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Understanding Use Cases for Double vs. Triple Lumen Dialysis Catheters in ICUs

Announcer:
This is ReachMD, and you're listening to Vascular Viewpoints, sponsored by Becton Dickinson, advancing the world of health.

Your host is Dr. Jennifer Caudle.

Dr. Caudle:
When critically ill patients develop acute kidney failure in the ICU, dialysis often becomes the main arbiter of survival versus death, but not all approaches to acute dialysis are created equal, and with multiple catheter options to choose from, understanding the right applications for the right patients at the right times can be challenging. So, what should we keep top of mind when they making catheter selections for acute dialysis procedures?

You're listening to *Vascular Viewpoints* on ReachMD. I'm your host, Dr. Jennifer Caudle, and joining me to help answer that question and more is Dr. Brian Boer, a critical care physician and Assistant Professor of Internal Medicine in the Division of Pulmonary Critical Care, Sleep, and Allergy at the University of Nebraska Medical Center. Dr. Boer, welcome to the program.

Dr. Boer:
Thanks. Thanks for having me.

Dr. Caudle:
So, to start us off, Dr. Boer, can you give us an understanding of the different types of catheters that are used in the context of acute dialysis?

Dr. Boer:
Sure. We try and keep it as simple as possible at Nebraska Medicine just in terms of the choices of catheters we have so as not to confuse people which one is the best for each patient, but the main considerations we have are the number of lumens and the length of catheter. And then also, to some extent, uh, the style of the catheter, like how it exits the patient's body.

So, to expand on that a little bit more, uh, a lot of dialysis catheters are only double lumen, because you have the inflow and outflow of blood to do the dialysis. We like to utilize a triple lumen catheter, which has the two large lumens, and then what we call a pigtail catheter on there, so that there's an extra port to do things like administer vasoactive drugs or, uh, other medications that require typically a central line, because in the setting of the ICU – is - somebody's sick enough that they're needing acute dialysis – they almost always need a central line, too, and in many cases, we're limited by the number of lumens we have on our central lines in terms of medications we can give, uh, concurrently without complications, and so, the more lumens, the better in some ways. And in a lot of cases, if you have a dialysis catheter alone with a pigtail on it, it can prevent the need for a – an additional central line in that patient. So, far and away, we utilize temporary catheters that have that third lumen for medication administration, and then the other thing we think about is just essentially the length of the catheter. And the bottom line is, depending upon what site you put that in, you want that catheter as central as possible to maintain flows and have the least likelihood for flow limitations. Um, and so we want the tip of the catheter to be kind of, really right at that, uh, superior vena cava/right atrial junction if it's coming from above, and if it's coming from below, you want it as far into the IVC as possible in many ways. So, again, it's like a 16-18 cm catheter on the right IJ, 20 if it's from the left, and then 20-24 if we're approaching from the groin. So it's all about just getting – getting a working end of that catheter in the right place.

Dr. Caudle:

Hm. Wonderful. And, you talked a little bit about this already, but, what are some of the unique benefits and limitations of each of these different types of catheters. Is there anything to add to what you've already told us about?

Dr. Boer:
Sure. So, I would say, you know, benefits for shorter catheters in general, you can achieve higher flow rates if you end up needing to use it for things other than dialysis such as resuscitation, so that's a good thing. Um, and then the pigtail, as I mentioned, is very helpful in terms of medication administration or drawing labs off a line that's in use. Um, and then the way our lines are configured, some of them exit – the ports exit straight from the skin and away, and some of them curl back, and so, depending upon like what it looks like where it exits the – the patient's body can be helpful in terms of how you configure the lines running to the machine and just make it easier for the – the nurses taking care of that patient and more comfortable for the patient.

Dr. Caudle:
So, from your experience in critical care, Dr. Boer, what are some of the common challenges you face when considering catheter options for your ICU patients needing acute dialysis?

Dr. Boer:
I would say one of the biggest challenges is not so much at the time we place the line, but after the line's been placed - finding out it's not functioning like you – you would want it to, just because of the fact that, as I alluded to earlier, the tip of the line is not in the best position, and you don't know that until after it's been placed, and then you get some type of confirmatory imaging. An example would be, uh, the tip of the line being too high in the SVC – the superior vena cava, and then it's up against the side wall of the vessel, and that continuously is creating like suction limits or alarming the dialysis machine, because you can't achieve the peak flows you need to. And then having to go back in, and then replace that line with a longer line, for example, is definitely a challenge, because it's an extra procedure for the patient, it's more risk of infection, and it's just – it's extra work. And so, being able to prevent that ahead of time by, again, choosing the appropriate length line and really being diligent about exactly where you have the access site in the neck to achieve the right spot – all these things are taken into consideration – just with the hope that, uh, the thing is as functional as possible.

Dr. Caudle:
And again, continuing on that theme, is there anything else you'd like to add to, you know, how you go about addressing those challenges when they come up?

Dr. Boer:
Yeah, so one of the things I would add is, we're pretty proactive about trying to pick the right site. Again, our right internal jugular venous approach is the best in terms of a straight shot, and highest likelihood of that catheter functioning properly over a long period of time. So we try to avoid placing other lines, like a – a routine central lines in the right internal jugular, just to leave that site open in case the patient needs dialysis.

Dr. Caudle:
For those of you who are just tuning in, you're listening to *Vascular Viewpoints* on ReachMD. I'm your host, Dr. Jennifer Caudle, and with me is Dr. Brian Boer, from the University of Nebraska Medical Center. We're focusing on the use cases for different catheter options in the context of acute dialysis procedures.

So, Dr. Boer, I'd like to switch gears a bit and talk about the impacts of the COVID-19 pandemic on approaches to acute dialysis. What changes have you seen towards this procedure in COVID-19 patients, and have the respected benefits and limitations of catheter options changed in this setting?

Dr. Boer:
Yeah, good question. One of the concerns we had, especially looking at the experiences of other centers that were ahead of us in terms of the timing of the influx of COVID patients, was the tendency for their circuits to clot off or become nonfunctional due to clotting events. And so we were prepared to make changes to our practice techniques in terms of potentially offering therapeutic anticoagulation even if needed to keep circuits going. Um, because I know that's something a lot of places did in this setting. What we decided to do at Nebraska Medicine is, practice like we always have, and then see what happens and then see if we experienced the same problems. Thus far, I'm happy to tell you that we haven't seen an increased rate in clotting or nonfunctional circuits, even on our continuous, uh, dialysis patients, so we haven't felt compelled – or, we haven't really felt the need to change what we do in terms of anticoagulation at this point, which is great, because we also know we're seeing a lot of bleeding events in these patients in addition to the thrombosis, so we'd rather not exacerbate that if we don't have to. Um, we – in terms of the catheters we select, it hasn't affected us too much. It's made us a little bit more aware, I would say, of – of choosing the appropriate length catheter and the appropriate location to make sure it stays as functional as possible. Uh, for the reasons I talked about earlier in terms of just achieving right flows, just because what you don't want to do is have to go into COVID-19 patients' rooms more often than you have to and do more

procedures than you have to, just from the increased risk of exposure to, uh, patient – uh, to the providers.

Dr. Caudle:
And, as we're increasingly seeing a volume shift in acute dialysis among COVID-19 patients, what are some of the downstream impacts of this on ICUs?

Dr. Boer:
Good question. I think it's – like everything we're seeing just in terms of the increase in volume, is just the resources utilized to take care of this many critically ill patients. So I think on average, in my experience, the patients with COVID-19 in our ICUs are on the more severe end of the spectrum of what we normally see for a critical care patient on average. And so, they're more likely to utilize higher amounts of resources, and everything takes longer in these patients. You've got to wear the appropriate PPE to go in and out of that room, so more, you know, in the setting of HD at least, there's more lab draws, there's more nursing cares, and – and so achieving that high amount of resource utilization has been challenging. Um, I think it's been doable, but we worry about, as the volume in patients grows, that we could outstrip our resources at any time if we have too high of a surge.

Dr. Caudle:
Understood. And lastly, Dr. Boer, as you continue to treat COVID-19 patients, what are some adjustments that your team is making or learning to accommodate for patients in need of acute dialysis?

Dr. Boer:
Yeah, so one of the things we were really worried about is seeing high rates of thrombosis of the – or, clotting of the circuit in other centers and the need for a therapeutic anticoagulation and even to keep, uh, dialysis circuits in function. We were prepared to do that here, uh, but as things kind of progressed, we decided to treat these patients like we would anyone else and kind of wait and see how things went. And so far, we haven't seen a high rate of, uh, clotting of the circuit any more so than our other critically ill patients, so we haven't changed our – our practice, uh, models in the setting of COVID-19 as of yet.

Dr. Caudle:
Okay. Well, with that closing thought in mind, I'd really like to thank my guest, Dr. Brian Boer, for joining me to weigh in on the pros and cons of different catheter lumen options for acute dialysis procedures. Dr. Boer, it was great having you with us.

Dr. Boer:
Yeah. Thanks for having me.

Announcer:
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