

**LAUREN DOYLE** So I am lucky to be joining you guys in practical Ps. And headache is something I'm certainly very passionate about. So I have no financial disclosures. OK, so my goals and objectives, so we're going to be very ambitious. We have a lot of things that we want to try to address. But I'm going to try to give you my initial approach and evaluation that I do with my headache patients. And I want to focus on the history taking and try to help you understand what I think are red flags in the history taking and examination.

And then we're going to go over some important secondary headache types and what things that you want to not miss when you see them in your general pediatrics practice. And then if we have time, we can go through some abortive headache medications. OK, so I mentioned my Twitter handle.

And I think it's important to address because Twitter is becoming a big thing in medicine and is certainly academic medicine. And a lot of people are tweeting at conferences. And it's a way to follow your journal articles and what is new hot and important for patient care. And believe it or not, #migraine is the top tweeted medical condition of 2015. And it is still the top tweeted medical condition of 2016.

So your patients are talking about it, which makes sense that they're also going to bring it up a lot in your office visits. OK, so how common is it? We know that it is very common, and especially is associated with a lot of disability, both financial and also work related and school related disability. Patients are missing school. Their parents have to miss work to take care of them. And they often are ending up in the emergency room.

And so when they look at the disability related costs, it's actually quite large. And we're looking at upwards of over \$13 billion a year. So that is pretty much a very big deal. And we need to work as a group to try to prevent these patients from ending up in the emergency room. And a lot of that starts in everyone's clinics.

So the question that we got from a lot of parents is, how common is this in children? Kind of understanding that it can happen in adults, but how common is this in children? And we know that headache is the most common manifestation of pain. So they're going to come in. It's going to be about their headache. And it actually is one of the most frequent reasons that they show up in emergency room and that neurology is consulted.

OK, oh, and then also I wanted to point out is a lot of people maybe are come on board and understand that they're going to have headache, but what is traumatizing to them is to understand that they can have frequent headache or daily headache. And if you look up at that statistic that 2-6% of the children that we're seeing for a headache are actually reporting daily headache. So that's a good statistic to be able to tell families that it's a lot more common than you realize.

OK, so when we talk about the initial approach we're looking at things like primary and secondary headache. And that's our term for is it something that is genetically inherited and probably a benign syndrome, or is this something else concerning-- or something else that we don't want to miss because it has certain treatment options that we can offer. So if you don't know yet if it is definitely a migraine and the primary headache syndrome, you can write in your note concern for secondary headache. That's your term for it could still be primary, but I am working up and worried about a secondary headache.

So this is a great diagram. It's kind of talking about they come in with headache, and we're going to be a detective. And we're going to try to ask a lot of our history and do our exam and try to look to see what red flags will put us into different categories and make us worry about primary versus secondary headache.

OK, so history taking, so this is very challenging. And it's hard because you almost need a lot of time to be able to accomplish and ask so much of this. But what I would focus on is really mostly the pattern. That's going to give you a lot of information. Is this new? Is this something that they've been having a long time, and they just came to you now about? And why is that?

So you want to ask them, why are you coming to me now? And why are you telling me about it? And why are you worried? What about this is making you worried? And try to understand what about the headache has changed over time. And was it daily? Was it infrequent and now it's daily?

Has this been going on since they were five, and it was once a month, and now it's every day. We try to have to dig deeper and understand what is different about the headache. And, sure, it's very helpful to understand the headache character, the headache description, and trying to understand is this something that's throbbing in nature that makes you think more about migraine? Or is this something sharp? Or something that's constant and has some tingling associated, something else that doesn't sound like migraine, so the character.

Let the patient tell you the story of their headache. And aura is nice if you already know they have aura. But a lot of times patients will tell you neurologic complaints, and we don't know yet if they're aura. But really important to know what's symptoms they have and how they spread and timeline and where on the body and where everywhere it's involved and how long it lasts.

And that'll help you sort out if it's aura or not. And then there's a lot of associated symptoms. So I put a whole list of different associated symptoms. And the difficult thing is all those can be very scary and can be indication sometimes of a secondary headache. However, everything I listed there can actually be a normal thing seen in migraine. So it can be quite challenging.

OK, so patients come to you all the time going, I've been looking, or helped me find the trigger, and what are the common triggers and things like that. And I think it's important to go through some of the common triggers. But you also have to be careful about focusing too much on some of these triggers because sometimes in the end, when it is migraine, most people won't end up finding a trigger for their migraines. So I think the things we don't want to miss is a sleep pathology, definitely a psychiatric pathology, and then dental pathologies, especially if kids have poor dental care, or if they're a teenager or young adult, and they're starting to have emerging wisdom teeth. So we have to be careful about that. Right?

And then you want to know what makes it better. OK? Because when patients tell me about all this pain, and then they said, oh, well when I play video games, it really doesn't bother me. Or, luckily, she was able to go to soccer practice. You know these kinds of things will help you sort out how serious it is. And they might not directly tell you that. They'll say 10 out of 10 pain, but then she was doing all this. And that'll give you a different story, a different flavor to the headache.

OK, so sometimes we have younger patients, or we have older patients that aren't very good at communicating what they're experiencing, and there is a great study in 2008 done by one of my mentors at Boston Children's. And what she did is she had patients draw their headaches. So I think it's a very useful tool to say, hey, can you draw if you're having trouble telling me? Maybe you can draw what the pain is like? Or maybe what the aura is like?

And when they did the study they actually had independent neurologist read and look at these images, and they could actually diagnose migraine versus tension type headache and other different types of headaches based on the drawings. And I'm starting to collect drawings because I want to frame them and put them in my office. So other history taking, it's good to kind of address head on, what are the parents worried about? And I do it in front of the children. I don't feel like I have to do it separately.

But I just ask is there something that you are worried about? And then you want to ask about family history. We all want to know does someone in the family have migraine, and that's helpful. But you also want to find out how their migraines were and did they take certain medicines that help them? Because that will help you align with the family. I find it's a very useful tool because if they said, well everyone in my family responded to Imitrex. They're not going to be happy leaving the office until you've given them Imitrex. So that helps you understand immediately what the agenda is.

Yeah, everyone's laughing. I know. We all know, right? All right, so, red flag-- so this is what gets us all nervous and we don't want to miss. OK, so this was done by the AEN a few years back. And there really hasn't been an update because it pretty much has withstand the test of time.

But what we're looking at is in the history is this the first and worst headache? So the most severe and the first time it's been severe like this. So that's something that I think we would all agree on is a reason maybe to send them to the emergency room or be worried. But some of the more subtle things is if they've had longstanding headaches, we don't want to miss something that's concerning.

So you want to know, did your headaches, in the past, were they well controlled with medicine and not a big deal? And then all of a sudden they've changed? And what's different about them? But that could be something that would be concerning. And then the location of the headache, so if the headaches are located in the back of the head, occipitally located. That is considered a red flag.

So, for sure, migraine can happen occipitally. And I don't want you to freak out when you hear an occipital headache. But that would be enough for us to say, we need to take a little bit more in-depth history about these headaches because it could be something else. And then if the headache wakes you up from sleep, we all kind of ask that, but I would also give you the extra advice. That it's not just that the headache wakes you up from sleep, it's also had to be like that they didn't have headache, they went to bed, and boom, they woke up with a headache.

If they've had a headache all day, and then they went to sleep, and they happened to wake up and had a little bit of headache, that's a little bit different and is less of a concern. So no headache going to bed, and it waking you up from sleep, that's more concerning. The other things we're going to look at is it triggered by exertion. So if they tell you I don't have a headache, and then when I exercise, or I go to the bathroom and I strain, that brings on a headache, that's concerning.

And then the other thing is, is there anything that on their skin exam that makes you think of neurocutaneous syndrome, like neurofibromatosis or tubular sclerosis? So I'm not telling you guys to do a skin examine every patient that you see who has headache. But what I'm asking you is just to ask them, or you guys know your own patients, to just remind yourself, do they have a large white spot or something else that would prompt you to take their headache a little bit more seriously?

And then age, anyone under six doesn't mean I'm going to immediately image them. But it's something that it's going to make me pause and maybe follow them a little bit more closely. OK, so I want you to be aware of this resources. This is the International Headache Society website. And all you have to do is type in International Headache Society in Google, and it'll pull it up.

And they are constantly revising the classification on migraine and tension type headache and then, basically, hundreds of other headache types. But it's really neat because you can put in what you think that the patient has, and it'll give you the classification. And it will also sometimes have some helpful pointers or articles underneath it. So it's a great resource.

OK, and then I was lucky after I first joined here to be part of the creation of the CHACC guidelines. And these are a wonderful resource. They are focused on helping us as a community triage and deal with our headache patients and when to image, when to refer to neurology, and when to refer to the emergency room and helpful dosing on some of our headache medicines. So if you're not familiar with the CHACC guidelines, they have them for many other different kinds of complaints. I would familiarize yourself with it and Google it. And our headache guidelines should be available online.

OK, so migraine is fascinating. It's what got me into going into being a headache specialist. And it's really neat because we've been talking about migraine for years. There are descriptions about migraine back to early papyrus and discussed in early medical school times. And when we look at the formation of some of our diagnoses and our classification systems, migraine was one of the first things that they were able to describe. And back in the late 1800s, they were able to distinguish the difference between migraine with aura and migraine without aura.

And the other thing is that there's a lot of history of migraine and headache that played out in literature and art. And so it's-- that's why I included a painting there. Because you'll see that a lot of people want to describe what they're experiencing and the symptoms that they see. OK, so migraine prevalence, so we kind of already talked generally that we know that it happens in kids. And that it is something that can be a common problem.

And the thing is also helpful to have these statistics. Because, especially, when you have a young patient who has headache, looking at the prevalence of ages. Yeah. It's low, but it can start and happen in a three to seven-year-old. And then what we notice is, obviously, as time goes on, we-- it makes sense the prevalence increases and definitely we know it's highest prevalence is going to be in the 20s, 20s and 30s. But over time it increases.

And then the other thing that we noticed is that the change in predilection for boys versus girls changes. The way I like to explain it to families is that it probably has something to do with the hormones and as they enter puberty, it becomes more common for girls to have headache. And this was based on a large Danish study. And we don't have a lot of literature out there for prevalence of headaches. So this is a commonly cited statistic.

And this is a kind of talking about the same thing. But this shows you over a lifetime, there are people that are suffering with migraine and headache throughout their life, even up into their late ages. But the time that it most hits people is in the young adult ages, which is when we're supposed to be functioning, carrying a family, doing well in education, and building our lives. So it's a very problematic time.

OK, so migraine pathophysiology, got a lot of questions about this. This is actually, believe it or not, despite us talking about migraine and headache for a really long time, this is something we are still trying to figure out. And it would be nice to have more research money to be able to sort this big mystery out. But every year there are still new things that we are finding. And so in the past we used to think that this was purely a vascular problem. And that's probably because headaches have a throbbing nature. And so people used to think, OK, if it throbs, and it's like a heartbeat, well then it had to be vascular.

But now we're realizing there's a lot more to this. And we know it's involving the trigeminal neuralgia system. And we are-- basically, the arteries are pulsing. But the other areas in the brain are being included. And it's creating a pain pathway. And for people who have chronic pain, it can be almost a chronic central pain sensitization problem. OK?

And then the other interesting thing is that we don't understand why some patients have aura and why others don't. But when a patient has an aura, they have another phenomenon that has been very well described in pet studies, and that is the cortical spreading depression. And this looks and behaves very similarly to a seizure because it will spread from neuron to neuron and spread fast. But it doesn't spread as fast as a seizure.

And is very interesting for patients who have an overlap of both seizures and migraines. Because that's what we call migralepsy. And sometimes a seizure can actually trigger a migraine, or migraine can trigger a seizure because of the fact that there's something about this. OK, it also may be why you notice that a lot of times we're using medications that are classically seizure meds.

OK, all right, so classification for migraine, I'm getting a little closer so I can remind myself. But, basically, when we make a diagnosis of anything, we want them to have at least more than five attacks. And if they haven't yet met all the criteria on the slide, that's OK. You just call it probable. OK? But we want them to have more than five, so we can feel pretty comfortable with the diagnosis.

And then what we're looking about is how long the headache lasts. And this range has actually been changing over time. And this reflects the newest rendition of the classification. But we are now using two as our cut off, two hours. But what I want to let you know is it's not just two hours of the pain, it is two hours of the entire time they're not feeling well. So if they have a headache that lasts 20 minutes, and then they go to sleep, and then they're asleep for six hours, my goodness, that's a 6 and 1/2 hour headache. OK?

So the sleep and when they're not feeling well is all part of the headache syndrome. And all that counts when you're trying to make the diagnosis. And then the other thing is then we're looking at what the character is. And it's typically a pulsating, throbbing headache. And it's usually of a high severity. And it is basically aggravated by certain types of activities.

And when you look it says greater or equal to 2 of the following. So if it doesn't have all those features, it's OK. It doesn't have to be unilateral. And, in fact, most kids actually will present with bilateral headaches. And it's not until they start to get older that they will then start identify persistently unilateral headache. So if they meet it on the severity, and they meet it on the avoidance of activity, and the nature of that-- I mean, you're already at three features, so you'll make it. OK?

And then the other thing that I want to focus on is the other features. So they kind of keep that separate. They're supposed to have one of the following. OK? So if they have nausea or vomiting, that counts. OK? So they don't have to be vomiting but just nausea would count. And then if you think about the sensitivities, they have to have both light and sound sensitivity. So if they are just light sensitive that would not count as part of the criteria. And then would make you question the diagnosis of migraine and wonder if it's tension type headache.

OK, so does anyone know what this picture depicts? What would be our medical term for that visual image? What did you say?

**AUDIENCE:** Photophobia?

**LAUREN DOYLE** Photophobia would be sensitive to light. So that is probably something associated migraine. But that's not what

**STRAUSS:** we're depicting in that picture. I heard scotoma. So that is definitely right. So that would be a scotoma. There's something different about this scotoma. So scotoma is our word for difficulty seeing or kind of loss or something haziness about the vision. There's trouble with an area of your vision. But it's sparkly, right? Scintillating, so our leader here got it right. So scintillating--

**AUDIENCE:** Because I get that.

**LAUREN DOYLE** Oh, because she personally gets it. So she probably looked it up, right? And so this is a scintillating scotoma. And

**STRAUSS:** sometimes if a patient is having trouble telling me, I even can just Google scintillating scotoma, pull it up, and then show it to them. And they go, that's it. That's what I'm seeing. But what is reassuring about this, is although they have loss of vision, they are seeing extra symptoms. They are seeing sparkles, or they're seeing light. And positive symptoms are reassuring and make you think more about migraine. OK?

So that is a scintillating scotoma. And we know that aura is definitely common in headache. And it is certainly happening in children. And if it's going to happen, it's more commonly going to be visual aura. That's the most common. And then some of the other auras are less common. Probably second is sensory.

You would be surprised how many kids do not tell me about the bizarre things they are seeing. OK? And that's because they have a very different perspective. Because they've only been alive for a certain amount of time. And they've been having headaches. And this happens. And this is normal for them.

So you want to directly ask them, are you seeing anything that is different? Are you seeing colors? Are you seeing sparkles? Anything? You have to be careful you don't put too much into their minds, depending on the kid. But you do want to try to listen. Is there anything else? And there are many times that we're in a visit, and the child starts going, oh, yeah, every time I have the headache, I see a blue light, and it's a circle and it comes across the vision. And the parents mouth opens and goes, oh my goodness. But it would make you more reassured that it's migraines. So that's why it's worth the extra time to ask that.

Oh, and the other thing to point out is that it's reversible. So if it doesn't go away, that's concerning, OK? And then also-- but it can happen. We have people who have persistent visual auras. So it can happen. But that would be a reason for a referral because you would be worried. It's supposed to be brief.

Most auras are going to be 5 to 15 minutes. And if it's lasting more than that, and lasting up to an hour, then that's still within range. But once it goes over that, then we get very worried that this is something else. And then you'd be worried that even if it was migraine when it started, it could end up being a migrainous infarction or could develop into a stroke. Because some people can have migraine, migraine, migraine, and one day it could be a stroke. So if there for a long time, it's reason to get it evaluated.

So that goes well into this topic. A lot of times when we see our first aura, we're worried. Is this in an ischemic event? And so it is kind of important to talk about it-- we've kind of already touched upon all these, but-- positive features are helpful to make you think it's more migraine. You're also going to look to see how it comes about. OK?

So if someone says I have numbness in my arm, OK? But it suddenly came on. And it's in a certain distribution. And it was there. And I just noticed it. And it's terrifying. That's a little bit different than it started in my fingers, and then by the time I realized it was something abnormal, it was all the way up my arm. And then I think it involved my face and maybe inside my tongue. Because that spread-- is something over minutes to hours-- is more characteristic of migraine.

So if you see a spread that's spreading over time, then we're going to think more of a migraine, rather than something like stroke like. OK? Still that may be something that you might want to re-evaluate it. But it's less concerning. OK? Especially if it's associated with headache, so that's what we're also going to be looking for. OK, the other thing is the duration. So migraine is going to be-- usually can last a long time. Well with aura, sorry, it's going to be shorter. So that's a little bit awkward in there. So I apologize. But they're talking about versus a TIA.

OK, and that's generally it. And, obviously, TIAs are going to be more common in certain age groups. So we're lucky in pediatrics that we don't see as much of that. OK, all right, so I want you guys to be a little bit more interactive. It's after lunch, so now we're getting to some cases. So if you know the answer, please shout it out. But this is a 15-year-old girl who comes to one of us with bilateral frontal pain. It's daily. It's moderate intensity.

She's able to play sports, but the headache is bothersome to her. But she's able to play. And they last four to six hours, one and a half times a month, and it's going on three months now. I feel a little-- she notices a little less appetite. The lights bother her. The sounds don't really bother her. And there's no nausea, vomiting, or any aura symptoms.

What is this? I hear a lot of tension. Does anyone think this is migraine? Why?

**AUDIENCE:** We don't have the criteria.

**LAUREN DOYLE** Because we just went over the criteria. Great, you guys are listening. And what about the criteria is it not

**STRAUSS:** meeting?

**AUDIENCE:** Phonophobia--

**LAUREN DOYLE** It doesn't have both photophobia and phonophobia. And she doesn't have nausea. So, therefore, those things--

**STRAUSS:** and maybe she's not telling you about it. But what she's telling you, I'm going to say it's probably not. The other thing is it's moderate intensity, which is right at the borderline, right, between tension type and migraine. But the other thing is that she's not aggravated by activity. So she's not meeting all the beginning criteria either. OK, so here is tension type criteria.

So basically I like to think of it as a spectrum of tension type headache to migraine. So I kind of focus does it meet criteria for migraine? And does it-- or makes me worried about a secondary headache? No. OK, maybe it's more in the tension type headache. So this typically is bilateral. And they don't really have nausea with it. Although, it's kind of hard. They could have some mild nausea. It's really more like an anorexia. So that's kind of the headache there.

All right, so I wanted to focus on this because sometimes our patients who come to me, they've already seen multiple people by the time they come to me. But sometimes they are upset with the diagnosis of tension type headache. Because the perception, sometimes that we don't even realize we're giving off, is that tension type means that it's related to stress, meaning caused by stress. And if they could just eliminate their stress, that it will go away. Well news flash, stress causes all different types of headache, including cluster, including migraine. So we have to move away from thinking that tension type is our way of code word to someone else, this is just because she's stressed because she's being bullied or something like that.

So stress triggers all different types of headache. And that doesn't mean when we tell you, you have tension type that we just need to remove the tension and help them. We certainly want to work on that. And that'll help. But that's not the only reason they have headache. OK?

And the other thing is sometimes when you inherit a patient that's had headaches for a really long time, if you have chronic migraine, some of the patients can almost look-- by the time the symptoms have been going on for a long time-- they can actually look more like a chronic tension type headache. So you really want to try to focus on what the worst headaches are like and what symptoms they have associated with the worst headaches and make your diagnosis based on that. Right?

So these are some of the secondary. These are hints. So you guys already kind of know because you-- oh, I forgot. You have cheater's slides. You already know what the cases are. OK? All right, so try to pretend you didn't see the other slides. All right, 13-year-old boy who comes in the emergency room with the worst headache of his life. Immediately, what is that? Sudden onset within minutes? What was that?

**AUDIENCE:** Secondary, like--

**LAUREN DOYLE** OK, secondary, great. So even if you don't know what you're worried about, you know you're worried about

**STRAUSS:** something. Right? So secondary goes to the emergency room, like even if they called your clinic, they are going to go to the emergency room. When you have a headache that starts and is really high intensity within a few minutes, that's a certain type of description of a headache, what do we like to call that?

**AUDIENCE:** Explosive headache?

**LAUREN DOYLE** It might have been used to be called explosive.

**STRAUSS:**



**AUDIENCE:** Thunderclap?

**LAUREN DOYLE** Thunderclap, great, because it's like the thunderstorm, like a thunder clap onset headache. So when you convey

**STRAUSS:** to another medical professional that you are worried about a thunderclap headache that speaks very differently to then she just has a severe headache. So this is a rapid onset headache that is rapid onset within a few minutes, OK? So very different than a severe migraine that intensifies over the day, OK?

All right, so what do we do? We send them to the emergency room. And now they're in the emergency room, and what do we do? I'm going to pick on you over there. He said he wants to do ED. What do you want to do?

**AUDIENCE:** Imaging

**LAUREN DOYLE** Imaging, great imaging. So, yes, I agree.

**STRAUSS:**

**AUDIENCE:** Would you do a physical examination first?

**LAUREN DOYLE** Well, that is in a perfect world. Yes, we all do exams on every patient. And, yes, we would do an exam. But it

**STRAUSS:** doesn't matter what this exam looks like. Even if it's normal, I'm going to image. So that's why the exam is important and may make you change what kind of imaging you want. And it depends on what your resources are in your community, but either way, this kid is getting image. Whether or not it's an MRI or a CT, we already know they're going to get image. OK?

So this is thunderclap headache. And so before we use to just do a CT, and if the CT was negative, we move onto an LP. Because there are sometimes subarachnoid hemorrhage can be missed with a CAT scan. So we're doing an LP because we're trying to look for evidence of old blood. Because it's a subtle thing you don't want to miss. Because sometimes in the cat scan, the bleeding is not big enough that we can miss it on the imaging. Which is why we're doing the LP.

In the past, we used to say LP is normal. Oh, and great, it rules out meningitis as well. And then we're like, OK, treat your headache with some meds. And we'll send you home. But now the world has changed. Because we know that there are other conditions now that can be part of a thunderclap headache. And that is vascular problems. So now it's not enough that we will do a CT. We will actually move on to do vessel imaging. OK?

Does anyone know what RCVS is? So this is a condition that affects the blood vessels that used to be called Call-Fleming syndrome. And it's been discovered in the last, I guess, in the last of 50 or so years. And what happens is you have a reversal vasospasm that occurs in the blood vessels. And they will come in with intermittent thunderclap headache. But they may be first presenting for the first time with the headache, first time they have the headache. And it could be RCVS. So if their headache is really onset thunderclaps severe, and their prior imaging is normal, a lot of times if we get a neural consult, we're going to ask for imaging because we're looking to see if there's beating of the blood vessels, OK?

And the reason you want to know about it is their increased risk for stroke. OK, so what other things can cause thunderclap headache? So I didn't put it in here. But actually people can actually have a pre-orgasmic or orgasmic headache. That can be normal. That's after we've done normal imaging. And then the other thing is you can have migraine brought on by exertion.

That can be a thing. But actually there's a primary headache disorder known as exertional headache. And so they'll present with intermittent thunderclap every time they weight lift. They have a severe rapid onset headache. And then you do all your whole work up. You're looking for dissection. You're looking for aneurysm. You're looking for all these things. And it keeps happening every time their exercising, and the imaging is normal.

So if it is solely based in exertion, then we treat with indomethacin as a pretreatment. And then we can also treat with the daily medicine if it's happening frequent enough. So I had two patients in my clinic just last month with that.

OK, so we kind of already went over some of the other work up there. OK, new case, 8-year-old girl, she's got new onset headaches this year, worsening in frequency. It's based in the occipital area. We're worried about it already, right? Occipital. OK, and it also sometimes goes into her neck. Well that makes me feel also a little bit-- I'm going to be a little more careful about this patient. There's no nausea. There's no vomiting. And guess what? Unfortunately, there's no photophobia or phonophobia.

And then she feels some odd symptoms. She noticed some hot and cold sensations that she's feeling differently in her arms versus her legs. OK? And then she's feeling some tingling in her hands bilaterally. Do migraine patients have bilateral symptoms? They can, right? But I'll tell you, that's not usually from the aura. OK? Because the way an aura spreads, it spreads like a seizure.

So if it's slowly spreading, and it's coming across one side of the brain. It has to go to the other side to get bilateral. So a migrainer, if it really is going to spread, it's going to start on one side and kind of spread across. But the people who complain to of a bilateral tingling in their hands, I could probably guarantee you that they're hyperventilating, and they're causing them themselves have tingling on top of their headaches. OK?

So it's not a common feature to hear bilateral. Sure it can happen but not common. So this is something else I would say. Any ideas?

**AUDIENCE:** Chiari.

**LAUREN DOYLE** Did you cheat?

**STRAUSS:**

**AUDIENCE:** No.

**LAUREN DOYLE** So Chiari, she got it right. OK, so this is Chiari. So why does a Chiari cause those symptoms? Does anyone know?

**STRAUSS:** Yeah, so, yup, you guys are all in the right ballpark. So basically if you have such a severe Chiari, what can happen is the fluid can build up in the central canal, in the center of the spinal cord, and then that can affect certain fibers that affect your sensation. So you can end up with a cape like distribution of sensory concerns. And a lot of times they noticed that when their in the shower.

So that would be maybe that the child that I have there has a syrinx along with their Chiari. And then the bilateral symptoms also goes along with maybe either the brain stem or the spinal cord is affected. But these headaches are typically occipital. And in the past they used to think the Chiari only happens in older patients like the 40 and 50 year olds.

But now we know, actually, it can happen in a lot younger patients. And so you don't want to miss it. Because in our younger patient, it might be something, if they're having severe headaches, you can drastically change their life if they really have a severe Chiari. Because then you're going to want to operate.

We do not operate on every Chiari. So when you see a Chiari, it is good to talk about the possibility of a surgery. But you don't want to give the impression to the family that's the only option. I would refer to neurosurgery if you see a significant Chiari. But a lot of times we actually manage these medically with medicines. And then we see if their headaches get better. Because it's not always that if we operate on Chiari that the headaches immediately go away. So we have to be very careful on who we operate on.

OK, so another case, 17 year old, she's got PCOS. She's got headaches that started two months ago. They are worsening. And they're now daily. She has transient episodes where her vision just goes black. OK, that's kind of scary. And then she also has blurring of her vision when she looks to the left that resolves when she closes one eye. And she hears ringing in her ear, "in my ear I hear ringing." OK, so this is a primary headache, or is this a secondary headache? Secondary, we would be very worried that this is a secondary. Because there's some weird symptoms going on, right?

So what does it mean when transient episodes where your vision goes black? What's our visual-- what's our medical term for that? I heard something over there. Transient visual obscurations, so that's a common description in patients who have increased pressure in their head. They will blink. The vision goes black, blink, blink, blink, vision comes back.

So it's a very few seconds. Sometimes they won't tell you about it. So you want to ask them if you are really worried. OK, that's called transient visual obscurations. OK, what's this deal about blurry vision when looking to the left, and then when they close one eye, it goes away? Would you get it?

**AUDIENCE:** [INAUDIBLE] nerve--

**LAUREN DOYLE** Perfect, so this is a six nerve palsy. So we're always looking for it on exam. But sometimes the patient will tell you. So a six nerve palsy is going to affect your lateral rectus. And so when you ask them to move their eyes to the side, they'll notice some blurring or double vision. And if they close one eye because it's the misalignment of the eyes, the blurry vision or the double vision will go away. And it's noticed in extremes of vision.

So when you do your exam, if you're not so confident about your papilledema exam-- you know that takes time to get really good at. And that you're not confident, you absolutely want to test their extraocular motion and ask them if they have blurred or double vision on extremes. And if they do, ask them to close one eye.

So say they close their eye, and it doesn't go away. Or say they close their eye, and they now see three. It is not a six nerve palsy, OK? It means it's either psychogenic or it's migranous, OK, or medicine induced. OK, so it's more that it goes away when you close one eye. So that's concerning. And then here is ringing in my ear. What's our medical term for that?

**AUDIENCE:** Tinnitus.

**LAUREN DOYLE** Tinnitus, right, so it's a unilateral, right? What's up with that? That's concerning. OK, so what are we worried about? Pseudotumor, great. OK, so pseudotumor is not just in females. It's not just in people that are overweight. **STRAUSS:** It happens in all ages. And what triggers us about a lot of those features, sixth nerve palsy is the most common neurologic exam finding, other than I guess papilledema in someone who has increased pressure headaches.

And the reason for that is that the sixth nerve is the longest nerve in the brain. And so it has the furthest to travel. And that's why it gets often compressed. So patients with pseudotumor can also have other cranial nerve problems.

But the sixth nerve is one of the most common. So they can also have a third nerve and other nerve involvement. So the only way to diagnose is with an LP. And when we do our LP, in the past we used to think that 20 was our cut off. But now we have new evidence that we're actually moving that target to 25. So 25 is where I stand. And then you also want to look to see if the patient gets better after you tap. So they're borderline, and you don't want to commit necessarily to that diagnosis, there's nothing wrong with tapping and then seeing how they do before you immediately jump to starting Diamox or Topamax, OK?

So another thing this could be because of that tinnitus going on in the area, that could be from increased pressure. Sometimes you wonder, is there a cause for this increased pressure? How are the headaches behaving? Do I need to worry about venous congestion as a cause? So Cerebral Sinus Venous Thrombosis can definitely be something on the differential. And if they're on birth control-- and definitely our pregnant patients-- but if they're on birth control, that would increase their risk of having a clot there. So you do want to worry about that.

And imaging here at Brenner's, I've been educated that they can actually pick up on most clots in the veins if you do an MRI brain with and without contrast. So you don't always need a dedicated MRV, and if you're definitely worried, you want to go on to an MRV eventually. But a good screen-- if you really are worried about this, just go to straight MRI, brain and with without contrast.

OK, so I wanted to introduce this idea because you see after a tap that some people have low pressure headache. But sometimes from exercise, we have patients who have ended up with a dural tear. And they can have a low pressure headache. So they're definitely going to have an opposite positional feature to their headache, that their headaches are worse with standing. And usually we're very conservative. We don't go straight to doing a blood patch. But they are treated with caffeine, rest, laying down, and lots of hydration.

All right, so we're moving on to treatment. Any questions? So I put up a very dramatic picture. So this is a skull of actually trepanation. So this is an old, although still probably currently being done in some areas of the world, treatment for migraine. It used to be thought that migraine, or some severe headaches, were related to evil spirits. And if you could just burn a hole in their head and let them out, then your headaches would go away.

So when people present this slide-- a lot of times it's a favorite picture that is present in a lot of our headache talks-- Oh, five minutes, OK-- is that they like to say, well if someone drilled a hole in my head, I'm not going to go back and complain about my headaches any more. So it's a good treatment. But you need to be aware there actually are some surgical treatments of headache out there right now. And there is a lot of things that are still happening in the surgery world that we're not yet sure are right. And triptans, if you look, were developed in the 1980s.

So these are not-- this actually hasn't been around that long. And we really don't have many treatment options right now for headache. This is how I approach abortive treatment and headache. And, basically, I think of it as step one, step two, step three. And it really depends on the patient, the situation. You are more than welcome to go up to step three. So I'm kind of tailoring it to what the patients been through and how bad their headaches are.

But I'm going to think of Tylenol, Motrin. I usually advocate for them to combine it with Gatorade, which is electrolyte containing fluid. And some of my young, young patients, the parents don't want to use any medicines. They can just try Gatorade. And a lot of times that helps during a headache. And just think about if they're dizzy or feeling unsteady, that kind of helps pump up their blood volume and helps them feel a little bit better during it.

And then if I think I need a little bit more, a lot of times, especially in the younger patients, I'll move onto an anti-emetic, such as Reglan, which is anti-headache as well as anti-migraine, or Compazine, or Phenergan. Zofran is a great anti-nausea medicine. However, it's not so good at aborting headache. So it depends on what their symptoms are. But that's usually what I'll think of. And if they really have more moderate headaches, I will actually give them a combination. Because we know about NSAID's combined with some of our other medicines, they actually work better, kind of like 1 plus 1 is 3. So I will, in some of our more severe patients, combine them at the start of the headache.

And then when they really need something stronger, I will go to triptans. In the past, we were very worried about using triptans in young patients. And my age in that is going down to now like five is where I start to hesitate. So I don't want you to be worried about using triptans. And the key is educating and treating early. There's so many patients, they're waiting hours and hours and hours, going home from school, and they're not treating. And then no surprise that the headaches aren't being resolved.

OK, and when you make that first prescription is when you educate them on medication overuse. OK, so here's some of the options we can do. OK? And we'll go through. So, triptans, so there are seven in the class. OK, so the way I like to say is, we are looking for a good pair of comfy shoes. We try one. We'll keep trying until we find one that matches, that you like, and is comfortable, OK?

So there's no way to predict what is going to be the best one and which one is going to have side effects. If they have a problem with one, we can't tell when we move on to other ones what's going to be the best option. So I usually start with sumatriptan which is generic. And then if I need to, then I will go on to other ones. And the reason I do that is it's generic and is more likely to be covered by insurance. And it gives you options, 25, 50, or 100. So you can pick 25 milligrams. And that you know, in a pediatric patient, is better.

But if they're an older patient, and they're almost adult size, I will go straight to 50 milligrams of sumatriptan. If they have a lot of nausea and vomiting with their headaches, then I will go on to something like a melt away like Maxalt or a nasal spray. And I prefer the zolmitriptan or Zomig because it has more uniform spray compared to the sumatriptan.

But basically we're trying more than one. We keep going through them. And you want to limit it to two pills a day and two treatment days a week, so they don't develop medication overuse. What you want to educate them on so they don't hate you is that you can have a lot of flu-like symptoms. You can actually develop flushing in the face and chest. And you can develop a tightness around the throat. And that often is something that they'll panic on and think you gave them a bad medicine. Right?

I don't want you being worried about serotonin syndrome. There's a lot of looking into this. But, basically, the triptans are acting on different receptors than the ones that we know that mitigate serotonin syndrome. Sure, if you're on very high dosing of a serotonin agent, and then you add triptan into the mix, you could-- but low dosing of an SSRI combined with the triptan, we are not worried any longer.

You're asking is, how bad is it before you give a daily med? You're going to gauge a lot of this from the family and the patient. But we're thinking that more than one to two times a week their complaining of headache. If they're having lots of missed days of school or multiple emergency room visits. So even if they have a headache that lasts-- that's once every month. You think that's not a high frequency. If they're down and out and miss two days of school, and they're in the emergency room every time.

Then, for sure, then they are a good person to think of a daily preventative. And I don't have a favorite because I tailor it to what other co-morbid symptoms they have. If they have sleep problems, my favorite is amitriptyline because it makes them fall asleep at night. If they have anxiety, my favorite is propranolol, also gabapentin if they have anxiety.

And if they have ADHD, I'm going to avoid Topamax. And the reason for that is because it can worsen their ADHD. And if they have asthma, I don't avoid propranolol because it's not a-- unless it's severe asthma that they're in and out of the emergency room for-- it's not a reason to avoid propranolol. And if they're really, really young my go to is cyproheptadine because of the mild side effect profile. And you can use calcium channel blockers. I just don't usually use them first.

OK, so her question was, is Alice in Wonderland syndrome the same thing as migraine with aura? So it's very interesting. I mean, there's so many wonderful things we can talk about in migraine. But in pediatrics, we also deal with a lot of migraine variants. And one is Alice in Wonderland syndrome. Where people experience distortions in the perception of body parts. So they can look at their hand, and they can look smaller or bigger than it normally does to other people. Distances are skewed.

And it's kind of like Alice in Wonderland. Everything that was upside down is upright, and everything that's distant is close. And it usually happens around age 4 or 5. It supposed to be quite common. Although, they rarely come to the office to talk about it.

And it is a migraine variance. So it's not migraine with aura because they don't initially have headache with it. And it lasts hours and sometimes a lot longer than that. So there's other migraine variants, cyclic vomiting, abdominal migraines. And the new hot topic is whether or not infantile colic is a migraine variant.