Mayo Clinic Q&A podcast: Dr. Jamie Van Gompel - Epilepsy treatment

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SPEAKERS

Narrator, Dr. Jamie Van Gompel, Jason Howland

N **Narrator** 00:01

Coming up on Mayo Clinic, Q&A...

D **Dr. Jamie Van Gompel** 00:03

Epilepsy is a very diverse disease, and it's a very common disease. So 1% of people will, at any given, time have it. The hallmark is that there's events of loss of neurologic control that occur at times that you're not expecting or can't predict. And if it happens more than once, and that's what epilepsy is.

N **Narrator** 00:25

Epilepsy is a central nervous system disorder causing seizures or periods of unusual behaviors, sensations and sometimes loss of awareness. Treatment for epilepsy can include medications or surgery to control the seizures. Thanks to advances and new minimally invasive techniques, surgery is an option for more patients than ever before.

D **Dr. Jamie Van Gompel** 00:45

The game is much different now. We've really improved the outcomes for patients. There's a lot of patients that are seizure free without side effects from the surgeries. I think it's important to not be scared of thinking about doing some of these things because they can have substantial, meaningful impacts in people's lives.

J Jason Howland 01:01

Welcome, everyone to Mayo Clinic Q&A. I'm Jason Howland sitting in for Dr. Halena Gazelka. Epilepsy is a neurological disorder in which brain activity becomes abnormal, causing seizures or periods of unusual behavior, sensations and sometimes loss of awareness. Anyone can develop epilepsy. Epilepsy affects both males and females of all races, ethnic backgrounds, and ages. Treatment options can include medications or surgery, and advances in treatment means, now more than ever, there are options to help patients. Joining us to discuss those options available for epilepsy treatment is Dr. Jamie Van Gompel, a neurosurgeon at Mayo Clinic. Dr. Van Gompel, welcome to the program.

D Dr. Jamie Van Gompel 01:46

Thank you, Jason, so much for having me. I appreciate it.

J Jason Howland 01:50

All right, we've got a lot to talk about. So, let's start with the basics. Epilepsy is not a one size fits all disorder. There are different types of seizures and different causes. Can you start by helping us understand what epilepsy is?

D Dr. Jamie Van Gompel 02:04

Yeah, epilepsy is, as you point out, it's a very diverse disease. And it's a very common disease. So, 1% of people will, at any given time, have it. And what the hallmark is that there's events of loss of conduct neurologic control, that occur at times that you're not expecting or can't predict. And if it happens more than once, so it has to not just be one event, that's what epilepsy is. Now, fortunately, a lot of patients can see a neurologist and figure out what the cause is and be controlled with medications. That's about 60% or 66% of patients. But there's another, you know, whole 33%, or substantial proportion that fail to be controlled by medications. But realistically, it's a disease that has a bunch of different causes, especially if you're a kid or an adult, there's different reasons that one might have it. And it's a very complicated problem. And it's very difficult problem for patients that have it.

J Jason Howland 03:10

So how are doctors able to personalize epilepsy treatments? And why is that important?

D Dr. Jamie Van Gompel 03:16

Medical doctors or the neurologists have a lot of different medications that may be beneficial to the type of epilepsy that people have. But after that, once people fail medical treatments, surgeons have a plethora of treatment options that we work in partnership with our neurology and neuro psychiatry and radiology colleagues, to help figure it out. For a lot of people that come to us, our hope is to just see them once, just one episode of care, to diagnose where these things are coming from. In certain circumstances, surgeons can tailor the approaches to

stop the epilepsy either by doing craniotomies and removing it, which was the only tool we used to have in the tool shed. But nowadays, we can also do things like use lasers to treat them, we can stimulate that area of the brain to treat seizures. And we're doing a lot more to keep people exactly how they were before and to get rid of these things.

J Jason Howland 04:19

So if patients have not been seen at an epilepsy center, or if it has been a while, what should they know about epilepsy treatments that are available today?

D Dr. Jamie Van Gompel 04:28

Epilepsy treatments are changing so rapidly right now, with the introduction of robotics and stereotactic techniques. So, what does that actually mean? Well, before there were only a few techniques that we could have the diagnosis. They put the buttons on the scalp that try to figure things out. We used to actually put some on top of the brain, and a very few through it. Now we actually put very, very small electrodes directly into the brain in a way that we can reconstruct where seizures are heading and going. That's been very beneficial for understanding treatment options for patients. And these things, although available in Europe for decades, in the United States, really the last decade they have been available. That's something called stereo EEG. And on top of that, some of the things that we have to do with new treatments for epilepsy we just didn't have a decade ago. So there are ways that we can make, I want to say incisionless, but that's not necessarily true, but a small stab incision, deliver a laser catheter and treat the same tissue that we'd have had to use a large craniotomy before. I think some of those big treatments in the past have scared patients away from what we have to offer. In fact, we have a trial open, at least at Mayo Clinic right now, that involves no incisions and using MR-guided ultrasound, ultrasonic energy to deliver energy inside of the head to actually treat some of these epilepsies without ever actually going in your head.

J Jason Howland 06:03

Wow, that's fascinating stuff. You talked earlier about tools in the toolbox to treat epilepsy. So, let's start with talking about the whole toolbox. So first off medications. And I'm assuming those have been around for quite some time. Are there new medications that are coming up that are doing a better job of helping patients with epilepsy?

D Dr. Jamie Van Gompel 06:31

Yeah, so you said medications around for a long time. When I was a medical student, we learned about six or seven of them. Since then, there's almost 30 and there are new trials coming out all the time. And I think that's very fortunate for patients because there's an ability to be able to modify those medications and avoid actually having surgery in some circumstances or avoid side effects from them. We're also learning that some of those medications are actually very beneficial to some of the things that we use surgically to treat patients with epilepsy. Sometimes we install stimulation devices that are actually helped by

some of those medications or lower doses of those medications. So that's certainly rapidly advancing. And if you haven't seen your epileptologist at a tertiary care center, there might be something new that they can help you with.

J Jason Howland 07:25

So next tool in the toolbox, and you mentioned it right there - brain stimulation. What exactly is brain stimulation?

D Dr. Jamie Van Gompel 07:34

So, brain stimulation has been around for a long time, at least, trying to treat areas without cutting them out. So, in movement disorders, which is not what we're talking about here, but things like Parkinson's disease, or tremors, we used to actually kill tissue. But now we just put small little probes in the head and deliver electricity. And it does the same thing. It eliminates the tremors without causing a lot of side effects. It's reversible. Now that kind of technology that's been around for decades, is really being utilized a lot in epilepsy now for a variety in a variety of different ways. One of which is called open loop stimulation, which is how the DBS procedures are done for movement disorders, in which we deliver electrodes to different parts of the brain, most often the thalamus, and give currents that the patient can't feel and don't typically cause side effects but have a substantial improvement in seizures. That's called deep brain stimulation that's somewhat similar to what vagal nerve stimulation does. There's also something that's, to use a technical term, closed loop stimulation. But it's a lot like a pacemaker, in which a pacemaker detects bad heart activity, and actually paces the heart. There's actually a device just like that, that goes into the brain that detects bad brain activity or seizures and delivers a stimulation that stops the seizures to directly treat them. Both of those types of devices are just the newest kid on the block, and those have only been around for one, five years, and the other a decade. But now there's a bunch of different devices coming down the pipeline and new targets, things like the pulvinar, things like central media. In fact before, generalized epilepsy we did not think could be treated in this manner. There's a large national trial now going on for things where for idiopathic generalized epilepsy it's called Nautilus through NeuroPace, inc. And we have a lot of hope and actually scientific evidence that's going to help a lot of patients.

J Jason Howland 09:48

So with the brain stimulation, are the electrodes under the skin and do they sense, perhaps like when a seizure is going to happened and then it stimulates the brain? How does it work?

D Dr. Jamie Van Gompel 10:02

Yeah, so we do put electrodes in that go through the skin for monitoring. And we should talk about that, how the advances and how we diagnose these epilepsies. But the ones that we just talked about are under the skin. There's one where the device is in the skull, the other one in the chest. But there are devices out there that respond to seizure activity and treat it. And in fact, there's also devices, some of the other older devices that people may have, like VNS,

some of those actually respond to an increase in heart rate that is caused by a seizure and gives extra stimulation to stop that. And we have a lot of reason to believe that there are going to be a lot more of these types of treatments out there that respond to having a seizure to hopefully keep the patient awake. In fact, we're involved here at the Mayo Clinic in a trial, that's really interesting in that it's not actually trying to stop the seizure. What it does is detects the seizure, and then it actually goes to the inside part of the thalamus called the CL nucleus, and it stimulates it so you can't lose consciousness during this seizure. We're very excited about what that might be for the future for patients.

J Jason Howland 11:17

Fantastic. Let's talk a little bit more about minimally invasive treatments, another tool in the toolbox. You mentioned laser treatments, also the MRI-guided ultrasound. Talk a little bit more about how both treatments work.

D Dr. Jamie Van Gompel 11:32

I think we're always trying to have the goal of having the patient be as good as they can, both looking after the procedures and, and have less headaches, less side effects from treatments. So, through the wonders of technology and engineering, we can actually take care of tissue or remove tissue without making very big incisions any longer. We think this is also, so a lot of these minimally invasive techniques are coupled with real time imaging, especially with MRI. So, MRI imaging in which we can monitor structures to try to keep them safe. So, we can reduce the chance of having complications with these procedures. Or, for instance, if we have a seizure onset area that's close to your hand movement area, we can insert a catheter, we can treat right next to it, but monitor the area that you're using to move your hand so that it won't be damaged during that treatment. And then lastly, the last tool in the toolbox is of course surgery to remove part of the brain that's causing the seizures. Who can be helped with epilepsy surgery, and what is the goal of surgery? Yeah, so in patients that surgery can be something where you go to sleep and not get many incisions. But we still have a lot of the older procedures out there. And we're actually a lot better at predicting who will and who will not respond to those therapies. I think when these therapies came out in the 80s, we were just kind of taking everybody and doing these big procedures. And some patients weren't seizure free, unfortunately, and some patients were. We're becoming much better at selecting the right patients for those procedures. So in fact, in the most common type of epilepsy that we treat, temporal lobe epilepsy, we still very commonly do a craniotomy, which is an opening of the bone to get down to the brain and remove the right temporal lobe. Because in most patients, they can do very well with that and go on and be seizure free. On the left side, rather than doing that bigger procedure, in a lot of patients we don't do that, because they may suffer from some issues with memory after that. We can replace that procedure with a laser ablation procedure, for instance, that would preserve that memory that we would have lost in the past. And so sometimes we're using the old school techniques in different ways in order to still get the same success rates where they were really good. And using some of this newer stuff to kind of get around some of the problems we were having in the past with some of the larger operations. But craniotomy is not a bad word. It actually is super helpful for patients. And those are some of our most happy patients because once that's done in their seizure free, they no longer have to see me or see an epileptologist. They're no longer on those medications that may be causing them to be drowsy or cause a tremor or something like that.

J Jason Howland 14:34

Yeah, I think there might be a misconception out there that craniotomy is high-risk and difficult, but it sounds like the field is definitely evolving and especially with some of these new minimally invasive techniques.

D Dr. Jamie Van Gompel 14:47

Yeah, and I think everything is changing so rapidly right now. We just had a national meeting talking about how rapid the advancements have been over the last 10 years. In fact, the most common way of monitoring the brain, which is an intracranial diagnostic procedure, that's gone from almost not being done anywhere in United States 10 years ago, to almost every center doing it across the country. And it's cut the complications rate down by all by almost 80%. And so, it's really opened the door to understanding people's epilepsies. And then all these other techniques weren't even around a decade ago. So again, if you have epilepsy, and you've checked in with a center maybe 10 years ago, or you have people that you've heard of had issues with epilepsy surgery, I just would like to emphasize that the game is much different now. That we've really improved the outcomes for patients. There are a lot of patients that are seizure free without side effects from surgeries. And I think it's important to not be scared of thinking about doing some of these things, because they can have substantial meaningful impacts in people's lives.

J Jason Howland 16:07

Well, I'm gonna have you whip out your crystal ball now. What do you see is on the horizon for seizure prevention, prediction, and treatment?

D Dr. Jamie Van Gompel 16:16

I think because we are treating more and more of these, we're getting smarter and smarter. So things like artificial intelligence or machine learning, to help us understand what individual patient would be the best possible outcome for them, which I'll which will lead this patient standardization, and improve the outreach of these treatments will be important. I think we will continue to move more and more towards removing less and less brain. And in fact, I do believe in decades, we'll understand stimulation enough that maybe we'll never cut out brain again. Maybe we'll be able to treat that misbehaving brain with electricity or something else. Maybe sometimes it's drug delivery, directly into the area that will rehabilitate that area to make it functional cortex again. That's at least our hope. We want to actually make people better with the surgeries not worse, of course. And I think that all those things are coming. There are companies working on that stuff. I think we're actually also thinking about what the stimulation devices and some of the surgical treatments, treating some of the side effects directly of epilepsy itself. Like patients often have depression with epilepsy. And it might be possible to, I don't want to say to kill two birds with one stone, but to treat two problems with one treatment. Stimulation for epilepsy and for depression. And that might help a lot of patients. You know, I very commonly talk about the way electricity in the brain works is all the medications people take for psychiatric disorders like depression, or epilepsy, which is not a psychiatric condition.

They're just aimed at changing the way electricity runs around the brain. And if you take enough of those medications, I think, in a lot of circumstances, you would treat the seizures or your depression. But unfortunately, those medications may make you so drowsy, or they may stop you from breathing. And what they're doing is again, just modulating the circuits or changing the way electricity is running around. And we can do that directly by interfacing with the anatomy, and really avoid some of the side effects from these medications. And I think that's really where we're headed with this.

J Jason Howland 18:38

Fantastic. Well, we are just about out of time. But I've got one last question for you who should ask for a referral to an epilepsy center?

D Dr. Jamie Van Gompel 18:46

So anybody that has uncharacterized events, or even characterize events that has been treated with a medication that's continuing to have events. If you've been diagnosed with epilepsy, and the medical treatment is working for you, you should stick with that unless you're having side effects from it. You can either talk with your primary care physician or your at-home neurologist. There are a plethora of tertiary, what we call now quaternary treatment centers, that are more than willing to give secondary opinions to patients. And there are certainly great places to understand how to get to those. There's also support through the Epilepsy Foundation for patients that are financially unable to travel. They very much support people to come up for second opinions. And they will sometimes also help with some of the treatment costs as will the institutions that you're going to. So, I think it's really important that if you're having events that are uncharacterized or you're or you're having epilepsy that's continuing despite medication trials, especially at least two separate medication trials, that you seek a second opinion about what could be potentially done with this. And I would recommend touching base with that second opinion almost every five years.

J Jason Howland 20:07

Well, our thanks today to Mayo Clinic neurosurgeon Dr. Jamie Van Gompel for joining us today to discuss treatment options for epilepsy. Thank you, Dr. Van Gompel.

D Dr. Jamie Van Gompel 20:17

Thank you so much, Jason. Have a great day.

J Jason Howland 20:19

And thank you for joining us on Mayo Clinic Q&A. Have a great day.

N Narrator 20:23

Narrator 20:23

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