave us a measure of how rapidly the right heart improved after treatment. That was our primary endpoint, but we had an incredible amount of good secondary endpoints that show that anticoagulation relative to mechanical thrombectomy results in a delayed response and recovery. Not only did the CAVT patients recover their heart rate, oxygen requirements, and reduce their risk of deterioration at 48 hours, this also translated to better functional outcomes at 90 days. When you look at the 6-minute walk test, the patients walk a lot longer distance if they were in the CAVT group vs anticoagulation alone. There were also additional patient-reported measures at 90 days that favored the CAVT group.

How do STRIKE-PE, STORM-PE, and other study findings support the role of CAVT in PE treatment?

We did STRIKE-PE to understand endpoints and the patient journey. STORM-PE now gives us randomized data to say that the efficacy of actually doing this is well supported. We are going to have multiple other clinical trials being presented in the next year that will hopefully reinforce the fact that intervening on these patients early, whether it be with catheter-directed thrombolysis or thrombectomy, will actually improve their outcomes. Ideally, they will feel better faster, and by 90 days or 1 year, more than 80% of these patients will have returned fully back to their usual life.

What is the difference between CAVT and other mechanical thrombectomy? What are some benefits you've noticed with CAVT? What is Lightning Flash 3.0?

There are many catheters or devices available for extraction of thrombus from the pulmonary artery tree. Some of them are manual aspiration devices. Some of them are agitated removal of clot devices. Some of them are just mechanical, like CAVT, which is a mechanical aspiration system. It is a very simple device based on a very well-engineered catheter, which is now 16F, that is introduced into the pulmonary artery tree in a very systematic way.

Then we introduce it into the major lobar branches, and the CAVT includes a pressure sensor that turns the valve on and off and that doesn't allow an incredible amount of blood loss, but it is sampling all the time to see if it is in contact with a clot or not. Only when it comes into contact with clot does the valve fully open and allow the full suction to remove the thrombus from the pulmonary arteries.

Now the latest version, which is the Lightning Flash 3.0, makes it even simpler.

What are the clinical implications of this data for physicians considering CAVT for their PE patients?

I think the learning curve is pretty short and the data are pretty solid. I think the safety profile of these devices is very good. In my opinion, there is a high likelihood that when this device is used, you can get a substantial amount of benefit with thrombus removed very quickly and with minimal blood loss. ■

Interview sponsored by Penumbra, Inc. Dr. Suhail Dohad is a consultant for Penumbra, Inc.

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