

## BroadcastMed | Assessing and Managing Stroke Risk in Adult Congenital Heart Disease

MELISSA LYLE: Hello, everyone. I'm Dr. Melissa Lyle, cardiology fellow at Mayo Clinic. Today we will be discussing how to assess stroke risk in patients with adult congenital heart disease. I'm joined by my colleague Dr. Naser Ammash, professor of medicine and Dr. Christopher McLeod, associate professor of medicine, who both specialize in this area. Thank you both so much for joining us.

**NASER** Thank you for having us.

**AMMASH:**

**MELISSA LYLE:** So I am aware that patients with adult congenital heart disease are at increased risk for stroke. But could you describe the overall incidence in this population?

**NASER** When they are compared to the normal adults with no congenital heart disease, there's a significant increased risk of stroke in adults born with congenital heart disease. And in women, it's around 6% to 8% in their lifespan until age 65. And in men, it's a bit more, 8% to 9% in a study done in Canada, including 30,000 patients followed over a long period of time. So it's like a 10 time increased risk compared to patients the same age without congenital heart disease.

**CHRISTOPHER** And for each specific syndrome, it's obviously different. And some of them are going to be 100 times more likely than the general population. Some of them, a few times.

**MCLEOD:**

**NASER** So there are many variables that play the roles in determining which is the most predisposed, which is the least predisposed in that patient population. It's so diverse.

**AMMASH:**

**MELISSA LYLE:** And in that regard, what are the most common mechanisms for stroke in this population?

**NASER** Since Chris is here, it's going to be irregular heartbeats. So atrial fibrillation and flutter. This is very common as patients get older, especially if they have multiple operations before. I would say that's the number one major risk factor.

**AMMASH:**

**CHRISTOPHER** And heart failure. Heart failure, for sure. But heart failure, and it's one of the things we just don't know is how much of that atrial arrhythmia is subclinical and how much of that atrial arrhythmia is a manifestation of the heart failure. And so the left sided heart disease lesions, patients also with ischemic heart disease. We're getting into the older population. These are not just kids anymore. And so, all of the population, probably some of the regular risk factors that we think of, heart failure being the first one for [INAUDIBLE] and then age for sure. It's an age dependent increase.

**MCLEOD:**

**NASER** Because unfortunately in our patient populations with congenital heart disease, the chances of them having heart failure increases significantly as they get older. The risk of atrial arrhythmia significantly increases as they get older. And these are two major risk factors for stroke in everybody. So it adds a bit. And there are more factors that also affect that, like some patients who have problem with clotting. So there are more risk of strokes. Some patients have hole in their heart, so they are at risk of what we call paradoxically embolism. So it adds to the complexity. And that's why every patient is different and we have to assess the risk in every patient and determine what can we do to reduce the risk and prevent strokes. Because this is the most feared complications because it has significant impact on patients and their families and everybody around them. So that's very concerning.

**AMMASH:**

**CHRISTOPHER** Yeah. I guess the other thing is just to add to that is that peculiar to this particular group is sort of the  
**MCLEOD:** Eisenmenger patients where the blood viscosity is different. The hemoglobin is higher, but clotting is abnormal. The other thing is that these patients just have many more interventions. And anytime we start sticking catheters in patients, anytime we try to close holes and put plugs in and devices, that's a risk for stroke. More operations, more surgeries, one of the main risk factors that we worry-- one of the main outcomes that we really worry about and counsel patients about is stroke. So they've just been exposed to more of this.

**MELISSA LYLE:** And as a follow up, I'm seeing a patient with adult congenital heart disease in my clinic. What tools are available to me for risk stratification?

**NASER**  
**AMMASH:** Well, we really consider every patient as a single entity where that patient's different from the next patient we are going to see. So that really depends on the underlying anatomy. And then, what's the rhythm and what's associated acquired problem with these patients. Keeping in mind that more than one third of our patients are more than 45 years old. So you have to add all of those. So the tools available for us are practically what we know about the risk of strokes and acquired heart disease, the risk of stroke in that specific heart disease, in that patient, keeping in mind also what that patient has had before in intervention surgery. And this is when we assess the risk and they say, OK, do we need to do anything about it, like start anticoagulation. Can we reduce the risk of stroke without starting anti-coagulation? So it's case to case. We discuss it all the time.

**CHRISTOPHER**  
**MCLEOD:** It's often a difficult one, definitely at a center that sees a lot of this. Because if you have a patient with pulmonary hypertension who you're worried about a catastrophic bleed in the lungs from pulmonary hemorrhage starting them on a blood thinner because they have diabetes or some heart failure or some other co-morbidity that would predispose like atrial arrhythmias, it's really a different kind of risk of bleeding. And so we don't have a good risk stratifying tool.

**NASER**  
**AMMASH:** No, we don't. I mean, all those tools that we have for the acquired heart disease patient. We don't have them in congenital. But it's based on their experience. And ironically, the same patients who are predisposed for strokes and blood clotting can be predisposed to bleeding. So you have to really assess the risk, the Eisenmengers, and the Fontaines, and the patient with liver disease. So it's really the key thing. And keep in mind that these are predominantly young adults. And if you commit them to it anti-coagulation, that's huge for them. No matter what medication we're going to give them, it's different than somebody at the older age group. Because that's a longer lifespan for them.

**CHRISTOPHER**  
**MCLEOD:** No. It really is a hard one.

**MELISSA LYLE:** Once you do decide to anti-coagulant the patient, what's the general approach for management of anti-coagulation?

**NASER** So, for years we have depended on warfarin. Obviously, that's especially in the more complex patients, we feel more comfortable with it. The patients know that's what we need to do. But they read the news. They watch TV. They know about the direct anticoagulants that we have available now, especially that in relation who don't need the blood test with the INR. So that's a discussion. But most of the time, the vast majority of our patients that have been on warfarin for a long time, if we really believe they're an increased risk of stroke without significant increased risk of bleeding if they are on warfarin. And they have done well for years. We have thousands and thousands of patients who have prosthetic valves and irregular heartbeat that have been on warfarin. But discussion about the new anti-coagulant, the direct ones, is a very valid discussion. What do you think, Chris?

**CHRISTOPHER** Yeah. It is. And we obviously don't have very much data. There are a couple of very small cohort studies that show it's safe. But follow up is not long. That being said, even though we've been using warfarin for all these years, we don't have any good data on warfarin to say that it--

**NASER** It makes us feel better. And they do OK. So I don't think there's like a randomized clinical trial on warfarin in adult congenital heart disease. But we know it works. And it reduces the risk of stroke by 70% in some congenital patients. And we feel comfortable with it. And the patient have been on it before. But there is no question that why not the other drugs. As we become more and more comfortable using them, especially as compared to adults with acquired heart disease, when you look at causes of stroke in congenital, it's predominately ischemic stroke, not bleeding. You know, 80% of all strokes are caused by ischemia and 20% by intracranial bleeding and subarachnoid hemorrhages.

In adult congenital heart disease, patients 99% is related to ischemia, unless they have an intrinsic problem in the brain that predisposes them to bleeding. So that is a factor that we have to put into consideration. But we have many patients. In fact, we're doing it frequently now. We give them direct anti-coagulants. We don't use them. We don't give them warfarin.

**CHRISTOPHER** So I guess in some ways we're extrapolating from these bigger atrial fibrillation trials. And so the picks have been large trial comparing warfarin against [INAUDIBLE] in patients with atrial fibrillation without congenital heart disease, without mitral stenosis, significant mitral stenosis. Even some-- and the edoxaban trials. Some of these patients have bioprosthetic valves. Some of them had native valve disease. So we're excluding mitral stenosis.

There was no signal that these are more dangerous. And there was definitely a trend towards probably less bleeding, which is the real advantage for this. And I guess over time, as we become more comfortable with them, as we get a reversal agent for the 10A inhibitors, and we have a reversal agent for Pradaxa, then I think it's probably going to evolve. And there are two large trials going on now for adults with congenital heart disease who have atrial arrhythmias and using the direct anti-coagulants.

**NASER** One of the challenges, I think, of those trials is the diversity of the patients that we see. Because if somebody has a simple congenital heart disease, like an ASD and they have an atrial arrhythmia and we do an ablation, I'll be very content with using an [INAUDIBLE]. If you have a Fontaine, with the fenestration and the right atrial [INAUDIBLE] Fontaine connection, and a fenestration [INAUDIBLE] arrhythmia, I'm not sure I would feel comfortable using the-- although it might be OK. What do you think?

**CHRISTOPHER** Yeah. We just don't know. You know, definitely there isn't the level of comfort for it. But it's just we're starting a new era. And certainly there isn't any evidence out there now that these newer agents are going to be particularly more risky. That's the concern. Are they going to be as effective? We're not sure.

I think that one of the things that is borne out by all of the other sort of registry or large systematic reviews of patients with valvular heart disease is they're at high risk. And so you do need to have a lower threshold to start an anti-coagulant in someone with congenital heart disease, because they almost certainly have a higher risk. It is syndromes specific. And you can have severe right sided heart disease, severe right ventricular dilatation, and the left atrium is normal. The left atrial appendage is normal. The left side heart function is normal. So for that patient, maybe, it's wrong, And so it really needs to be very individualized. But if you look at anyone with the left sided lesion who has valvular heart disease, they're at high risk of stroke.

**NASER**  
**AMMASH:** So what I suggest is typically with those patients nowadays is the shared decision making with them. So I usually tell them what we know and what we don't know, and the options on how we treat it. If we decide with direct anti-coagulant, we say , we use it adult patients with acquired heart disease, It has worked. This is the risk of bleeding, and so on and so forth versus with using warfarin, which we have used before. So I think that the challenge at time is if somebody had been on warfarin for a long time in a therapeutic range where we want to be for a long time, no complications for a long time, so they say, why would you rock the boat. But in the newer patients, I think we have that fair discussion about what we know, what we don't know, and then make a joint decision, as long as the renal function is normal. And that's very important for the direct anti-coagulants.

**CHRISTOPHER**  
**MCLEOD:** And I guess the other thing just to make the fellows aware of, younger patient, on warfarin, there's good data that there's going to be less bleeding and less thrombo-embolic stroke if they check it themselves. So the home INR checking, really crucial for the patient. They're going to become better at doing it than their clinic who has change in staff, change in approach. They know when they're traveling. They know when their diet has changed. And there is evidence that [INAUDIBLE].

**NASER**  
**AMMASH:** We suggest home INR monitoring on everybody who really, and they're dependable about it typically because they have had the heart disease for a long time.

**CHRISTOPHER**  
**MCLEOD:** Or the parents are.

**NASER**  
**AMMASH:** Or the parents are.

**MELISSA LYLE:** Well, thank you. That's very helpful information to know. What are the most important and current adult congenital heart disease guidelines that we should be aware of while caring for these patients?

**NASER**  
**AMMASH:** So we have the ACCHA guidelines from 2008. But the newest guidelines are going to come out in the next few weeks I hope that are a bit different, looking at disease specific evaluation and treatment and suggestion on how to monitor these patients. But it's going to be disease specific. There are going to be some section on stroke. But typically we talk about stroke in each disease because it varies from one patient, from one disease entity to another. So there are other guidelines, good guideline from Europeans and the Canadian guidelines from our neighbors up north. So there are three major guidelines on treatment of adults with congenital heart disease. The one in 2008 is a major one. [INAUDIBLE] was this the first author on it from Mayo. But the newest guidelines are coming very soon.

**CHRISTOPHER MCLEOD:** From an arrhythmia point of view, the 2014, it's really a consensus statement. First author's Kerry. So management of all arrhythmias in adults with congenital heart disease. So there's specifically an algorithm in there for how should we treat the adult with congenital heart disease who has an atrial arrhythmia with regards to anti-coagulation. So they fully disclose that this is level of evidence C. So this is expert opinion only. There is no data for this.

And so they would break up the approach into complex versus simple congenital heart disease. Complex congenital heart disease, and you can have a look at that. It's quite a complex group of disorders. But if someone has complex congenital heart disease, you're almost always going to go with warfarin. So very low threshold.

**NASER** Safest.

**AMMASH:**

**CHRISTOPHER MCLEOD:** And go with warfarin. Simple congenital heart disease, if there is any valvular heart disease lesion, that would say probably go ahead with anticoagulants. And that would be, they're guessing but they're saying probably direct oral anti-coagulants or warfarin. But if they don't have any significant valvular heart disease, and it's simple congenital heart disease, you can probably use a [INAUDIBLE].

So this would be the 69-year-old repaired ASD now with some atrial fibrillation. How do you treat them? They are 69. They've got diabetes and hypertension. You probably should use a [INAUDIBLE]. They're 41 years old, they've had-- you can probably go down that route.

**NASER AMMASH:** Because most patients that are younger the chest tube [INAUDIBLE] is going to be low. I mean, because they don't have these empty-- I think one of the important things to keep in mind is cardioversion in these patients. We have a protocol in which practically everybody has congenital heart disease get the TE before cardioversion. And we anti-coagulate. And in that case, I think it's OK to use a direct anti-coagulant before and after cardioversion. I think I'd feel safe, especially if it's a simple to moderate congenital heart disease.

In the complex patient, we err on the safe of what we know, what has worked before, and use warfarin. But that group of patients. I think, that we have to pay particular attention because with the structure of heart disease they're more predisposed to thrombus formation and strokes related to cardioversion. So I think I should point that out specifically.

**CHRISTOPHER MCLEOD:** The other thing, even though not well-reported but definitely recognized, is if fellow comes across or one of the adult cardiologists comes across a patient with one of the classical Fontaines, this right atrium to PA Fontaine can be these very big, baggy chambers. Despite anti-coagulation, you can still have thrombus in there. So making sure that you do a TE to make sure that when cardiovert that patient-- I mean, obviously if the patient is critically ill you have to go ahead-- but if this is an elective cardioversion, just making sure, even if they've been anti-coagulation and their INR has been between two and three, they can still develop thrombi. And you can dislodge those. And you can have a fatal pulmonary embolism in that situation. So making sure that you always do a TE in those patients.

**NASER AMMASH:** Up to 20% of these patients have silent PE without us doing anything. So I think that's very important, especially the [INAUDIBLE] connections.

**MELISSA LYLE:** Thank you so much Dr. Ammash and Dr. McLeod for joining us today. And thank you for your insight into this very important topic. And thank you all for joining us on theheart.org on Medscape.