**Title: LINC 22: Pt Selection in NIVL and Preventing Migration in Venous Stenting**

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- My name is Kush Desai. I'm an interventional radiologist at Northwestern University in Chicago, Illinois. I'm an associate professor of radiology, surgery, and medicine.

**Rationale**

Stent migration, very simply, is movement of the stent out of the intended place where it should be. So for example, most commonly, stents are placed in the venous side in the iliac vein. And if the stent moves out of the iliac vein into the inferior vena cava or more dramatically, into the heart, which can have serious negative clinical consequences that is stent migration and that's something that we're really seeking to avoid.

**Inclusion/Exclusion Criteria and Study Design**

It's primarily a concern because these stents are placed in a spectrum of patients that actually skew compared to other vascular diseases to the younger side. So many of these patients are quite young. These stents have to last for a very long time and the presenting symptoms can be quite significant, quite severe, or they can be relatively mild. And so, I think we need to exercise quite a bit of judgement in selecting patients that we think that are going to actually improve with the stent and that that stent is going to last for the rest of their lives, in many cases, a matter of decades. The reason why stent migration is a concern is that, for example, if the stent is placed for a relatively mild or moderate clinical severity or indication and then that stent moves and causes a very significant complication that may require as significant as open heart surgery or could result in death, the negative clinical outcome is quite disproportionate to the original intended indication for the stent placement.

**Key Findings**

Myself, along with my colleagues, Dr. Black, Dr. O'Sullivan, as well as many of Dr. Black's colleagues at St. Thomas' in London, did a retrospective systematic review of the published literature to date, as well as a review of reporting systems, most significantly, the US Food and Drug Administration's MAUDE Database and the MAUDE Database is user-reported designed to collect data on whether there are complications or malfunctions of devices. And utilising all of this information, we were able to analyse when stent migration occurred at least as a function of stent diameter and stent length. And what we found is when stents are less than 14 millimetres in diameter and less than 80 millimetres in length or eight centimetres in length, they were at a significant risk for migration, particularly, in the iliac vein, which is the area of chief concern. So that data or that effort really synthesised all of the available data as well as user-reported information into one package that can really inform how practices perform moving forward.

**Risk Prevention**

I'd say the primary way of reducing that risk is starts with patient selection. Ensure that you're placing a stent in a patient that actually needs a stent and will improve with a stent. For example, if a patient comes in with relatively mild symptoms, say they don't have venous claudication, they have only ankle or calf edema, it's unlikely a stent is going to improve them. On the other hand, if they have significant post-thrombotic syndrome and have venous claudication or venostasis ulceration and have an iliofemoral deep venous obstruction, the stent is very likely to help them. So, exercise judgement , that's the first key. The second key is ensuring proper procedural technique and in non-thrombotics, where I'd like to point out, every reported stent migration that I'm aware of has occurred in non-thrombotic patients not post-thrombotic patients. You have to be very careful in selecting the size of the stent. Exercise judgement , utilising intravascular ultrasound to identify exactly where your lesion is, rule in the lesion as something clinically significant that correlates to the symptoms that the patient presents with, and then utilise that IVUS to measure the size of the vein, especially in the external iliac vein, where I typically size off of so that you can select the stent size. So for example, if an external iliac vein is roughly 13 millimetres in average diameter, a 14 millimetre stent should be okay, but if it's on the cusp of anything over 13.2, then we're going to want to size up to 16 millimetres. You definitely don't want to undersize and you don't want to do one-to-one sizing. And here it's key to follow instructions for use that are included with each stent package. So selecting the stent diameter is key that way. And then the second thing is using a longer stent. And the reason behind that is that you want to anchor the stent cranially in a non-thrombotic at the compression site where it typically occurs due to the right common iliac artery. And then caudally, within the external iliac vein, you want to ensure you have a significant purchase there so that the stent is anchored in multiple locations.

**Further Study Needed and Next Steps**

I think we're really moving towards requiring prospective registry data. And this really means any stent that's placed, the data is entered into a anonymized, of course, centralised registry that we can track what's occurring and then we can quickly identify when there's a series of problems or there's a pattern occurring that can be rectified either through device modification, practice modification, or regulatory guidance. And I think that's going to be key to ensure the safety of this therapy moving forward.