Paws, Claws, and Balance Laws: Animal Vestibular Disorders Explained, presented in partnership with the American Academy of Audiology

Presenter: Patricia Gaffney, AuD, MPH, BC-VA

It is my honor to introduce our webinar today titled Paws, Claws and Balance: Animal Vestibular Disorders Explained. Today's course is presented in partnership with the American Academy of Audiology. Our presenter today is Dr. Patricia Gaffney. Dr. Gaffney received her AUD from the University of Pittsburgh and is Board Certified in Vestibular Audiology to the American Board of Audiology. Her primary clinical and academic specialty is vestibular diagnostics and treatment.

Please read more about her presenter in the handout and at this time I'm turning it over to Dr. Gaffney. Thank you so much and thank you for having me. So we're going to hear from me first.

Welcome. I'm Tish Gaffney, the president of the American Academy of Audiology, and I'm here to share important information about the organization. The Academy is dedicated to achieving recognition of audiologists as the experts in hearing and balance care and the field of audiology as an independent clinical specialty that is integral to the healthcare team. Through our partnership with Audiology Online, we're excited to offer courses like this one to help you broaden your knowledge and skills. We also offer the latest resources in practice management and evidence based clinical practice so you can grow professionally and improve patient care.

We advocate for our members in Washington and across the country to ensure that the voices of audiologists are heard and we help connect audiologists to one another through our valuable networking opportunities like our annual convention. To learn more about the Academy, make sure to visit audiology.org thank you. All right, so you can see that I have changed hair and I've changed title to past president. So these are my disclosures, these are some limitations and risks, and these are the learning outcomes for today's session.

So this is the outline of what we're going to be talking about in today's session. So we're going to be going over some anatomy, physiology, some disorders, how these disorders are assessed in animals. I have some case studies and then at the end we can summarize and ask any questions. You please

feel free to put questions in the chat or more importantly, in the question and answer box. I'm happy to answer anything.

So I just wanted to start off with, you know, like, why did I get into this? So first off, I'm a vestibular person, so dizziness and balance is kind of the world I live in. But I'm also very much in the dog world too. So this is me and two of my dogs. And so I have competed in agility with my dogs.

I have a Lot of dog trainer friends. I have vets that are friends. And this is something that has come up because people know I do vestibular. And so when they've had their animals have a vestibular issue, they've contacted me over time saying like, what happens? And so this has always kind of piqued my interest.

And I've had a lot of discussions with one of my vets about this. And so this is kind of what spurred this whole kind of side quest in, in my, you know, time of what I have to look into things. So we're going to start off with some comparative anatomy and epidemiolog.

So just kind of starting off, the vestibular system is much, much older than the auditory system by millions of years. And because it's so old, there are a lot of similarities amongst different types of animals because of how this happened through evolution. And when we look at mammals in particular, since they tend to be the closest to humans, we see that the structure in mammals is pretty similar. So similar number of semicircular canals. The otoliths, they all pretty much function the exact same way.

There are some variations that we're going to talk about that vary based on species of animal, but for the most part the vestibular system is fairly consistent on the animal side. What we really see a lot of variation is in the cochlear side because of how that evolved much later and different needs for these animals over time. When we leave mammals and we start going into other types of animals, there are more variations, particularly in some of the lower life forms. So when we start looking at like jawed

vertebrates who have three semicircular canals, this is where mammals fit in versus jawless vertebrates like lampreys may only have two semicircular canals. Hagfish only have one semicircular canal.

So when we get below mammals we do see a lot more variation, but amongst mammals we're actually, actually pretty similar.

So this is the inner ear of a cat. So if you look at the cross section, if you go in and go from the tympanic membrane in, it all looks very similar. Where we do see more variation is in this structure for the external ear, right? So we see this very sharp L looking bend that is a little bit different. And then this is canine.

So once again internal ear. So from the tympanic membrane back, it's, it's more similar. We have this L shaped ear canal as well. The one big difference here, and you can kind of see it, well, a little bit here, but more so in canines. They have a much deeper middle ear space and they call it the tympanic bulla.

I have another. This is a, this is a, a model. I took a picture in my vet' you know, and you can see that it's much more round and it has kind of a deeper pocket to it for that middle ear space. And that's going to come become important when we start talking about causes of dizziness in different animals.

If we look across to other animals. So we have equine. So our horse friends, very similar, they have a more straight horizontal ear canal, but the internal middle ear, internal ear, very similar. And I just wanted to expand it out just a little bit. So here's a snake and you can see that their structure is actually pretty similar too.

So we have our three semicircular canals. We have otolith organs. Their auditory side is different, but we see that the vestibular side is pretty similar. So we have a fairly consistent model across from animals to humans. There are some structural, more fine structure differences that we see.

And this tends to be in the realm of the curvature of the semicircular canals. And so there are some differences in that curvature and how that relates to how fast mammals are, particularly mammals. So in the anterior semicircular canal it tends to be a little bit more elliptical and not as much of a circle. In marine carnivores such as pimp pinnipeds, we see a greater radius of curvature in mammals where they are more sensitive to pitch rotations. So we see that, that change in the anterior canal as well.

And then in some marine animals like dolphins, sea lions and manatees, we see a greater arc in that semicircular canal in the horizontal canal. So there was a study that was done that looked at the size of the semicircular canal versus body mass and agility. And what we see is that animals that tend to be more agile and fast tend to have larger semicircular canals relative to their body size. So the, the hypothesis is that these large semicircular canals are more sensitive to rotations in that space than the smaller semicircular canals. So when they look at more slow moving animals, we see smaller semicircular canals in relation to body size.

So the galagos and the leaping tarsiers, they have larger canals for their body size. And if you aren't sure of what those two animals are, I wasn't either, so I had to look them up. So the galagos are sub, subsaharan African animals. They're primates, they're also called bush babies. So they are very fast leaping around.

And then tarsiers are, are also nocturnal and they are incredibly known for their jumping ability. So in relation to their size, their semicircular canals are much bigger versus our more slow moving animals like lemurs and our sloth lemurs and koalas that have small semicircular canals for their body size. And we do see, as I mentioned earlier, some changes with aquatic mammals. So when early cetaceans moved to aquatic behavior, they, over time their semicircular canals, canals also started to change. And so whales in particular, their semicircular canals are three times smaller based on their body size compared to other mammals.

And so the semicircular canals of blue whales have smaller semicircular canals than humans when accounting for the size difference. The other thing is that, you know, they think that in these marine mammals that some of this also became limited use. So there was, it's more of a stig of a vestigial condition because they have much more limited rotation and movement of the neck and eyes based on their size and what they do.

So I had to kind of put this together. This is my one dog, Jura. So when we look at ocular motor function, the ocular motor system in mammals is very similar. So we have six ocular motor muscles just like we do in people, same cranial nerve innervation. The only thing is they have slightly different names.

So medial and lateral are the same, but instead of superior they switch it out to dorsal. And so for inferior it switches out to ventral. But otherwise it's the same six ocular motor muscles. And then the ear physiology is pretty much exactly the same as it is in humans. So deflection of the cupula for our semicircular canals, otolith stimulation, the pathway in our VOR is pretty much the same.

So otherwise we're very similar. Which can lead to really some interesting comparisons between mammal animals versus humans. There has also been a look at some breeding impacts. So we know over time, particularly in our canine group, there have been changes to dog breeds based off of, you know, what people find popular and what they find visually appealing and you know, modifying that over time, you know, has there been any risks to that? And there has been an article that looked at different mammal or different breeds of dogs and have found some vestibular changes in the labyrinthine structure which may have an impact on function.

They don't really Know, our evaluation of vestibular function in, in canines is not as sophisticated as in humans, but they found this mostly in brachiocephalic breeds. So any of the dogs that have kind of that

more smushed face, like bulldogs, you know, pugs, things like that. And if you know your vestibular history, you may have recognized the name. Joseph Hurdle, who was known for collecting and comparing different inner ear systems. And part of his collection is actually on display at the Muter Museum, which is in Philadelphia, which is my hometown.

So every time I go to that museum I always look for this. Sometimes it's in different spots. But he really helped to compare most of this is middle ear. But he also has a whole collection on inner ear comparisons of different animals. So you can really see the differences in the sizes and breeds based off of, you know, what, what branch of, of animal they fall into.

So let's look at some of the epidemiology. What do we know about how much of a problem this is for our animal friends? So there was a really large epidemiology study done in 2020 where they looked at close to a million dogs across the UK. They had 886 veterinary clinics participate in this.

They narrowed it down to confirmed cases of 759 vestibular issues in dogs, with a total of 2,600 that were potential candidates, which ended up being a prevalence of about 8 per 10,000 dogs. When they looked at it, the prevalence of the dogs was over the age of 9 with a mean onset of between 12 and 13 years of age. So the biggest thing when we look at canine is that we are going to see a preponderance of this happen in older dogs. And the most common symptoms that these dogs experienced were head tilt, nystagmus, ataxia and vomiting. And when we break down the nystagmus, the large majority had horizontal nystagmus, a few upbeats, a few torsional, one had disconjugate nystagmus, but for the most part horizontal, which is similar to what we see in humans when there is a vestibular, peripheral vestibular abnormality.

French bulldogs and bulldogs had the highest odds of having a vestibular diagnosis. Brachiocephalic dogs overall had a higher incidence. As well as some of the spaniel breeds, there were a few breeds that had a decreased odd that they were that there's some sort of more protective mechanism against

this. And that was the West Highland Whites, Jack Russell's and Yorkshire terriers. And when they looked at the Age, as I mentioned, the large majority ended up being in that 12 to 13 range.

But even if you just look at the overall prevalence, we do see it in that upper age range for dogs. And this was prevalence by breed. So if you look for your own breed in there, you might. You might or may not see them in there. But so we see, you know, the spaniels in, in the kind of the higher percentage, as well as some of the brachiocephalic.

So when we start looking at disorders, what happens with them? So there are some breeds that are known for congenital vestibular syndromes. So in canines, German Shepherds, Dobermans, Akitas, Cocker Spaniels, Beagles, Smooth Fox terriers are known to have, in some of the dogs to have congenital peripheral vestibular syndromes. And there are a few in the feline group. So Siamese, Burmese and Takanese cats can also have a peripheral vestibular syndrome.

And what we've seen is, so for example, in Doberman puppies, they may have a degeneration of the cochlear epithelium, neuroepithelium, as well as be missing some or have abnormal otoliths. This tends to be an autosomal recessive disorder in these, in this breed. And then some also have hearing loss. So like Dobermans, Akitas and Siamese cats. And I'm sure if you have an interest in animals, you've probably seen our colleagues who are doing animal audiology looking at hearing loss.

So in some of them, they may have vestibular disorders as well. There's also been a grouping of Sumatran tigers who have congenital vestibular disorders. So this is in a group of tigers down in Australia and New Zealand, they found 93 tigers. They looked at 93, and 14 of them were positive for congenital vestibular disease. And they had ataxia, head tilt and disorientation.

A large majority of them had strabismus, which I'll talk about a little bit later. As far as what that means, six of them also had VOR testing, which was abnormal. And in this grouping, because it's across these

14 zoos in a of lot in a, you know, smaller geographic region that they believe it's a combination of genetic and environmental effects. So there are this group who have congenital issues, but then we have other causes of either dizziness or vestibular symptoms. So a very common one is otitis media interna.

So the veterinary group causes omi, and this is typically in that deep cavity of the tympanic Bulla. So it's, it's basically a middle ear infection, but it can also impact the inner ear. So they just kind of lump it together as omi. And so OMI is known for causing dizziness and vestibular disorders. This can impact both cats and dogs.

So it's not restricted to just one type of animal. A good number of them may have an acute onset, but more often it's this chronic long term issue where they have this otitis, this omi.

It can also impact other types of animals, including ruminants. So like our sheep and goats. And it can cause a head tilt and affect their balance. So this was in a case where you. So a sheep was bright and alert, but then all of a sudden started acting different and it then started to have a head tilt.

It had left sided nystagmus, it had twitching on the side of the muzzle. And they thought this, this, you had a vestibular disorder. And what it ended up being was an infection related to listeriosis. This. And so they gave the sheep penicillin and an injection of dexamethasone, which is a steroid that most of us are pretty familiar with.

And over time the u returned back to normal, the neurologic symptoms and signs improved, and then, you know, went back to living with the rest of the flock just fine.

So along with omi, we can also consider labyrinthitis. So labyrinthitis being caused by bacteria, virus, spirochetes or fungi in this population. And so they think that, you know, a good portion of the OMI

animals may actually end up having labyrinthitis that impacts the vestibular system and hearing loss. But most of the owners in this situation notice the balance problems and the dizziness more so than the hearing, especially if it's unilateral. You know, the, the animal will still respond to auditory C from the good ear.

And so in these cases where it is more invasive, they tend to do a much more aggressive treatment and they surgically debride that middle ear space so it doesn't invade into the brain and cause more of a meningitis. So they may go in there and surgically clear it all out.

Canine her infection caused by bacteria from ticks. This is a tick borne infection, primarily brown dog ticks and lone star ticks. So in chronic cases they may have seizures or vestibular signs and they may also end up having spontaneous bleeding or meningitis. So with these patients, the, the typical treatment is antibiotics with Dr. Doxycycline. And so there was a case study looking at A four year old shepherd.

This was an animal from outside the US that had a two month history of these intermittent vestibular episodes. And these episodes lasted anywhere from seconds to over two minutes with spontaneous recovery. And they did MRI testing which did show some inflammation in the brainstem and cerebellum. But when they did serology and other testing, they determined that it this infection caused by a tick.

Ototoxicity. So just like in people, there are drugs that are ototoxic to animals. And so we know ototoxicity can impact both hearing and the vestibular system, particularly with aminoglycosides and particularly gentamicin, which is vestibulo toxic primarily. And this, these are used in vet med. And actually I had a dog who had my one dog, Isla, had an ear infection and my vet gave me these drops that and I read the box and it says gentamicin.

And I'm like, I call, I texted him and I go, you are sure that she does not have a TM perf before I put this in her ear, right? And yeah, he's like, yeah, why? And I'm like, well it's ototoxic, like so, you know, I don't think vets necessarily always think about that, especially you know, when you're desperately trying to, you know, say save an animal, just like we see in human. The other thing is that there are also some disinfectants and antiseptics that, you know, used for cleaning that may also be ototoxic and you know, given animals and having to clean up cages and, and areas that dogs are in, some of these may be used in those cleaning areas in, in vet clinics. So that would be something to just be, you know, thoughtful about of.

And so when we've seen, when there are ototoxic events with animals hearing, it may go unnoticed for some time generally because it's more high frequency. They do have some hearing left, but they can also have nystagmus, strabismus, ataxia, head tilt, circling, nausea and refusal of food. But generally with these animals they do tend to compensate to some degree. They still may have struggles with things like jumping or going downstairs. And in some the head tilt may be permanent.

Animals can also experience head trauma. So if there's any sort of trauma to the head, you know, with, with these patients, there's no specific treatment for these animals. Usually it's, you know, if there's a surgical intervention that's need needed, they may go and do that. If the, you know, if the fracture is Bad enough they may choose euthanasia, or it just might be a more watch and wait, you know, situation, especially for more of those concussion type situations. I, I do, I did find it funny that there was no known reports of baro trauma from veterinary literature.

So I guess nobody's taking their canine scuba diving or you know, you know, going out of an airplane, a skydiving. But what we see most commonly is just these idiopathic peripheral syndromes in the dog world. It's typically called like old dog vestibular syndrome. And it's really quite common. The mean onset is around 12 and a half.

So similar to that epidemiology study that we looked at in the beginning part, typically a sudden onset, there's head tilt, nystagmus, circling, loss of balance or ataxia, and then nausea and or vomiting. It often appears overnight. So the dog wakes up with this and generally there's a gradual improvement over days to weeks. And it is idiopathic. We don't know exactly why.

You know, there's. This tends to be mostly a diagnosis of exclusion. There are some pathophysiology possibilities. So endolymphatic abnormalities, a micro intoxication or ischemia related in the blood system, viral or immune mediated inflammation or degenerative changes. Since we see it a lot in older dogs, I, I tend to equate the literature that I've seen except the for the fact that they tend to be older dogs.

It almost comes on very suddenly like a vestibular neuritis. Now obviously we can't get in there and do all the types of testing and believe me, I tried, but you know, I kind of think of it like that, like those neuritis patients where it just kind of comes on suddenly tends to be idiopathic, you know, and we have all these symptoms and then they gradually get better over time.

So one differentiation when we look at, you know, differential vestibular, this idiopathic vestibular syndrome tends to be in our older dogs. While omi causes of vestibular symptoms tend to be younger animals, the age of onset is much younger and they tend to have a lower body weight. So some of those more small dogs, dogs. The other thing to always be aware of, you know, is, is this an infarct or some sort of stroke, especially since it's an older dog. And so when you think about your patients, what are they most concerned about when these vestibular events come on?

They're always very concerned that they're having a stroke. So, you know, that does tend to be part of the differential workup is this central or peripheral. And so, you know, we're trying, you know, the, the, the literature on true vestibular disorders in particularly as well as other animals is not as extensive as it is in the human world. It, it. There's not a lot of great consensus on, you know, the underlying causes of

it.

It's more about, you know, stabilizing the patient and then just kind of making sure they're okay. Moving on. Now, there is also a feline idiopathic peripheral vestibular disease in the. In cats. It can happen at any.

This does tend to be more regional and season related. So there's a higher incidence related to outdoor cats in the summer and autumn months, and particularly in the northeast and mid Atlantic US Area. In these cats, it does tend to be peripheral instead of unilateral. I'm sorry, it tends to be bilateral instead of unilateral. And with these cats, as they're working up the differential, um, they do not have any sort of facial nerve paralysis or Horner syndrome, which I'll also show you in a little bit, which affects their third eye, causes ptosis, also a diagnosis of inclu.

Of exclusion. And then they may experience head tilt, rolling, falling over and vomiting. And typically in these, in these cats die. Other diagnostic testing is normal, like imaging and blood. Blood work.

And I said imaging. There is one slight exception. If people are willing to do this. There was a study in 2020 that showed a utricular asymmetry. Those who had the vestibular syndrome had a larger utricular diameter.

But, you know, with this population, you know, a lot of times people hold off doing, you know, extensive imaging just due to cost of it in their animal. Animals and cats and dogs are not alone. There is also a version in rabbits, particularly senior rabbits. It is caused by a particular bacteria that causes an infection. It can cause chronic otitis interna, or it can even cause a brain lesion.

In these rabbits, we see head tilt and they may also experience rolling or circling. And when I talk about rolling and all of these, they are literally on the rolling over. Like. So think about like training a dog to like

roll over. Well, they do that.

They, they tilt their head so much that they end up just flipping their whole body because of that VSR abnormality.

So idiopathic tends to be the most common. We do also have some other different disorders that may cause vertical, may cause vestibular issues, balance issues, or dizziness. So one is, is cerebellar hypoplasia. So this tends to happen in younger dogs. And so in these younger dogs, you tend to see these episodes creep up more when they are at play.

So there was this case study report on three different dogs. So there was a golden retriever who was about 2 to 3 years old. They had head tilt, mild cerebellar ataxia, vertical nystagia magnus, pelvic limb cord in coordination and truncal sway. And 22 months later, the dog was stable. They had some transient episodes, but only when playing.

There was another animal, a pug, that was two months old. They had these vestibular episodes, ataxia. All of this increased with playing and eating. They had head tilt, drifting, and then a wide base of support. But four months later, later the dog had compensated.

There was still some episodes while, while they were playing. And then a Boston terrier, seven months old, very similar to the other one, similar symptoms. And then months later, they did still have some episodes when playing or sniffing, which is also a very important activity for dogs. So this tends to be more young and tends to be more aggravated by physical exhaust exertion.

As I mentioned before, the concern is also when you have these sudden onsets is stroke. And so the veterinarians are going to try and differentiate our, you know, peripheral symptoms from central system symptoms and to determine whether they need to do imaging to, you know, confirm a lesion. If there's

no other underlying disease and they just have a stroke, the prognosis is actually pretty good. Most dogs, obviously it depends on the size of the stroke, the location of the stroke, etc. But overall, not, not a, always a bad prognosis, even when there's a stroke.

So the symptoms with stroke in animals is head tilt, difficulty walking. Then you get into some other things that we don't see in vestibular, like loss of house training. So where they're having accidents in the house, house repeatedly change in personality. So they may become more aggressive or, you know, maybe not interested in playing or doing activities, less aware of their surroundings, abnormal eye movements like nystagmus, falling to the side. They may also have blindness or seizures.

They may also end up with neoplasm. So also another concern of stroke. So do they have some sort of tumor? MRI is obviously going to be key to diagnosing this. So, so if you're thinking of central in these, in these animals, is it more stroke?

Is it more of a tumor situation? There was a case study of 21 cases of cattle. I tried to include other things than just dogs and cats. So there was a group of Cattle that had these neoplasms and they had altered state of mental behavior and mental state. SARAH Bell in coordination and vestibular syndrome syndrome.

Less common. So if you're a dog owner or a dog friend, you know that grapes and raisins are a big concern because it is very toxic to animals and can cause acute kidney injury. But what I did find, which actually my vet didn't even know, was that in some of these, they found a small number of these dogs where they actually had symptoms that mimicked vestibular abnormalities. The head tilt, drifting, and ataxia. When they looked at it, the neurologic symptoms were all located to the thalamus and cerebellum.

So the cerebellum helps to explain why they had these symptoms similar to that. Obviously, if a dog eats a grape or raisin, we need to get them veterinary care immediately. And then the last one is pituitary apoplexia, which can show neurologic signs due to a hemorrhage or an infarct near the pituitary gland. And these dogs tend to also be on the older side. The mean age is about 10, but they have symptoms that could look vestibular in nature.

So this falls into that differential. But the differential signs is that they would have seizures and aggressive behavior. So they would need to have imaging even if they're having nystagmus imbalance issues.

So to kind of compare across what we see, you know, between these different disorders. And then the last thing I just wanted to kind of put out is like, what is the prognosis? So most of them are either good to fair, fair, meaning that they are probably going to recover. They might have some permanent abnormalities, but overall they tend to improve. And idiopathic vestibular is one that actually has a pretty good prognosis.

So I mentioned differential assessment. And just like adult, like just in humans, whether adults or children, we need to look at all the pieces, right, and figure out what's going on. Obviously, you know, in human vestibular, we rely a lot on the history and we have in, in animals, you have to rely on the owner information. And they may not necessarily know exactly what happened, how that animal is truly feeling on the inside, obviously. So it can make the differential a little bit more difficult.

The other thing is cost of assessments. And if you have your own animals, you know that going to the vet is always a several hundred dollar visit. And if you're looking at, you know, extensive diagnostic workups and you're talking, you know, imaging like mri, it's going to escalate quite quickly. So this does also make it difficult for the vets, in some cases to determine what's going on. Going on.

So they can look at history, what is the onset, the symptoms, otoscopy, looking to see, is there any sort of infection in the external ear? You know, can they see anything that might suggest, you know, an infection in the middle ear? But then they can also do a neurologic exam. So looking at mentation. So are they with it?

Do they know what's going on in the environment? They can look at gait and posture. So are they coordinated? Is there any, you know, weakness? They can look at cranial nerve function.

So looking at facial symmetry, blink reflex. So what they'll do is they'll kind of tap around the eyes to see if the dog will blink, or they'll kind of go in like that and, you know, try to cause something to make them, like, blink.

They can look at vor. They can look at pupil response, postural reactions. So they'll lift limbs to see if the dog, you know, reacts. You know, typically spinal cord reflux. So looking at your typical, like, patellar reflexes, truncal reflexes, spinal reflexes.

And then they may also look at pain receptors. So they may pinch, like, the tail or the toes to see does the dog feel that and do they withdraw from that sensation?

Now, one thing we do in our vestibular patients, right, is we put patients in the dark to see if there's any spontaneous nystagmus. And to my knowledge, there's no VNG goggles designed for dark dogs. But what they do instead is they do a pen COVID test. And so essentially what they do is they put a pen light right in their eye to essentially remove vision. So they'll cover the one eye and put that.

That light in there to remove the vision to see if the nystagmus continues. I do like this description, though, where it says it involves covering one eye and shining a bright light into the other eye, the. The other tested eye, effectively dazzling the animal and prevent animal from spontaneously fixating. So

this is one way to look at, you know, vision denied nystagmus for these patients I mentioned earlier on strabismus. So in animals for vestibular strabismus, what they do is they take the.

The animal and they tilt their head up so they. They move the head up so they. So they can. They tilt it up. And then what they're looking for is, does one of the eyes deviate?

And they tend to deviate ventrally so in animals, remember, ventrally is down, and so the eye deviates down and that is typically the side where the lesion is. So it's ipsilesionally. But this may only be a mild sign in some cases. Cases. The other thing they look for is Horner syndrome, which I mentioned earlier as well.

This is an oculos. Oculosympathetic pathway that can cause meiosis of the eye. It also can create a posterior displacement in the eye, a protrusion of the third eyelid and ptosis. And so this is a neurologic origin that causes this eye deviation. This syndrome can happen at any age.

It can happen in cats and dogs. There are some dogs that are more prone to this, golden retrievers in particular. So this is what it would essentially look like. So the eye, it gets smaller, it gets a little bit displaced posteriorly back in the eye. And then in some cases you may see the third eye protrude more.

And then you can see here the ptosis where it's, it's. The eyelid is drooping.

They can also do lab work and imaging, so blood work, urinalysis, CT, MRI. In some cases, they may choose to do a spinal tap to look at CSF to see if it's an infection that is impacted. You know, the, the c. The central system. There was a study done in 2023 where they surveyed vets across North America, UK and Europe to see what vets were actually ordering when they had a patient come in with any sort of case here. And so neurologic exam was one, and then mri, you know, biochemistry, cbc, csf, blood

pressure and then, and then otoscopy.

And so here's what we're looking for as far as, like peripheral versus central. What the vets are doing to see, you know, do we need to go further their workup, you know, what's happening. And so, you know, working through like head tilt, nystagmus, postural reactions, cranial nerve abnormalities, if they have Horner syndrome or not, and then consciousness. How alert are they treatment options? For the most part, the treatment options are just manage the symptoms, make the animal calm, you know, try to make sure they're in a safe environment where they are not going to hurt themselves by falling over, etc.

If, if they think it's OMI, they may prescribe, you know, antibiotics or steroids. If it is a more invasive, you know, omi, they might do a surgical debridement or other medications if it ends up being something else, like, if it is like a Parasite or if it's a stroke, they may choose other types of medications and treatments. Treatments. When they do think it is vestibular, vestibular sedative drugs, you know, they're often given like a meclizine type drug. Obviously we know they don't want to be on those medications long term and most vets don't prescribe like long, you know, courses of that medication.

But they may also prescribe medication that is to reduce nausea and vomiting. Cerenia is one of one that they prescribe often for nausea and so they may prescribe different medications if there's vomiting as well.

So the, the top treatments tend to be cerenia, like I mentioned, that's to help just reduce the nausea and vomiting. This isn't necessarily anything vestibular related. They may also recommend some physiotherapy. So making sure the dogs are moving around, around. If there is a lot of nausea and vomiting, particularly vomiting, they may give an IV infusion just to, you know, give them some fluids back.

They may also put some medication in there just to, you know, especially if the dog is vomiting a lot, it's hard for them to take the medication. And then there has been some medication given by vets in the EU which also has a neuroprotective agent to help improve cognitive function. Especially since a lot of these dogs are early, older. So if it is truly vestibular, the prognosis is that they'll likely recover in a short period of time. If it's infection, if they're, they're more likely to recover if it starts getting into things like infarcts or tumor.

The location and severity will have a big impact on recovery.

All right, so I have a few cases that I wanted to go over and all of these cases I have permission to share this information.

There's no real HIPPA for dogs. So this is our first case study is Emma. So this is actually my dog trainer's dog, one of my dog trainers. I, I, I unfortunately pay several of them, but this is one of my, and she's one of my very good friends. So this was Emma.

And Emma at the time was a 13 year old Australian shepherd. And Emma had an onset of around 11pm so at around 11, 8, 11pm her owner noticed that she was unbalanced, was kind of shaking her head and it would kind of splay out with all four feet. The next morning she was better, but still, you know, not really fully stable and steady. At that time there was no nystagmus. But then by the next morning at that time, she had head tilt, nystagmus and circling, denied any vomiting and ataxia.

And so these videos are from that day that the. That there was an onset. And they ended up giving Emma some meclizine for a few days. So I'm gonna turn the audio off. You don't need to hear it.

Oh, so you can see that nystagmus, right? So we have that, right? Beating nystagmus. Here's another view. I'll turn this off as well.

People doing things in the background, like making. Making dinner.

So you can see that horizontal nystagmus.

Here's more. I. You know, and then the vestibular person in me is like, okay, try this. Try seeing if she'll follow it to see if I can get the dog to follow Alexander's law, you know? So turn that off so you can see the nystagmus there at right beat.

The other thing is in this shot here, you can see the strabismus. Because if you watch this, this eye here is ventrally deviated. Hold on. I have two monitors and one monitor in the way. Here we go.

So when she looks over the other direction, you'll see it. So this eye is in more in the center. See how this one is much lower in the eye compared in the eye socket compared to the other one.

So here we can see more of the head tilt. Nystagmus is still there.

Here we can see that head tilt. So here she is trying to eat. You know, she's not in the center of the bowl. You can see in her little eyebrows, the nystagmus still going, the head tilt.

And then this is while she's trying to sleep. And you can see even as she's casually just laying there, the head is slightly tilted, but more so you can actually, if you look at her little eyebrows, you can see the nystagmus still going. So this was all throughout that day.

I kept getting videos via text message that day. So this was now four days after onset. So we see the head tilt.

This is four days. So as the dog moves, you can see the head tilt.

And then three months later, the head tilt had resolved. All of the symptoms had resolved. So this is Emma, next one. So this was a shelty. So I have shel.

So I tend to be in a lot of, like, shelty groups. I don't know these people personally, but they had posted it online, and I had reached out to them to use this in presentations, and they said yes. So this was Shadow, who was a 12 year old Sheltie, they had nystagmus. And so the owners took the dog to the vet because they were very concerned. At the vet, they were diagnosed with a vestibular disorder.

So they had posted online like, does anybody else have, you know, a dog who's had a vestibular disorder? And so they gave the dog Rimadil, which tends to be more of just like an otc, you know, pain reliever, kind of like, you know, know an approxin or a, like, like a Tylenol aspirin. And after a few days. Oh, let me turn this down. After a few days, Shadow was back to normal.

Okay, this is Hershey. So this is a dog that was owned by one of my students. Um, so Hershey was 14 at the time. Time. So Hershey had a seizure and then the next day had nystagmus.

Couldn't stand, couldn't really walk. Head, Head tilt. This was. Hershey does not have a confirmed vestibular abnormality. They.

They ended up not taking Hershey to the vet because she seemed pretty stable.

So you can see the nystagmus there. Head tilt.

And here's another.

So here you can see that protrusion of the third eye. Of the third eyelid. Sorry, not a third eye. That would be really weird.

Okay, Sydney is our next case study. So this was actually my aunt's dog.

So Sydney was 13, miniature schnauzer. My aunt was. Was married to an ENT. So there was also an ENT at the house at this time. Um, and so they did take the dog to the vet and she was actually already being seen by the vet for other issues.

Um, and so she had. The vet was. The vet diagnosed her with idiopathic vestibular disease. They did do an MRI on her and she was negative. But here's.

You can see in this one, you know, a lot of the ataxia. You can see in her little eye eyebrows, the nystagmus going.

You know, she doesn't really want to move because she's not stable when she moves. Plus everything's likely spinning. I have another video of her. So this was, this was actually the report from the veterinary clinic. And so five days after the initial onset, left sided head tilt, which had improved from the first visit, but still was circling.

You can see that head tilt.

You can see some of the ataxia. Wide base of support.

So the other thing is, as you've seen, all of these dogs are all older. This is. So this is actually my dog. This is my dog Isla. So this actually Happened last August.

So this happened when Isla was 13.

I woke up around, you know, 6 and noticed that she was kind of just wobbling and bobbing. She was on my bed and she just kind of bobbing around. And I look over at her, and she had a left beating nystagmus. And she was unstable with a head tilt. So here is her nystagmus.

This is her trying to walk around.

And then I'm afraid she's gonna, like, bang her head into something as she's stumbling. But you can see the clear ataxia.

My other dog, dog in the mix. And then she just wanted to lie down. So my dog loves her crate, so she went and put herself in her crate, and I quickly closed the door to keep her there just so that she wouldn't stumble around and hurt herself. Most of my. My apartment is this type of flooring, so it's pretty slippery in there.

She's also drooling due to the nausea. Oh, sorry. I was listening to my audiobook at the time. Let me turn that down. So she's in there.

You can see the nystagmus. There's a whole lot of drool in here. This was on a weekend, so obviously everything is closed. So I went to the. The pharmacy, picked up some meclizine, gave her one dose of meclizine, and just had her hang out for bit a little, little bit later that day.

Still in a stagus.

Of course, I also tried doing a whole bunch of things with her. This video. You can see that clear head tilt.

So the next day, so. So this is the nerd in me trying to get her to see if I can get her to do Alexander's Law.

So.

So I'm trying to get her to. To see if she looks from one direction to the other. Does it increase? Hold on. Look, look, look, look, look.

You want this straight?

My dogs are so patient with my antics.

I'll turn this down. You don't need to hear it. But, yeah, so, you know, it's tough to do. So I don't have a clear.

I don't have a clear increase in nystagmus. It looks a little bit like it. I did contact my vet. I am friends with her, so I texted her videos. Videos.

I. And I talked to her, did some FaceTime with her, and she's like, yeah, it definitely looks vestibular.

This is taking her out to go to the bathroom. So I. I put a harness on her so I could help hold her up. But even just to, like, urine urinate. She would, you know, fall over. She couldn't like really squat to and keep her balance.

And so you can see her not being able to walk in a straight line and deviating.

I also wanted to see what she'd be like on foam, so I put her on my bed.

So she did not like this. And I tried this on my couch as well. You know, I wanted to see if how she would do on a. On a compliant surface. This is what happens when, you know, your owner's a crazy vestibular person.

But you can see she, she. It made her very uncomfortable to try and stand up.

And then I try again.

And back down she goes. She just wasn't having it. I also tried to do a head shake on her.

So try to head shaker.

I'm not holding her tightly. I don't want anybody to think that, you know, and she's like, okay, I've had enough.

And it's hard to tell. So our evaluation of animals has. Has a long way to go in the vestibular world. The auditory groups have figured it out a little bit better. So this is a couple days later, you see.

So this is September 4th. Remember, her onset was August 31st. So you can see her walking. Comparing this from the. From the parking lot.

Much improved. Not perfect, but much improved. Also the same day we can see that the head tilt has improved. This is my other dog head till improved. And then I just want to show you like she improved quite quickly.

So like even within those five days, she improved quite a bit. I only gave her one dose of meclizine that first day and then that was it. And then I just wanted to show you. So this is in December of last year.

So a couple months later, keeping in mind she's also 13 and, and almost 14 here.

You know, she's out there being able to run and do things pretty normally. Again, also keeping in mind her age, you know, and then this was as of May of this year, no, no noticeable head tilt. I will say there are some things with where if I go to give her a treat, the head kind of does sometimes tilt.

But overall, you know, you can see that over time these do. These dogs do compensate. And, and all of the dogs I had presented all compensated pretty well. Unfortunately, most of the dog, except for Isla, all the other dogs are no longer with us because they are all senior dogs. And so, you know, like Isla's now 14 and a half and so, so you know, it.

You are looking at very senior animals typically. So some summary and considerations. I know we're right at the. At the close to the one hour mark is, you know, a lot of these disorders parallel what we see in humans. And so could we be making comparative, you know, medical, you know, research and understanding between different species and humans?

So I think that there are ways that we could collaborate more with veterinary care. These are transient issues. So the dog comes in and then they recover quite quickly. So I don't think we're going to see the same type of interaction like we see with some of the animal audiology on the auditory side, because, you know, hearing loss tends to be more permanent than these vestibular issues. But could we do more comparative research and share more data with them and, you know, can we help maybe veterinary care with more formalized assessments at some point?

I think those are some, you know, future considerations. Considerations. So I want to thank you for attending. This is my young dog, Jura. She's two.

I made her run a 5K. And if you have any questions, you can certainly put them in the chat or in the Q and A box or you can certainly email me.

Thank you so much, Dr. Gaffney. That was fascinating to see, the comparisons to human anatomy and animal anatomy. I mean, I can just. I know I've taken my dogs in to the vet many times, and they're always. And I'm always like, I don't have Q tips in the house.

And they're like, you can have a Q tip for a dog. It's. The ear canal is different. And that makes so much sense now. So that's.

That's awesome.

I'm not. I don't believe I see any questions coming in the Q and A, though.

So at this point, I'm just going to wrap up and say thank you, everybody, for attending. And please remember to complete your exam once the event is over. Give us about 10 to 15 minutes, and then go back to Audiology online and go to your pending courses to take the exam. And it will only remain in your account for about seven days. We did get one last comment about that.

It was very informative and to thank you very much. So I'm going to pass that on. Again, say thank you very much.