Debunking Vestibular Migraine

Presenter: Debunking Vestibular Migraine

It's my pleasure to welcome back today to audiology online, Doctor Kaitlin Ryan. Today, Doctor Ryan will be discussing debunking vestibular migraines. If you'd like to learn more about Doctor Ryan and her background, you can read her bio on the course registration page. But at this time, I'll hand the mic over to you. Doctor Ryan, thank you so much.

Hi, everyone. It's good to be back. Today we're going to be talking about vestibular migraines, and hopefully it is something that we can all kind of take away from. These are my disclosures and these are the learning objectives. I'll go ahead and read them.

Number one will be that you are able to identify key aspects of the diagnostic criteria and clinical features of vestibular migraine. Number two is that you're able to identify aspects of case history that separate vestibular migraine from other vestibular disorders. Number three is that you are able to discuss how to recommend treatment and test options that are better tailored to a vestibular migraine patient per evidence based research.

All righty. How we're going to attack today is obviously in a very organized way, hopefully. First, we're going to start talking about the history of vestibular migraine. Second, we'll go through some of the epidemiology of vestibular migraine and how it intersects with other types of migraine. We'll talk about the comorbidities within the vestibular realm of vestibular migraine.

We'll talk about the diagnostic and clinical features of vestibular migraine, of course, treatment options. And then throughout, we'll be talking about different case studies. Some of the case studies, if I do skip over, are all available in the handout. So if I do look like I'm you passing something over, it should be available to you. So first things first with the history.

The relationship of dizziness and migraine dates very far back to the 19th century in kind of more recent studies. And it has lots of different origins, but there are what is considered to be an electrical or a neurologic origin that appeared as far as that time in which it was described very analogously to epilepsy. And now in the realm of epilepsy, it was described based on the paroxysmal or kind of brief, transient nature of it, as well as sort of this storm of neural firings, which I'll talk about in a minute. There are also vascular origins of migraines, in particular, that date back to the 17th century, but it wasn't until the 1930s that a neurologist, Doctor Wolff out of Cornell, started to study this origin a little bit more closely, and he invented several theories as to why there are vascular origins of migraines. In 1984, there was what is considered to be a landmark study defining a vestibular migraine as its own separate entity.

But sadly, it wasn't until 2012 that there was a consensus document and criteria published related to specifically diagnosing and understanding vestibular migraine. This document was a brainchild of the Berenice Society for representing ENT and vestibular, as well as the international classification of headache disorder. So it kind of came together as one. The epidemiology of vestibular migraine is a little bit sporadic, as I think the theme of the day will be. There's lots of different studies that approach the epidemiology of vestibular migraine in lots of different ways.

So kind of as a consensus across these documents, there's anywhere between 1%, up to about two and a half percent of the population, that experience vestibular migraine in the general population, but anywhere from ten to almost 30% of them of. Of people coming to our dizzy clinics are going to be experiencing vestibular migraine. There was also an update in the consensus document in 2022 that suggested that about 13% of individuals seeking treatment for headache also have vestibular migraine. Overwhelmingly, the prevalence of male to female is much higher. On the female side, there are studies that say up to 85% of patients who have vestibular migraine are female.

But across all of these studies, you'll see that there's a four to one ratio in favor of female. There's a 1.5 to one ratio, and there's another metric I read that's like 65% to 85% of patients seeking treatment for dizziness who are female do have vestibular migraine. They are often sporadic in the report of if dizziness and headache come together or separate, but as you'll see in a few minutes, it kind of also runs the gamut. So finding an epidemiology consensus can be quite tricky.

The pathophysiology is where things get even trickier. There's lots of different theories and kind of ideas as to why people get migraines, but in particular, vestibular migraines. However, all of the documents that I read specify that the pathophysiology of a vestibular migraine is a derivative of a classic migraine. There's an electric or neurologic pathophysiology that, like I mentioned before, is what is classified as, like, a nerve storm or a neural firing that is not dissimilar to epilepsy. And some people who've studied this suggest that the kind of source of the neural firing is from the visual thalamus.

That theory was not widely picked up, but there is sort of some theories that if this particular scientist had claimed that it was just the visual cortex, overarchingly, it may have picked up a little more steam, because other studies have shown that there is an intense excitation of nerves across the visual cortex in individuals who have vestibular migraine. And it jumps us into our next pathophysiology is that there's often an intense dilation and constriction of the flow of electrical activity, as well as blood flow to and from the brain. A vascular origin of vestibular migraine and migraines in general, is typically related to the trigeminal nerve vasculature. And it's typically involved in the activation of releasing different vasoactive peptides, which spans out of my wheelhouse. But those are all at the end of blood vessels.

What it can do is it causes cerebral palsy, vasodilation, but also what they're calling a vasospasm. So those blood vessels kind of open and constrict and open and constrict and cause, in some theories, the onset of these vestibular symptoms. There are some relation to, like, visual or occipital headaches and occipital migraines. And there are a whole other classification of migraines called retinal migraines, where this vasodilation and the vasospasms can cause monocular blindness in some people. There are theories that there are vasospasms that feed into the inner ear.

So it would be on the cochlea or the vestibular branch of some of the internal auditory arteries that become constricted and dilated repeatedly, which might cause the onset of otologic or vestibular symptoms in patients with migraines. So when they complain of oral fullness or tinnitus, or that their hearing might be fluctuating, there are theories that it's because of this vasospasm that's happening. There's also a specific genetic component to vestibular migraines and just plain old migraines in general. It's considered to be a genetic disease by many, many neurologists. And across all the studies, I read, about 40% to 90% of patients have some family history of migraines.

Typically in what I was reading, again, going back to that female dominance, it's a lot of mothers or grandmothers, sisters, aunts, things like that. And usually around the time of puberty or big hormonal changes, it is again compared to epilepsy as far as how genetic it can be. And there are theories that similar to epilepsy, anyone can have a migraine, anyone can have a seizure if provoked appropriately. So there are some naysayers about how genetic it is. There's also quite a bit of heterobility.

There's links to an autosomal dominant component amongst families with how genetic migraines are. But there's also different chromosomes that have been identified as putting people at higher having genetic having mutations on these chromosomes can put people at a higher propensity to have migraines. There's little evidence to drive home certain ones, certain chromosomes and certain genes that can cause migraines

and vestibular migraines. But science is getting a little bit closer to nailing those down. There's other pathophysiology theories related to inflammation and cortical diffusion inhibition similar to epilepsy, as well as multisensory disorder, but those have been as well studied.

These are the main three.

Now we'll move on to some of the diagnostic criteria and clinical features that are prevalent. The diagnostic criteria for vestibular migraine, like I mentioned, only came about in about 2012. It was clarified in 2022, but it was not changed. The first thing that someone needs if they're going to be diagnosed with a vestibular migraine is they need to have at least five episodes of vestibular symptoms of moderate to severe intensive lasting five minutes to 72 hours. The update in the 2022 document specified that moderate to severe means that moderate it inhibits but does not prevent you from participating in daily activities, and severe would mean that it prohibits you from participating in daily activities.

Additionally, you need to have a current or previous history of migraine, with or without aura, per the international classification of headache disorder version three, and you have to have one or more migraine features with at least 50% of your vertiginous episodes. Another clarification that the 2022 document made was that you can have one feature with a migraine, but it can be a different feature with each migraine. So that feature doesn't have to be consistent across all your migraines. You can have multiple features then. Lastly, it has to be not better accounted for by another diagnosis either.

Vestibular or headache related. Now, with line item a, those qualifying vestibular symptoms are spontaneous vertigo, which is a false sense of motion, whether that's visual, kind of your world is spinning or internal. I feel like I'm the one spinning. Positional vertigo following, particularly head position change. Visually induced vertigo.

This is what I think a lot of people describe as like riding in a car and like, the light moving in between the trees is really triggering for them. Head motion induced vertigo. So that's during a headache, and then head motion induced dizziness with nausea. And the 2022 document clarified that this is specifically disturbed spatial orientation versus lightheadedness or imbalance. And then the migraine features that have to accompany the headaches is a headache with at least two of the following characteristics.

It has to be one sided location. So a lot of people will say that the migraine is like covering an eye or covering their temple or over the side of their face. It has to be pulsating in quality. So a throbbing pain. And again, it has to be moderate or severe pain intensity, slowing down your participation in daily activities or preventing them entirely.

And it has to be aggravated by physical activity or routine activity, like walking or doing your job. You also have to have photo and phonophobia. So light and sound sensitivity and specifically visual aura, as opposed to a different type of aura. And this was again clarified in the 2022 document, that it was a specifically visual aura versus asomatosensory aura or a vascular vestibular aura, which some people do experience.

There's also a kind of subsection of vestibular migraine, which is a probable vestibular migraine where you don't quite meet the diagnosis, but you just might. Similar to the different classifications of Meniere's disease. However, this is not in the international classification of headaches. So probable vestibular migraine, you still have to have at least five episodes of vestibular symptoms with moderate to severe intensity. You also have to have only one of criteria b or c, so only a current or previous history of migraine, with or without aura, or one migraine feature with at least half of the vertiginous episodes.

So one or the other. And then, of course, it has to not be better accounted for by another diagnosis. And this was also clarified in the 2022 document that the. That it's not necessarily that you don't have another diagnosis, but that the symptoms that you're describing are not better accounted for by another diagnosis. You can have multiple diagnoses, but what you're describing best fits with vestibular migraine.

Now, I'm going to talk about a couple of case histories with patients that I've seen in my clinic. This first patient, she was a 15 year old girl, and she was referred by her neurologist. She had successive concussions that started her symptoms. She was involved in a skiing accident without a helmet. Unfortunately, she did report dizziness at the time of the first concussion.

Unfortunately, was not treated or didn't seek medical attention. And then because of the dizziness, she fell down some stairs and suffered a second concussion. So second impact, and that started a huge slew of vestibular symptoms. The vestibular symptoms that she experienced was on a monthly to weekly basis, and it lasted hours. She would experience a sensation of her environment spinning.

Her depth perception would change. She'd become nauseous, blurred vision. Her vision would bounce. So, oscillopsia, she'd get very motion sick in cars and pretty much anywhere that you can get motion sick, she'd get it. And she would notice that positional changes were a specific trigger for her, particularly at her job.

She worked at an ice cream place, and she would move back and forth repeatedly, which seemed to trigger her vestibular symptoms. Headache wise, her headaches were worsened with her symptoms, but they were not always present together. She did have light and sound sensitivity, and she also described something as brain fog, where

she kind of felt cloudy and muted and a little bit more lethargic. Otologically, she described bilateral oral fullness and tinnitus. It would alternate between her ears.

It wasn't always constant, and it was never just one ear. It was kind of between her ears or both. She did eventually meet the diagnostic criteria for vestibular migraine, which was good for her to hear, so she could get started on some treatment. The second case was a 30 year old woman who was referred by an ear, nose, and throat doctor, and she was also referred by neurology as well. She was involved in a car accident in 2016, and it caused the onset of right temporal headaches.

And vestibular symptoms came on in about 2021. Vestibular wise, she had seconds to minutes long episodes, recurring several times a week of an illusion of movement. So again, external sensation of spinning. She had distorted vision, and it got worse if she was in motion. So she specifically described a phenomenon called supermarket syndrome, where if she was walking, particularly in a store, there was lots of colors and items on either side of her.

In front of her, there was people moving all about. The lights were bright. The floor was very shiny. She felt completely disoriented. By that, and she started to avoid those types of things.

Migraine wise, she would get two to three migraines per week, lasting hours, all on the right side of her face. She would rate them as a seven out of ten intensity, and it came with light and sound sensitivity. She didn't have a specific visual aura with the migraines, but she did see halos around people at all times. She did not often experience migraines with the dizziness, but if she did have a headache at the time that she was dizzy, she did not find that one affected the other. They kind of were their own entities.

Otologically, she had bilateral tinnitus that seems to fluctuate with the dizziness, but as she had reflected, she was not sure if that was because of stress.

So next, one, couple more. So these are another two patients that I saw. The next one is a 62 year old woman who was referred by her primary physician, and she experienced two types of vestibular symptoms at the onsets of one and six years previously. Dizziness, which was her first label that she gave, started about one year ago, and it was the feeling of constantly being in motion when she was not. And it would come and go in seconds, long bursts, but it happened so frequently, it felt constant.

And then vertigo, which was the second label she provided, was a spinning sensation with nausea and vomiting. And this would happen one to two times a month and last for days. Migraine wise. She would get migraines only with the vertigo symptoms, and she would experience visual aura, so she would see spots. She had light and sound sensitivity, very severe head pain.

And she said that she would become very disoriented, so she would get a little bit more confused. Her thought processes would slow. And she mentioned specifically word finding difficulties. She did not have any otologic symptoms. And then the last one we'll talk about is this next patient number four.

She was a 39 year old female referred by neurology. She was referred on the suspicion of vestibular migraines. Vestibular wise, monthly episodes of dizziness lasting minutes to days. Dizziness, to her, felt like room spinning, visual disorientation, imbalance, and nausea. She had some association of these symptoms with her menstrual cycle.

For these more intense episodes that she would experience, however, she had a lot more milder episodes at random. Migraine wise, she said that her migraines were not

exclusive to her dizziness, and she had head pain. I think it was on the right side, and it was behind her eyes. She had reduced depth perception, so she felt like her vision was not very astute, light sensitivity. And she also had aura.

She would see flashes of light behind people. I got a question here. So it says, can you discuss visual aura spots more? Are they of a specific color? Do they show up spontaneously, independently of other symptoms?

So, as far as I know, with visual aura, they do not necessarily have color, but some do, some don't. People describe all kinds of things with visual aura spots, sparkles, flashes, zigzags, kaleidoscope vision, halos around people, shadows. To my understanding, with migraines, they're a hallmark of that visual cortex being activated. They don't typically have a specific color that I know of, but some people do report it, and they will show up typically around the time of a migraine. So for some people, it will be an hour or so before.

Sometimes it's only a few minutes. Based on other types of migraines, the different diagnostic criteria have different criteria for the aura that is associated. In the case of vestibular migraine, it has to be a visual aura. So something that they're seeing that's perhaps not real, and it typically shows up between five minutes and an hour before a migraine.

That was a good question, though. And otologically for this patient, she had bilateral tinnitus, bilateral pressure in her ears, muffled hearing with the dizziness and the migraine. So she just kind of felt completely disoriented. She also did meet the diagnostic criteria. So I'm going to skip ahead from some of these cases here.

We'll talk about a few more at the end. So overall, we're going to look at kind of the diagnostic criteria. So these are all the cases that we talked about. We specifically

focused on numbers one through four. Do they meet the criteria of having certain vestibular episodes?

And, yes, they all did. They all had five or more episodes lasting minutes to hours with any of these associated vestibular symptoms. All four of them had a history, current or previous of migraine. They had varying types of the migraine features with each of the episodes. All of them, as an observation, describes moderate to severe pain.

Some of them had unilateral quality. None of them described a pulsing quality. But typically it's more of a dull ache. Based on what people have described, half of them had light and sound sensitivity, and then three of the four did also describe a visual aura. So they all met those marks.

Now, was this better accounted for by another diagnosis? Unfortunately not. I will show that in a few minutes, they did meet the vestibular migraine diagnostic criteria. And in case number one, she also did meet another vestibular disorder criteria. She had a labyrinthine concussion as well, which manifested as a vestibular peripheral weakness.

She had a left sided peripheral weakness, but I will show that in a minute as well.

Now we'll move on to some of the clinical features that people will describe. One of the studies that I read noted that 66 or more percent of patients reported vestibular symptoms who went on to be diagnosed with vestibular migraine, compared to about 12% of the control. Migraine with aura is more likely to have vestibular symptoms, which might be related to ischemic changes. And only 25% of patients experience headache with a vertiginous attack, which, as I demonstrated with those case studies, that sometimes they do, sometimes they don't. During the attack, you'll sometimes see spontaneous or positional nystagmus, but not always.

And in a study that was collected with 208 patients, 87% of them met the diagnostic criteria for vestibular migraine, and 70% of them experienced migraine symptoms with some or all of the vestibular attacks that they experienced most frequently. The episodes last minutes to hours, and this was mimicked in a cross sectional study in Europe. Another study kind of had a smattering of duration of the episodes spanning from seconds to days. And what I did read and I found interesting, is that these second long episodes that people describe tend to happen so frequently that often they are described as a constant feeling that they are constantly dizzy, they constantly don't feel well, and it's typically because these seconds long episodes come and go so quickly, but it just feels like it's all the time. Individuals who have days long episodes of vertigo can take up to four weeks to recover if the core attack was about three days per this study.

And 20% to 40% of these patients experience hearing loss, tinnitus, and oral fullness related to the acute attacks. It did not specify, though, if that was unilateral or in both ears. Another study also kind of breaks down the amount of vertigo that people experience in the types of vertigo. They experience spontaneous rotational vertigo, positional, non traditional, or non rotational positional vertigo, meaning they feel like they're going side to side or up and down, and then vestibular dizziness, which was not well defined in this study, but I'm assuming it just means kind of feeling off. Spontaneous rotational vertigo is the most commonly one described.

And as far as duration goes in this study, longer than five minutes was the most, and longer than an hour was the most common length of time that people experienced vertigo.

And then across three articles, they all kind of all overwhelmingly discussed that spontaneous vertigo, visual vertigo, and positional vertigo are the most common

features, which, now that we know the diagnostic criteria, we know that those are the requirements. So that's nice. And head motion induced dizziness. Again, one of the diagnostic criteria requirements is that that is a symptom people experience. However, they also noticed that this population of individual was more susceptible to a persistent motion sickness.

They were also more susceptible to nausea and imbalance, as well as not only light and sound sensitivity, but smell sensitivity. So being overwhelmed by different scents, which I do notice that some people describe in my clinical practice, they also go over several triggers, which I thought was interesting. Just like all migraines, there's triggers for different ones. Alcohol, lack of sleep, fasting, so not eating enough, the diet that you're keeping, stress, hormonal changes, different sensory stimuli, and weather changes tend to be the most common triggers that people will report in vestibular migraine. Personally and anecdotally in my clinical practice, I find that hormonal changes, weather changes, and stress to be the main three that people will tell me.

This was a nice quote that I found in one of the studies that I was reading that there is a book that was published in 1970 on migraines by Oliver Sacks. And he described that presiding over the entire attack, there will be a general feeling of disorder which may be experienced in physical or emotional terms and tax or elude the patient's power of description, which I think hits the nail completely on the head. As far as getting a case history from these individuals, I find overwhelmingly that getting a case history from a patient with a vestibular migraine can be extremely difficult and extremely overwhelming for the patient. So keeping all that in mind, we'll get kind of down to the brass tacks about it. How do we navigate the case history when we're asking all about their symptoms?

And if they're starting to kind of reveal to us that they have a vestibular migraine, how do we get down to the bottom of it and really try to help them?

So in the Jacobson text, it's the big red textbook that I think we all use for our vestibular classes. They actually offer a diagnostic interview for a determination of vestibular migraine questionnaire, and it kind of basically is something you can give to the patient, and they let you know if they meet the diagnostic criteria just by ticking the boxes. I personally find that tailoring my case history questions to what the diagnostic criteria is. Can be quite helpful if it's starting to shape up that way. It allows me to kind of ask those questions and have them answered before I make a referral or signal that they seek different treatment rather than vestibular assessment.

And I also find that it's very helpful to use more patient friendly terms. So instead of, do you have any visual aura, do you see any spots or sparkles or anything funny in your vision? Are you experiencing rotational vertigo more? Does it feel like you're the one spinning? Or does it feel like the room is spinning around you?

So different types of questions, I think, can be more helpful. I do find that these patients can have a really difficult time describing things and need a little bit more prompting. I also really recommend trying not to get hooked on the patient's specific symptoms, experiences, and sort of the minutiae of what they're talking about. If I had a nickel for every vestibular migraine patient that came in with either a notes app full of symptoms and experiences or pages and pages and pages of things that they've noticed day to day, and, oh, I notice when I do this, this happens, and this. This happens, and it can get so overwhelming, and they are so distressed about their.

Their migraines, their dizziness, that they just want to tell you everything. And I think it can get really easy to get stuck on that. So I like to kind of keep it broad and keep it big and then work my way in and try to maintain control of the appointment somehow. I also like to look for clues about their triggers and anxieties and other experiences with

their dizziness. So if this has ever happened to them before, do they have a history of vertigo, and this is a new type of dizziness they're having.

How do they feel about the dizziness? Do they avoid things because of the dizziness? Do they now know that things are different if they've eliminated caffeine or try to sleep more or don't drink alcohol, has anything like that changed the nature of their symptoms? I'm also doing this as a deliberate attempt to fish for possible comorbidities that might be present. I also really, really try to validate them.

I validate the patient as very best I can. A lot of times, these patients have not been believed. They are not well evaluated at times, and sometimes they get passed around and done the doctor shuffle. I also tried to validate them. I believe that this is what you're experiencing.

I am here to try to help you, but I also tried to prepare a patient that the testing may not reveal an outcome that they're looking for. So it might be normal. And I find in this population specifically, that is the most devastating outcome of all. They just want to know the answer.

So as we move on to testing again, the information is quite sporadic. But I do want to ask a poll before we get any further.

So the poll is what seems in the diagnostic criteria, now that we've talked about the clinical features and the criteria itself, what feels like it's missing, so what seems like it's missing in relation to the diagnostic criteria and the clinical features, number one would be imaging studies. Number two would be test battery and hallmark outcomes that we might expect. Number three would be other familial history, so kind of patient's deeper history and their family tree. Four would be neurologic involvement or involvement of the neurology clinic. So give you a minute to kind of pick and choose.

I find that this is the trickiest one. I think that this is the one that eludes providers the most, and I think it's the one that is most frustrating to providers that there isn't more of this. So I'll kind of explain a little bit more about the answer once we get the information. So it looks like about 28% of people said imaging studies, 43% of people said test battery and Hallmark outcomes, 7% said the familial history, and 22% said involvement of the neurology department. And I think that the majority hasn't nailed.

So there is actually no test battery available or hallmark outcomes available in the diagnostic criteria. So the testing itself doesn't tell you anything about if a patient meets the diagnostic criteria for vestibular migraine. It all comes down to the case history. So that leads me to my question of why are we even looking at the testing? Across all the studies I read, people exhibit low frequency sensorineural hearing loss in about three to 12%.

There's central vestibular dysfunction in a smattering of people, including spontaneous or positional nystagmus, gaze evoked nystagmus, abnormal random satcod testing. I do find that positional nystagmus tends to be the one I see the most. Photography and the sensory organization tasks are more likely to show visual preference or vestibular pattern than any other. And many people have directional preponderance that is exhibited on rotational testing.

There is this passage in kind of very brief little passage in that Jacobson textbook that the central positional nystagmus is one of the main things that you might see in somebody with a vestibular migraine, which I think is a very helpful little tidbit. So, continued in testing, you'll see here that there's just an absolute smattering of results that you could see on a test. 15% might have peripheral dysfunction. I've seen it as high as 25%.

There is 20% that show caloric weakness, but that weakness can be up to 50%. V hit can be reduced. There's lots of information about vamps in general, and for a while, my clinic was using vamps as more of a hallmark, but we determined that it's a really poor one. I have another question here that says, we have a patient in our clinic who had several VNG exams over the last few years, and her caloric test results seem to be wildly different every time. Unilateral weakness, normal bilateral weakness, back to unilateral weakness, etcetera.

She recently has been diagnosed with vestibular migraines. Could vestibular migraines cause caloric results to fluctuate in this way? That's a good question, and I think it is one that is really tricky to answer based on a lot of what I read. The answer is yes and no. Some scientists believe that based on the state of migraine that you're in.

So if you're in an attack, if you're around an attack, or if you're removed from an attack, your vestibular results can look very different. So it could explain the unilateral, bilateral, and normal results. But additionally, there are some theories that say that if there is an abnormality on a vestibular test and the person has a vestibular migraine, that abnormality related to the peripheral vestibular system is more likely attributable to something else. So it could be something else, but it also very well could be a vestibular migraine, depending on the timeline of her symptoms and when she. If she was in an attack, if she was near an attack, or if she was quite far removed from them.

So that's a very tricky question, but a very good one. So the answer is, I think, depending on who you ask, yes and no. But in my opinion, based on what I've read, I certainly believe that it could be.

So, going back to those case studies that I was reading a little while ago, these are some of the results that those individual patients produced. Case number one, the girl with the concussions, she had a left caloric asymmetry. She had poor vamps, but she

also had a positive cervicogenic screening. Another person had only asymmetric vemps. Another patient had some central markers.

One person had 100% caloric weakness. Another one had a bilateral caloric weakness. One was dead normal. And then another one had a pretty big caloric asymmetry. But her v hit was normal and she had poor rotary chair.

It runs the gamut here, which is why I think it is excluded from the diagnostic criteria. There's really no way to take these ten patients and peg them all for having vestibular migraine. Based on the nature of their results, you could peg them for other things, but vestibular migraine, unfortunately, is not one of them. This is another breakdown of those results. Then you might be asking yourself, why are we even doing this testing if it doesn't really provide us any information closer to the diagnostic criteria, however, overarchingly in the research, because there is no test to identify vestibular migraine, it is a diagnosis of exclusion.

So in my case, in my clinic, these tests are often ordered to rule anything else out, which is where I think the doctor shuffle comes into play. Everyone's trying to pass them off to somebody else. So if this test comes back normally, we're getting closer to a vestibular migraine. To answer that last person's question, you may see atypical results on testing during or shortly after an attack, which may explain why those results are a little bit more intermittent and fluctuating. So vestibular migraine, in essence, is diagnosed entirely on case history and clinical features.

So we do the testing to rule out anything else, to rule out anything else and meet that not better accounted for by another diagnosis criterion. But they could have multiple things, which makes it a lot more tricky because we're going to start to look at the comorbidities. There's lots of different comorbidities that you can experience with vestibular migraine. BPPV is a common one, transient ischemic attack or a mini stroke.

You can have vestibular paroxysmal, which is basically a vascular compression of the vestibular nerve, which causes, like, bursts of seconds, long episodes of dizziness.

You can have triple PD. You can have vestibular neuritis or labyrinthitis. You can have Meniere's disease, which is a big one. You can have migraines induced by vestibular activation. And you can have migraine aura.

And you can also have something called a basilar type migraine, which has actually been rebranded as migraine with brainstem aura.

Many of these are things that we come across every day in our clinic. Many of them are not. I don't work in a headache clinic. I work in a vestibular clinic. So things like the migraine aura and the transient ischemic attack and the basilar type migraine are not things I often deal with, but they are something that we can be aware of.

A transient ischemic attack is something that I will see people have had in the past, but not typically what they end up being diagnosed with.

As far as a stroke goes, some of the similar features one might experience would be positional and spontaneous vertigo, occipital headache, brain fog, so kind of feeling cloudy and dazed. And they might also experience speech changes. Some people do report having trouble finding words or processing information when they have a vestibular migraine. The differentiating features that you'll experience is the length of time with symptoms. Strokes are so brief and quick, but migraines tend to be repetition.

They tend to happen over a longer period of time. People who have strokes tend to have more vascular factors, and they will experience limb weakness. What we can do to differentiate the two is the hints test, which there was a podcast I listened to based

on how to handle dizzy patients that come to the emergency room. And this was the number one thing you're going to do the head impulse test. You'll see if they have direction changing or fixed nystagmus, and then you'll do the test of skew where you'll cover one eye and release it.

And if their eyes stay level while you do that, it's likely not a stroke. Head impulse. They will not have any ketchup saccades when you're turning their head side to side. And if they are having a stroke, their nystagmus will typically change direction based on where they're looking. So it will go left when they're looking left.

It'll go right when they're looking right. If it's more peripheral, you'll have the ketchup saccades. When you do the head impulse test, their nystagmus, if it is gaze evoked or in room light, should not change direction if they are looking in a new direction, peripheral nystagmus typically is direction fixed, and then the skew test would be negative. For BPPV. You'll have similar features would be positional vertigo.

That's what BPPV is. The differentiating features would be if they have nystagmus, you'll get that classic BPPV nystagmus, which is rotary and the length of the episodes or the predictability of the episodes would be very specific in BPPV and tends to be a little bit more vague in migraines. What we can do about it is a Dix hall pike or positional assessment, and you can try a Canalith repositioning maneuver. If it works, we know it's BPPV. If it does not work, we know that it was not.

Which is my favorite answer to give people. And then triple PD really starts to get muddy here, because I find a lot of people with migraines have triple PD. The similar features would be that they get that kind of supermarket syndrome where they get really uneasy in busier places. They'll be imbalanced. They get subjective visual vertigo.

Some of the differentiating features is that people with triple PD will start to avoid things. They'll have really rapid, catastrophic lines of thinking, spiraling thoughts about their dizziness, and they'll label specific situations in which their dizziness gets worse. So I used to work at the VA, and a lot of veterans would say that their dizziness would get worse if they were in an environment where they couldn't see the door. But if they could see the door, they'd feel better.

The catch is that these are highly comorbid, so sometimes they become one and the same. But what can be done is that oftentimes in the clinic I work in, the ear, nose, and throat. Doctors will trial SSRI medications and refer them to psychology to debunk some of what they're experiencing.

Another few comorbidities would be vestibular neuritis and labyrinthitis. The similar features is a really intense vertigo and imbalance with maybe, like, smaller little episodes. The differentiating features in a labyrinthitis, there will be hearing loss. And the other isolate kind of differentiating feature is that these are often isolated incidents. It's like a one day thing.

We have another question here. It says, in differentiating BPPV from vestibular migraine, what's the difference in length of attack? Typically with migraine, if they have seconds long episodes, anything that they're doing will cause these seconds long episodes. It may not be specific to just laying to the left or laying to the right, but people who have vestibular migraine will notice multiple different things trigger these seconds long attacks very, very frequently throughout the day, almost to the point of it feeling constant, whereas people with BPPV, it's a very specific movement that they make, and if they're not feeling dizzy all the time, they might just feel a little imbalanced. So, length of attack, still seconds, but with migraines it just happens a lot more.

And BPPV, it's a more predictable thing. That's a good question, too. How can we differentiate the difference between vestibular neuritis and labyrinthitis? What we can do is vestibular testing, and then we understand the timeline of their symptoms a little bit more. Vestibular paroxysmal is something that is not something I've ever seen before.

I think I've seen it maybe once, but the frequency of the episodes is similar to that of BPPV, where it's seconds long episodes, and it happens all the time. And this is also a diagnosis of rule out. So paroxysmal is a vestibular condition, and the length of episodes are seconds, but they're triggered frequently. What we can do about it is, in some cases, some doctors support imaging. Imaging is not a perfect way to diagnose, but trialing medication seems to be.

If the medication works, great, that's what it is. If it doesn't work, it might be more of a vestibular migraine. The medication that is typically used is an anticonvulsant or an epilepsy medication. The reason for that, I believe, is because it is a vascular problem and there's some connections there. Another question.

How often are vestibular migraines comorbid with or a result of idiopathic sudden sensory neural hearing loss? I didn't come across that in my research. The primary information that I read about hearing loss and vestibular migraines is that typically people have hearing loss in both ears, and it's a progressive loss. I didn't actually find anything about sudden hearing loss, but that would be something interesting to look into.

Then. The last one I wanted to talk about is Meniere's disease. We're going to talk about that for quite a bit of time, but some of the similar features are the lengths of attacks. They can come in minutes, hours, days, and they can, for some, come with

otologic symptoms. Some of the differentiating factors in some studies, they suggest that the tracings can help differentiate the two.

But in my opinion, what is the strongest is the differentiating factors of unilateral versus bilateral symptoms. Specifically, most studies will say that it comes down to a hearing loss. So in Meniere's patients, they will have a unilateral hearing loss or a low frequency, rising hearing loss, and in those with vestibular migraine, more often have high frequency, progressive bilateral hearing loss or no hearing loss at all. These are also very, very comorbid and is what I'm going to spend a little bit of time talking about. There are some precursors of vestibular migraine.

The most popular and overarching in the research is benign paroxysmal vertigo of childhood, which is like childhood vestibular migraines. And it can be very episodic, it can look very differently kid to kid, but it will often resolve by eight years old and then come back as a vestibular migraine if that's where they end up. We can work to identify this population of pre migraines and kids that might become vestibular migraine patients by asking very specific questions in their history. I always ask about cyclical vomiting as a baby, if they're clumsy, if they always complain about stomach pain, they've got headache complaints, if they have trouble meeting motor milestones, and if they have severe motion sickness, but most importantly, if they've got a family history of migraines. And when I see younger kids in clinic, I will always ask these questions.

You can also ask about a child's behaviors, if the environments that they're in make them fearful and why, or if there's any situational, hormonal, or behavioral compulsory to maybe what's going on.

So I will spend the rest of our little time here talking about vestibular migraine and Meniere's. But this is something that I could talk for, like, 6 hours on, just as is. Some of the clinical features of vestibular migraine versus Meniere's disease lie in a lot of the

minutiae. So, vestibular Ys in migraines that can last seconds all the way up to days, it can be spontaneous positional vertigo, visually induced or head motion induced. But in Meniere's disease, it typically lasts hours to days, and the vertigo is most often just spontaneous.

It comes out of nowhere. Nothing that they do makes it better. Nothing that they do makes it worse. Migraine wise, with vestibular migraine, as we've talked about, they have to meet a specific criteria with their headaches and migraines. But in Meniere's disease, about across all the studies, two to 80% experience migraines, so pretty widely varied.

However, light and sound sensitivity is more widely reported in patients with vestibular. With Meniere's disease. Otologically, Meniere's disease, as we all hopefully know, causes a fluctuating, unilateral hearing loss in the side where you have the meniere's disease. And at some point, that hearing loss stops fluctuating and just stays really bad and is really difficult for people. They will also experience fluctuating fullness in their ears and tinnitus in that ear as well.

Whereas in vestibular migraines, generally speaking, they don't have any kind of objective otologic symptoms, but they will often report alternating unilateral or bilateral symptoms in their ears. The comorbidity of vestibular migraines is, again, really well studied and wonderful. But vestibular migraine occurs most often in patients with Meniere's disease over other vestibular disorders. And vestibular migraine occurs more often in meniere's disease patients than general population. 28% of patients with Meniere's disease also end up having vestibular migraine, and they have a two times higher lifetime prevalence of happening together, if you've got one.

What I thought was pretty staggering is that 51% of patients who do have vestibular migraine are misdiagnosed with Meniere's disease, which I see all the time in my

referrals, that they report tinnitus and dizziness. It must be Meniere's. But this is a really, really dangerous slope to slide down, because the treatments for them are very different. And the comorbidity of these two diseases can be what causes the most uncertainty in providers. Individuals with both vestibular migraines and Meniere's disease, they tend to have more frequent vestibular episodes, and they tend to have more cognitive symptoms, like brain fog or word finding problems.

And they have a statistically significantly higher dizziness handicap inventory than just people with Meniere's disease. And they have a statistically significantly higher amount of anxiety than if they just had one of them, one or the other. So now we'll talk about treatment options for just a moment, and then we'll do a case study. So, treatment wise, this is where sort of patients leave our care, and they move on to either an ENT or a neurologist. But there's two schools of thought.

There is pharmaceutical and non pharmaceutical methods of treatment. Different pharmaceuticals. Treatments kind of rest upon what the provider feels is the origin of their migraines. So there's acute attack, sort of rescue medication, and there's also prophylactic medication. The prophylactic is usually used for people with very frequent and very severe attacks, and they typically have limited benefit from the rescue medication.

And then oftentimes, if the medication is controlling the migraines, well, they'll taper away after a few months. Non pharmaceutically, this can sometimes be more effective than medication lots of counseling, lots of self management, lifestyle modifications, so finding those triggers and modifying those. And there is a study that was done that suggested that exercise was as effective as some of the prophylactic medication, depending on the trigger, and then vestibular rehabilitation is where it gets a little more vague. But habituation and adaptation exercises tend to be the most helpful. As well as

gait training, there's also a lot of psychologic benefits, like improving their confidence and their balance and navigating their world.

However, there is a lot of mixed results on the success. So is it placebo? Kind of. Who is driving what? When we treat comorbid conditions, we first and foremost have to get the diagnosis correct.

So we need to figure out who's driving what. So what disorder is causing the most symptoms, and if we can manage that, we can manage the rest from there. And specifically, with Meniere's disease, you have to treat the with the least amount of damaging side effects. So if you don't have Meniere's disease and you do a gentamicin injection, it's really bad news. But if that is the right course of treatment after other things have been exhausted, then that would be sort of an appropriate timeline of treatment.

And I find that most providers do follow that there's lots of ways to kind of organize comorbid condition treatment, but typically, starting with the least invasive thing first and working your way down the line is usually the way to go. I do just want to go over a case study very quickly. This one I'm going to skip through, but I do want to go through a different one. This one is, again available in the handout.

So this case is a 51 year old female. She had a vertigo onset ten months prior to when I initially met her. She has a long standing history of a gradually asymmetric hearing loss that was sensorineural, worse than the left ear. She had a significant headache history, but her neurologist at the time did not believe that she had migraines. And her medical history includes a heart attack when she was 39.

Her vestibular symptoms were two types of episodes. She'd have more mild ones that would be throughout the week lasting up to 30 minutes, and she'd have these severe

monthly episodes that would last up to an hour that would just take the wind right out of her sails. She would experience nausea, vomiting. She would visibly have nystagmus, per her friend, she would have a sensation that the room was spinning, imbalance, brain fog, disorientation. She was an absolute mess, and she would have temporal headache.

She would have light sensitivity and sound sensitivity. The headache would be of a pulsing quality, and it was made worse just by existing in her life. She worked at a supermarket, so she did a lot of movement back and forth. Otologically, she had none with the vertigo and with the headache. Her differential diagnosis at the time was vestibular migraines and or possibly Meniere's disease.

This was her hearing loss, so not the best. She had that sort of moderately severe rising hearing loss, and then in the right ear, she had pretty normal hearing, and then sort of mild to moderately severe. We did the full vestibular test on her ocular motor was great. Positional was great. Vhit was great.

C vemp. We did what's called the meniere's protocol, and she had absolutely no vamps. Her calories was quite significant as well, as was her rotary chair. So this was her vhit. It looked great.

She had almost no vents. She only had one vamp at 500. She had a 74% left caloric weakness and a unilateral peripheral pattern on her rotary chair. That was where it got pretty interesting. She had a very significant peripheral vestibulopathy, and the clues about her pathology was that her v hit was normal, while the other peripheral tests were not.

So she did meet the diagnostic criteria for vestibular migraine.

However, where we get a little tricky is that it was, in an essence, better accounted for by a different diagnosis. So she was diagnosed with vestibular migraines and Meniere's disease of the left ear. However, her hearing loss was more likely to be explained by a cochlear hydrops. Based on what the ear, nose, and throat doctor said, her treatment plan was that she trialed a lot of migraine supplements without success, and then she ended up getting a intertempanic dexamethasone injection, which seemed to really, really help a lot of her symptoms, and she was only left with those really mild symptoms that she was then starting to manage with sertraline, and she was sent back to neurology to manage her headaches further. But this is a case where they really tried to use the migraine treatment plan to nail down her symptoms.

It did not work, so they took a more conservative approach with the dexamethasone injection for her meniere's disease, and that seemed to really help her, but she was still left with some symptoms, so they started back on the migraines, which I thought was an interesting evolution of her treatment. In total, vestibular migraine patients are likely to account for a high number of people that we see at our Disney clinics at the time. Nonspecific symptoms can rule out other pathologies. I do find that people who are more specific about what's going on tend not to have vestibular migraines. Case history alone is enough to determine if the patient does meet the diagnostic criteria.

And there is no vestibular test battery that we can use to diagnose vestibular migraines. There's a lot of comorbidities that are possible to help throw you from the symptomatology and so it's something to be mindful of. And treatment options work to target the dominant layer of symptoms in comorbid conditions. So they tackle the more dominant symptoms first and then you can circle back to the less dominant ones. But I really appreciate everyone listening and staying with me on this.

Hi, doctor Ryan. It doesn't look like we have any questions in the queue, so if you wanted to leave any last comments? Oh, we have one. It's just a comment saying thank you. Oh, you're very welcome.

I had a great time and we can go ahead and close the classroom. We really appreciate you, doctor Ryan, coming back and giving us this presentation. We'll go ahead and close now. Thank you so much, everyone, for joining us on audiology online. Have a good day.

Thank you.