Fundamentals of Videonystagmography: Lesson 3: Positional Testing

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Greetings everyone. We extend a warm welcome to each one of you and express our gratitude for joining us. Today, Inventis is privileged to introduce the third and final online lecture of the curse of fundamentals of vision stigmography theory, practice and clinical cases, featuring an internationally respected expert, Doctor Vishal Pawar from Dubai. Doctor Pawar is a highly skilled specialist neurologist with over a decade of experience in neurology and autoneurology. Thank you so much, Doctor Pawar, for accepting our invitation.

Well, this comprehensive curse has been structured to empower participants with essential knowledge and practical skills on visionist atomography. It has spanned three online sessions and will be followed by one hands on session in Dubai on June 8. Attendees have gained invaluable insight into the intricacies of VNG procedures and now look forward to the practical application of their learning in the upcoming sessions in Dubai. After discussing the Oculomotor test and the vestibular test, so, the spontaneous nystagmus, enlarged and dark head shaking and hyperventilation test, today's third and final session of the course will focus on positional testing for the treatment of common pathologies. We encourage you to jot down any questions in the designated space on your screen following the event.

You will receive a survey as usual and we can request your participation. Your feedback will enable us to tailor our educational support to meet your needs effectively. And now I leave the word to Doctor Babar and join the webinar and see you later.

Thank you Ana, for that kind introduction and I welcome all the delegates for this third and final webinar on video stagmography, which is like online webinar, which will be followed by a live session in Dubai. So what I will do now is I will just revise what we learned in the previous sessions. Previous both the sessions like session one and session two. If anybody has missed, I'll just, you know, give what we have done in one slide summary and we will dive into the positional testing. So in the first webinar we

studied the functional type of eye movements like saccade, smooth pursuit, optokinetic reflex, vestibulo ocular reflex versions, and visual fixation.

And we saw, we, we, like, we discussed about the, you know, the purpose of these eye movements. What is the purpose of each of these eye movements? That is, hold images of the visual world steady on the retina during brief head rotations or translations. This is brought about by the vestibulo ocular reflex, then hold the image of a stationary object on the fovea by minimizing ocular drift is done by the visual fixation. Visual fixation is an active process.

It is not something which is passive. Normally, we have microsaccadic moments until we fix it on a target. Like these microsaccades are inhibited by the visual fixation mechanisms. Hold images of the visual world steady on the retina during sustained head rotation or translations. Is done by octopanic reflex.

Hold the image of a small moving target on the fovea, is done by the smooth pursuit. Then bring images of objects of interest onto the fovea, is done by the saccades, and move the eyes in opposite directions, so that the images of a single object are placed or held simultaneously on the fovea of each eye is done by the vergence, that is, convergence, or the divergence movement. Then we discussed about how the circuit testing is performed. You can see here the target is moving to the left and to the right, and the eyes also move to the left and move to the right. And you can see the saccharied graph.

It goes up and then it stays there and then comes down, like. Okay. So that we discussed about the horizontal circuit testing and also with a similar thing happens in the case of vertical circuit testing. In case of horizontal smooth pursuit, the target moves left and right smoothly, less than 40 degrees per second. And you can see the graph of the saccade, like horizontal smooth pursuit.

And you can see the smooth pursuit movements which are seen in the videos. And we can see the graph as well. And in case of the vertical smooth pursuit, the same thing happens, but vertically, the stimulus moves up and down, and you can see the vertical smooth pursuit is recorded. So this is how vertical smooth pursuit, you know, the video, videography will show, the video will show the eye movements happening in the vertical plane. Now, coming to the optokinetic testing, during the horizontal stimulation, the optokinetic is presented in the dark, that is like the horizontally, or it can be also presented vertically for vertical optokinetic stimulation.

And you can see that graph is recorded here. Like, you can see the nystagmus, which is nothing but optokinetic nystagmus, which is recorded here. Now then, in the second webinar, we discussed about the spontaneous testing, that is, with fixation, that is, without the COVID or the flap or the visor on the goggles, and with the visor, that is without fixation. So testing without fixation is very important because sometimes the patient can come with acute vestibular syndrome, and there are no central signs, there may not be nystagmus which is apparent with fixation and without fixation, the patient can show like nystagmus, which is unidirectional. So for the diagnosis of neuritis, we need it.

Then in the last webinar, the second webinar we discussed, the localization of the nystagmus could be either in the peripheral vestibular apparatus, which is the most common type of nystagmus, or it could be in the brain stem, or it could be in the cerebellum, or less commonly it is there in the anterior visual pathways or cerebral hemispheres. Then we discuss the nystagmus attributes. Jerk versus pendular nystagmus. This difference between nystagmus trajectory and direction reference frames, monocular versus binocular nystagmus, conjugate versus dysconjugate nystagmus. What are the parameters which are important, that is, slow phase, velocity, frequency, amplitude, spontaneous nystagmus and straight ahead position.

We discussed about these various nystagmus attributes in the last session. Then we discussed about the horizontal gaze testing in light. That is, it stays there on the left gaze, and then it goes to the right and it stays there. So it is testing the gaze, like from the center gaze. And this is open like, you know, you can see it is with fixation, with the visual guidance of the visual stimulus.

But the same thing can be done by the guidance of the auditory stimulus, by giving verbal command to the patient, by keeping the eyes closed. We can check that. Now, vertical gaze testing, that is gaze testing in light can be, is done in the similar fashion. That is, the stimulus moves up, it stays there. It comes down, it stays there.

Then that. This is how we can record the gaze evoking sphagnum like gaze evoking stagnant, can be recorded. So here you can see in the center gaze. The eyes were there, then it went to, uh, up, then it stayed there, then it went down, then it stayed there, and then it came again in the center. Then the head shaking test we have seen where, you know, uh, like, uh, the patient's head is shaken at 2 hz/second for 10 seconds.

That is 20 shakespeare. This 20 shakes is followed by like, you know, you can record whether the patient, if the patient has latent asymmetry in the vestibular like tone, then it can bring out the that asymmetry. So this is how the graph is recorded for the 10 seconds you can see in the lower panel, that is 10 seconds we gave 2 hz/second every second, two stimuli, horizontal stimuli like the neck is shaken for two at the rate of 2. Then we recorded the nystagmus. If it is present in this patient, it was not there.

Now, in the hyperventilation test is the last one where the patient is asked to take deep inhalation and exhalation. Deep inhalation, exhalation, okay. One inhalation for 1

second, exhalation for a second, and similarly 60 to 70 seconds. The patient can undergo this. And then the patient's nystagmus is recorded after the testing.

So this is how the hyperventilation test is performed. This is about the recap of the past two sessions. Now let us dive into positional testing. So the, in terms of positional testing, like the learning objective of today's webinar, our first is I will talk about little basics about this, like, you know, before going into that subject. Then I will talk about what is BPPV, how it presents.

Then what is the role of video in stagmography to diagnose and treat BPPV. And then I'll talk about algorithm to approach positional vertigo. Now, coming to the basics, we know that ear has three parts. That is external ear, middle ear and the inner ear. Okay.

So the external ear and the middle ear are like, you know, conduits for, you know, sound. And that is predominantly, you know, we need it for hearing function. In the inner ear, we have two things. One is cochlea and another is vestibule. In cochlea is needed for the hearing.

It takes care of the hearing. And there are two parts of the vestibule. First is semicircular canals, which detects the angular head movements. And there are otolith organs. There are two autolyth organs, that is utricle and saccule, which are important for linear head movements, speed and gravity.

So together, the vestibule is needed for the perception of the balance. There are three systems which are important for balance. One is visual system. Second is the proprioception, that is position sense. And the third is the vestibular sensations.

So it is a 6th special sense. Unfortunately, it is not included in the five sensations. Special sensations. But it is a 6th sense. Why it is not included?

Because, you know, like, everybody is aware about the other sensory modalities, other special sensations. If you talk with any patient, any person, you can ask them how, like, how is your smell, how is your vision, how is your test sensation, how is your hearing, how is your touch perception? But have you ever, like, you know, if you check asking a person, how is your balance? How is your balance? Organs.

So nobody will. Many people like, you know, patients are not aware that where are the balance organ located. Everybody is aware that smell is through the nose, vision is from the eyes, test is from the tongue, hearing is from the ears, and touches from various receptors on the skin. But how are your balance organs? If we ask, then they are not aware about where are these balance organ located.

And because it's an intricate system, along with it's not only about the vestibule, but other systems also play important role. So it is an integrated system which is working continuously even during sleep. Our balance control is functional and it is giving us signals about, you know, the position. And even if in the nighttime, you wake up, spatial navigation, like we know where is the washroom. In the nighttime, even as soon as you wake up, you can direction, like, you know, you can decide which side to go based on these, like, memory which is stored in the vestibular cortex.

So this. This function that is six special sense that is balance is like, you know, this vestibular system plays a key role in that. Now, coming to the next thing is about the localization of the positional vertigo. So either the localization, the most common site of localization for the positional vertigo lies in the vestibule in the form of BPPV, or it could be in the vestibular nerve. Sometimes vestibular peroxysmia can present at the root entry zone due to compression.

It can present with positional attacks of vertigo and so intractable positional vertigo. The patient can present in patients with vestibular paragliding. Vestibular nuclear legion sometimes can present with positional vertigo. And so it can be because of peripheral vestibular involvement, or it can even be central nervous system involvement can lead to positional vertigo. Like, there are certain areas in the brain, like nodule, the lesions in the nodule or flocculus.

It can present as a positional vertigo even in the brain. So. And vestibular migraine can present as positional vertigo, which is called as pseudo BPPV. So I'm seeing of late, I'm seeing very commonly the presentations of vestibular migraine presenting as pseudo BPpV. So, like the positional vertigo, if we look at the localization, it can, you know, it can be either in the vestibule, vestibular nerve, vestibular nuclei, or in the central vestibular pathways, which is very commonly seen in vestibular migraine, where the, you know, the localization can be, and it is called as pseudo BPpV.

Now, coming to the next part, that is anatomy of the semicircular canals. It's very important to know the anatomy because there are three semicircular canals. That is, it has two things. One is this canal, and there is ampulla, the dilated end of the membranous labyrinth. That is ampulla, where the.

The cupula is located, which is a soft gelatinous structure. And it seals that. That end of the semicircular canal. So there are three canals with their respective ampulla and non ampullary end. So the non ampullary end of the anterior and the posterior canal, it joins together in the common crust and then it enters the utricle.

Okay? And so both have. Both share the non ampullary end. Like the non ampullary end, it is. It joins each other and then it opens into the utricle and the lateral canal.

If we look at the ampullary end again, it is sealed by the gelatinous cupula and non ampullary end, it opens into the utricle. So these were the basics about the positional vertigo. Now, what is BPPV? If we look at the BPPV? So, basically, there is.

In the utricle, there is autolytic membrane, and there are autoliths which are placed on this autolytic membrane. And these are the autoconias. And when the autoconias are shed from this autoconial membrane because of aging, because of various reasons, like vitamin D deficiency or because of a recent surgery or because of a dental procedure, there because of head injury. So there can be. Majority of the times the BPPV is idiopathic, but it can be because of some reason, these autoconias are shed.

And most commonly it enters into the posterior canal because, as you can see, it is the most dependent canal and that is the most common type of BPPV. The second dependent site is the non ampullary end of the lateral canal. That is geotropic variety of lateral canal BPPV. Or it can be in the ampullary end of this, like on the cupular side, that is ampullary end of the lateral canal. That is, apogotropic variety of lateral canal BPPV, which is around 15% to 25%.

The canal, it's rarely can even go into the anterior canal. If it goes into the non ampullary end, it can easily, you know, self like reposition itself like it can. But if it goes into the, like ampulla on the ampullary side, then it can still happen. The anterior canal, BPPV can still happen. Although it is not as common as the posterior and lateral canal.

But I have seen cases of anterior canal where we do Yakovino maneuver. So, uh, this one very important basic thing is like, you know, there are. If we look at this orientation, if we look at the orientation of these canals. Just check, make sure that this is working. 1 second.

Just give me a second and just checking whether this power is on. Yes. Okay.

Okay. So we were discussing about, like, what is BPPV? And we were discussing about, you know, this, like, various types of BPPV. Now, the clinical pearl here I would like to share is this is the sagittal plane. If you look at me in the video, this is the sagittal plane and this is the coronal plane.

Like, this is the coronal plane. So the anterior canals are not exactly anterior. They are having an angulation of the 43 degree with the, you know, the sagittal plane. That is about this anterior canals. And the posterior canals are not exactly posterior.

Like ideally they are supposed to be by names, like exactly posterior. They are not there. It is making an angle of 56 degree with the sagittal plane. So the interior canals are, if we look, look at them, they are more nearer to the sagittal plane than the posterior canal. And if we look at the posterior canal, they are more nearer to the, this coronal plane that is 34 degrees versus 49 degrees as compared to the anterior canals.

So. And the lateral canals, it's very lateral canals are not exactly horizontal. So they are making an angulation of, you know, they are not exactly horizontal. They are making anterior end is making an angle of 30 degree with the horizontal. So that's why it is better to call these as lateral canals than the horizontal canal because they are not exactly horizontal.

So the lateral canal is not exactly horizontal. That is one thing to remember. That is why we give during, while doing the head roll test, we give the, you know, little 30 degree head elevation. We give. Now coming to the Vor vestibular ocular reflex, when suppose you look at me, my video, suppose I move my head towards the right side from here to here, my head moves to the right.

Okay. The membranous labyrinth, which is situated inside, in the inner ear, that also moves to the right side because it's a bony structure. So it is, it has, it will move exactly like along with the head. It will move. And then the fluid inside the semicircular canals, the fluid which is present inside the semicircular canals will, because of the inertia and it will, you know, it will move exactly in the opposite direction so that it will move towards the left.

So when I move my head towards the right, the membranous labyrinth moves towards the right because it is being anatomical structure. And then the eyes remain on the, like, vestibule. In the vestibulocular reflex, the eyes move from the. Towards the left. So if we look at the eye movement, it happens towards the left side.

And so the endolymph moment is predicted by the, like, eye movements. So we are predicting the endolymph movement with the eye movement. That is the next clinical pearl. So the endolymph moment can be predicted by the eye movements. Like.

So that's why we are looking at eyes so carefully, because we are, you know, trying to deduce the endolymph moment based on the eye movement.

So now if we look at the tempo of the vestibular disorder, there are three different, you know, clinical patterns. What we see, and we are today, because for positional vertigo, we are dealing with this. Episodic vestibular syndrome is very important as far as this positional vertigo is concerned. So episodic dizziness, spontaneous or triggered, lasting less than a minute, 2 hours. It is episodic vestibular syndrome.

And BPPV is the most common type of episodic vestibular syndrome. It presents with positional attacks of vertigo. Duration is less than a minute, and it can present with or without nausea, vomiting, and vegetative symptoms. So this is about the like, you

know, how it manifests, then coming to the positional changes triggering the attacks. If we look at the positional changes, which commonly trigger the attacks.

If a person is getting the attacks from getting a. From supine. Okay, more commonly, like, posterior canal involvement is there. Whenever a patient has posterior canal involvement, the patient's present with positional vertigo on getting up, then the next thing is sitting to supine. If a patient gets, like, you know, vertigo on sitting to supine again, we should think of posterior canal commonly.

That is, commonly it can present like this. Now, bending over, like when a person bends over, that is common with vertical canals, especially anterior canal can be suspected. Or if we look up, like looking up in standing again, in vertical canals, either posterior or anterior canal, it can be seen. Okay, so this is about like, this. Anti vertical canal involvement.

Now, looking at, like whenever patient presents with vertigo on turning in the bed. If they complain like this, then it could be either lateral canal or even vertical canals can present, like, vertigo in the turn while turning in the bed.

Okay, so this is how it presents. And then that was about, you know, like, you know, the presentation. Like the common presentation. Now, coming to the role of VNG to diagnose and treat BPPV, let us discuss about the role of vnguard.

Yes. So, like, treating BPPV is like playing this particular game of. In childhood, we used to play this game. Like, in this game, what we do is we see the location of these metallic balls. And similarly, in BPPV, also, we have to search the location of the autolids.

And with the help of how we find the autolids is by doing the positional testing. Okay. And we place them into appropriate, you know, like, by doing appropriate maneuver. We place them in appropriate. Their place by doing the appropriate positional maneuvers.

So, that is the difference between positional testing and positional maneuvers. Positional testing. We should. So whenever we say Dix Hallpike, we should say as Dix Hallpike testing. It is not a maneuver.

It is. It is a test. It is a clinical test. So dix Hallpike testing, Mercure pagnini testing or head roll testing, we should see it as a testing. And when we say epleys or simons, they are the maneuvers.

They are the maneuvers which are done to treat this particular condition. Now, if we look at the, like, you know, location of the various canals, location of the autolids, it can be either of these in these canals. And the. One of the very important clinical pearl to remember is the ampullary end is sealed by the gelatinous cupula. If we look at the.

All the ampullary end. Hence they are sealed by gelatinous cupula.

So we have to do the manoeuvre.

So then remove that otolith through the non ampullary end. So all the maneuvers, we can take out that otolith through the non ampullary end, not through the ampullary end, because it is completely sealed.

Okay, so the clinical pearl here, I will tell about the various clinical pearls. So the posterior canal excitation. Okay, if we look at the posterior canal excitation, whether it is coming from the right side or it is coming from the left side, it will cause a beating

stagnus. Okay, and. But how we decide the, you know, the side of the BPPV is by the torsional, the component.

If the torsional component, the upper pole is beating to the right, then it is right posterior canal BPPV. And if the upper pole is beating towards the left, it is left posterior canal BPPV. So this is about the typical posterior canal BPPV. But of course, there is one atypical variety of BBB where we can, you know, see posterior canal inhibition. And in that case, the patients can have exactly different type of nystagmus.

Before coming to that, I will talk about the anterior canal excitation. That is, anterior canal excitation can lead to down weighting nystagmus. Whether it is right side or whether it is left side, it will cause down beating. The vertical component will remain same, but the torsional component, if it is right sided, uh, anterior canal, it will cause the upper pole will be still towards the right side. So whether it is anterior canal or posterior canal, the upper pole will still be towards the right side.

And whether it is right sided or the left sided anterior canal, uh, it will still remain down beating. So, uh, in case of left anterior canal excitation, the upper pole will be towards the left side. And that is about the anterior canal BPPV. Uh, then posterior canal inhibition, which I was talking about, that so can lead to down beating nystagmus, where is right side or the left side. But in case of right side, the upper pole will be towards the left side, not in case of left.

Left sided posterior canal inhibition. The upper pole will be towards the right side. So that is present in case of apogeotropic posterior canal BPPV, uh, like, which is nothing. But like, you know, it is a non ampullary, non ampullary end of like, you know, posterior canal can have the autolids and that BPPV is called as apogeotropic. Why it is called apogeotropic, that also I'm going to cover in a while.

Then anterior canal inhibition is very rare. It is very rare to see, but it can cause a beating and torsional nystagmus. But it, as I discover we discussed, it can get self corrected because it is in the. It can, the otoliths can gravitate into the utricle and can get corrected. So if we look at this diagram like, you will find that the anterior canal excitation of the right side is similar to the posterior canal inhibition of the left side.

The nystagmus which is seen in these two conditions is the same and the nystagmus which is seen in left anterior canal excitation is similar to the right posterior canal inhibition. So many a times. There is a dilemma between these two, you know, bPPVs, but differentiate between the anterior canal BPPV versus the apogeotropic posterior canal BPPV by looking at the predominance of which type of the nystagmus. If it is more of a torsional variety, then it is posterior canal, apogeotropic. And if it is more of a, you know, vertical, then it is more of a interior canal.

Now we will look into what are the different types of.

And each type of bppv. We will look into the what. What are the diagnostic tests? That is positional test. And what are the different maneuvers as far as the, like, you know, positional vertigo is concerned.

We. First thing, what we do in patients with, like, positional vertigo, if we look at the posterior canal, if we are. First thing, what we do is the which diagnostic he stick test rather than maneuver. So it's very important that the Dix Hallpike is a test. So in Dix Hallpike testing, the typical nystagmus, what is seen is torsional abating nystagmus.

And now let us. I'm going to show how posterior canal BPPV, we do the Dix-Hallpike pike testing. Okay, so coming to the typical posterior canal BPPV, the diagnostic maneuver is. The diagnostic testing is Dick's Hallpike testing and torsional upbeating,

stagnant. And we were discussing about the Dix Hallpike testing, where the patient sits, and we turn the head, like, you know, 45 degree towards the right.

For example, for the right Dix-Hallpike pike, we turn the patient's head towards the right side, and then, like this is to bring the posterior canal exactly in the sagittal plane, like, okay, so I'll just show you here. So we have turned the patient's head towards the right side, and then we are like. I take the patient down in the supine position, and then again the patient comes back in the sitting position. This is about the right Dix-Hallpike pipe test. So what essentially happens during this testing is the posterior canal.

The canal, it is located towards the, uh, like, ampullary end. That due to the supine position, it moves towards the, like, away from the cupula. And because it moves away from the cupula, it causes the endolymph movement, which is nothing but ampullofugal, which is excitatory in case of the posterior canal. And that leads to the abating torsionalness fragments. So if we look at the nystagmus, like, either the upbeating is seen, plus there is a torsional component.

The upper pole can beat towards the right side, or upper pole can beat towards the left side. If the upper pole beats towards the right side, it is right posterior canal BPPV. If the upper pole beats towards the left side, it is the left posterior canal BPPV. So it is not the positional test, what you are doing, which is important to decide which vppv it is. It is the character of the nystagmus which decides which BPPV it is.

And so that's why, you know, for example, sometimes Dix cell pike testing can come negative. And you, you are doing head roll testing. And during the head roll test, the patient can have a beating torsional nystagmus. So that doesn't mean it is lateral canal BPPV, although you are doing head roll test, but it is posterior canal BPPV. Because the character of the nystagmus decides the BPPV, not the, you know, the, like, you know, the which test which you are performing.

And the vantage point of the observer is very important. For example, in this, the observer is looking from here, okay, towards the eyes. So if the patient has a beating nystagmus, it will be towards this. But suppose the vantage point of the observer is from here, okay? And then the person gets a beating nystagmus.

So the up beating, this is beating towards the ground. Therefore, this type of variety, this typical posterior canal is nothing but geotropic variety because it is beating towards the ground. But suppose it is beating away from the ground from this vantage point. Like if you look at the nystagmus, it is beating downwards, okay? With respect to the patient, but it is beating away from the ground.

That's why it is called as apogeotropic posterior canal BPPV. Now, like, if we look at this, the whatever, what is the treatment for the posterior canal BPPV? It can be either Epley's maneuver or Simons maneuver or quick liberatory rotation maneuver. So there are various maneuvers which are described in the literature, but I will try to keep it simple. Like suppose you have to treat a patient with left posterior canal BPPV.

Suppose in that left posterior canal BPPV, you will turn the patient's head towards the left side, okay? And then in the second position, the patient lies down as if in the Dix-Hallpike PI position, that is left Dix-Hallpike PI position. Then the patient head is turned from there to here. That is 90 degree patient's head is turned. And there are subsequently, in every step, there is 90 degree rotation from here to here.

There was a 90 degree rotation from here to here. Again, there is a 90 degree rotation and the patient is looking towards the ground. And this is the next step. And then the patient gets up from this position. Patient gets up and sits up.

So this is how the epilepsy manoeuvre is performed in this particular pictures. It is for the left posterior canal, BPPV. Now let us look at how the quick liberatory rotation maneuver is performed. It is same like a police maneuver, but the third step is missing. Like this is the first step.

Then the second step is the patient goes as if the patient goes into the left Dix salpi position. Then the third step, which we use, usually do in a police maneuver, is not there directly. We go to the fourth position. This is the fourth position. And in this directly the patient looks down.

So this in third position is missing here in the quick liberatory rotation maneuver. And then the patient sits up. Then coming to the Simons maneuver, in Simone's maneuver, what happens is like the patient is sitting with the legs down and then the patient is taken towards one side, like for the treatment of the left sided posterior canal, patient is taken to the left side. And if you look at my video, there are four parts of the skull. That is there are two frontal eminences and there are two parietal eminences.

There are two parietal elevations. So when we are doing the this particular, like suppose this is the skull, okay, so there is a frontal eminences in front too. And there are two parietal eminences. So here, if the patient's left posterior canal, BPPV, if you are treating, I'm going to in the live session, we are going to see it in detail. Like the left parietal eminence, the left parietal eminence is in touch here.

Okay. And from here the patient is taken towards the right side. And the right frontal eminence touches to the, you know, like the bed. So if you can look here, here, you can appreciate this. The right frontal eminence we have to take towards the, like towards the bed.

It is touching to the bed. And it started with the left from parietal imminent. And from here to here, this shift should happen within a second. We have to take the patient from here to here. So here is a quick video.

Like, you know, the patient is taken towards the left side, left parietal eminence is touching. And from here the patient is taken toward the right side. You know, the right frontal eminence is touching. Okay. So in Simon's maneuver it is, you know, the, it uses the inertia, inertia instead of the gravity inertia of the autolids.

And in a pleas maneuver, it is the gravity which is, you know, plays a role while doing the positional maneuver. Now let us look at the lateral canal BPPV. Like there can be either geotropic variety in the non ampullary end or apogeotropic variety in the ampullary end. Now. So if we look at this lateral canal BPPV, we do the diagnostic testing which is performed is supine head roll test or pagnini Mercure testing.

And we see commonly horizontal nystagmus, which is commonly seen in this lateral canal. So like if we look at this, this is the position one, the patient is sitting and you can see that there is elevation of the bed. We. You generally elevate the bed for the like lateral canal for 30 degree. It can be either done at this level or it can be done even for the body.

Because it is ultimately what is important is the head. The body position doesn't matter whether it is flat or it is angulated. The head head angulation is very important. So this is the second step. The third step is during this, like, you know, the head head roll test.

Ideally it should be called as head yaw test because it is not the roll, it is yaw. So it is nothing but the head yaw test and or mature pregnancy testing. The head is turned towards one side, then we have to wait for 30 to 45 seconds, then come into the neutral position, wait for 15 to 30 seconds, then come to the neutral. We have seen and

it's very important to wait in the neutral for 15 to 30 seconds. Because we have to compare the nystagmus from the neutral position towards the right side, then coming to the center, then from the neutral, coming to the left side and then to the center.

So both sided nystagmus. If we want to compare exactly the intensity of the nystagmus on both sides, we have to do 90 degree on each side. If we do 90 degree on one side and directly go from here to the other side, the autolith movement can be, you know, it can affect the intensity of nystagmus. Because one side we are testing 90 degree, other side we are testing the 180 degree. So it can, you know, change the intensity, like, you know, like alter the interpretation.

And the last position is nothing. But the head is turned towards the other side. So we have to do it alternately. New person lies down, then turn to the right, wait for 45 seconds, then turn to the neutral position, wait for 15 to 30 seconds, turn to the other side, wait for 30 to 45 seconds and then again bring to the neutral. So that is nothing but the head you're testing.

Now, I will show in terms of canalith the autolyts, what is happening. So if we look here, the left is like, you know, I have given a color coding similar to in what is in done in the VNG systems. Left side is blue and right side is, you know, red. Suppose the patient has right lateral canalithiasis that is on the non ampullary end. So now let us, like, when we do the head roll test, like the nose is pointing towards the right and the right ear is down and left ear is up.

Okay? So in this position, what happens is the autolith gravitates down like the autolys gravitate down, and it gravitates, and it causes ampullopedal movement of the endolymph. And the ampullopetal moment of the endolymph is nothing, but it causes excitation of the, you know, amphilopetal movement in a lateral canal is excitatory. So it

causes right lateral canal excitation. And right lateral canal excitation will cause right beating nystagmus.

So this is right eye and this is left eye. And because of the excitation, it will cause right beating nystagmus. It will beat towards the right eye. Uh, so, uh, towards the ground, it will beat. So right beating means in this case, it is beating towards the ground.

That's why it is called a geotropic variety of nystagmus. Okay? Now, when the same patient with this lateral canal, BPPV, when the head is turned towards the left side, then this, the, the autolyth gravitates ampullofugally, like it is going away from the cupula. And that causes the endolymph movement, which is ampullofugal, which is inhibitory for the lateral canal. And this leads to right lateral canal inhibition.

And it leads to a nystagmus, which is geotropic variety of nystagmus, but it is beating towards the, you know, towards the ground, like, you know, towards the ground. So whether it is right side or left side, one thing is sure, it is beating towards the ground. But of course, the beating is different in both the cases. One side it is right beating, one side it is left beating. So here it is.

We call it geotropic. Here we use another reference frame, which is nothing but the ground. Now, coming to the right lateral cupulithiasis. If the, you know, the autolith is located on the this side, the cupula, like it is attached to the cupula or it is nearer to the cupula in this end. Then what happens is when we turn the head towards the right side, the autolith will gravitate down and it will lead to, you know, amphilofugal movement of the endolymph.

And the ampullofugal movement of the endolymph is it causes the kinocilium movement, which is inhibitory here, even though it is like patient is turning the head towards the right side and it is causing ampullofugal flow in case of lateral canal. And

that ampullofugal flow is leading to inhibitory type of nystagmus, which is less stronger as compared to the.

The inhibitory nystagmus is less stronger here. And so this leads to the left pitting nystagmus because it is inhibitory nystagmus. It is not an stagnant, which is excitatory. So right lateral canal will lead to left beating nystagmus because it is an inhibitory nystagmus and it will be less intense towards the side of the, you know, BPPV. And it is beating away from the ground.

If you look at the, this nystagmus right eye and the left eye, it is beating away from the ground and it is, you know, it is left beating nystagmus. So that's how it is apogotropic nystagmus. And in case of this, like, suppose the head is turned in the same patient towards the left side. What happens is there is movement of the autolith towards the cupula. So it causes, you know, the cupula to deflect downwards.

And that deflection of the cupula leads to nothing but ampullopedal flow of the endolymph. And ampullopetal flow in lateral canal is excitatory and it will lead to right beating nystagmus. So excitation of the right canal on turning the head towards the left side will lead to right beating nystagmus. The head is turned towards the left. That's why the nystagmus is beating towards the right and that's why it is called apogeotropic nystagmus.

So it is beating away from the ground. That's why it is called apogeotropic variety of nystagmus. So the nystagmus is stronger on opposite side of the, like BPPV. So that's, that's how the localization is done. In case of lateral canal BPPV.

So in case of lateral canal BPPV, the geotropic and apogeotropic, these are the two types of lateral canal BPPV. And we look at two things. One is symptom severity and nystagmus severity. And like the either it can be less severe symptoms or severe

symptoms. Either it could be geotropic or apogeotropic and the nystagmus could be also severe or less severe.

But the most reliable parameter in patients with for localization of geotropic and apogeotropic is intensity of the nystagmus and not the patient subjective symptoms. Because patients can be sometimes deceptive because like if you do Dix-Hallpike testing before doing the head roll, it can cause lythic practicability and it can lead to, you know, patients perception of the vertigo can change. But one thing which remains constant is the nystagmus intensity. And so in case of geotropic, variety of nystagmus, if the side involved is nothing but the side where the nystagmus is more severe and the symptoms are more severe. And in apogeotropic is the side where the side involved is nothing but where the nystagmus is less intense and less severe.

And another clinical pearl I would like to tell here is whenever we say geotropic in terms of lateral canal, we are trying to say it is canalithiasis. And when we say apogeotropic in lateral canal, we are trying to say it is cupula lithiasis. But that's not true in terms of posterior canal. In posterior canal, BPPVs we call it apogeotropic when it is on the non ampullary end, it is not attached to the cupula, but it is in the non ampullary end of the posterior canal. And geotropic we call when it is in the nearer to the cupula, in the ampullary end of the, like the posterior canal.

So geotropic apogeotropic is not equal to cupulo and canal lithiasis. It is dependent on the type of nystagmus. Again it is dependent on the type of nystagmus. Whether the nystagmus is beating towards the ground or away from the ground decides the name geotropic and apogee tropic. In terms of lateral canal it can be canal or cupulo for geo and apogeotropic, respectively.

But in posterior canal that doesn't hold true. Now, coming to the like algorithm, whenever a patient with positional vertigo comes we do. I do Dix-Hallpike pike testing

first, which can be positive or negative for horizontal nystagmus. And we do the specific test, that is supine head roll test. And then suppose in a case where on right side you find there is severe vertigo and severe nystagmus, the intensity of the nystagmus, that is the advantage of having a video nystagmography equipment.

Because sometimes patient symptoms are, you know, they are not able to judge it with which side is severe. But the VNG equipment can exactly characterize the intensity. And you can compare the intensity on right side versus left and decide which side is involved. So that is about. In this patient, it is right lateral canalithiasis, because the intensity of the nystagmus in a geotropic variety is severe towards the right side.

And then what, let us see what are the maneuvers which are performed like for the treatment. So, for the treatment and for geotropic, I commonly perform Guffoni manure. I used to perform barbecue rotation earlier, but I prefer Guffoni manure. It is very effective. And for apogeotropic, like earlier, I used to do Appiani followed by like Guffoni Apiani converts the apogeotropic to geotropic.

And then you can wait. And the step two is nothing but the gofoni. Nowadays I am performing Zuma manure. So all these three maneuvers I'm going to show. So, in the Guffoni, suppose the patient has right sided, right sided, geotropic, lateral canal, BPPV.

The patient is taken towards the left side. Can you see that? The patient has. This is the right side. The patient suppose has a right lateral canal, geotropic variety.

The patient is taken towards the left side. Then here the patient is exactly, you know, the head is exactly like, you know, parallel to the axis, parallel to the ground. So, but in the second step, in the third step, for example, here it's the second step. In the third step, the head is. The nose down position is achieved.

The nose is turned down towards the ground in the third position. And from there the patient is brought into the sitting position. So these are the four stages. One, two, three and four.

Okay. And now let us see another scenario where the patient suppose on the right side. If you are doing, doing the supine, your test, the patient has supposed mild vertigo and less intense nystagmus. But it is apogeotropic variety of nystagmus. And on the left side, see, patient symptoms are severe and intensity of nystagmus is severe.

But the patient has apogeotropic nystagmus. Then it is right lateral apogeotropic variety or right lateral capillary thiasis. BPPV is the only condition where you know you are giving the pathological diagnosis based on your clinical finding. Pathologically we are not going inside the inner ear. We are not checking whether the canulate is located in the endolymph or in the canal or it is in attached to the cupula.

But we are giving this diagnosis based on the clinical findings. So it is a very interesting condition where you know, without any dissection you are telling like what is the diagnosis. So treatment of apogeotropic lateral canal BPPV. It is a two step procedure. The first step is Apiani Apiani maneuver where the patient's head is.

A patient is taken towards the affected side. And Apiani maneuver will help to convert this nystagmus apogeotropic into geotropic. That is conversion of cupulithiasis into canal lithiasis. And then you will perform the Goponi manure after waiting for 1515 minutes. So I will tell the show you the upon Apiani maneuver how it is performed.

So Apiani maneuver. For right apogeotropic lateral canal BPPV the patient is again taken towards the right side. For right sided post geotropic lateral canal BPPV the patient is taken towards the right side and then nose up position. Not the nose down. It is nose is taken up and in each position wait for 45 seconds.

And the patient is then taken up for the sitting. This is about the RPNI maneuver. So it is a two step procedure. Like step one is nothing but a piano. It helps in conversion of apogeotropic to geotropic.

And then gophony. This I used to perform earlier. But nowadays I perform Zuma manoar which I will show you in a while. And then once the right apogeotropic converts into right geotropic then we know that for right geotropic the patient is taken towards the left side. Okay.

So here the patient's right apogeotropic. Initially we did Apiani towards the right. Now we are doing the gouverneur towards the left. We are taking the patient towards the left and nose down. In Guffoni, the nose is down.

Appiani the nose is up and the patient is again taken into the sitting position. In Zuma maneuver, I will show you. What happens is it's a very, very nice maneuver where the patient is taken towards one side. Okay. Towards the affected side in apogeotropic.

And then the patient is taken like the head is similar to the Guffoni, like the head is taken to one side and then the head in each position we have to maintain for three minutes. That is the difference between Guffoni and other maneuvers. Each position we are maintaining for three minutes. Waiting for three minute here. Then the head in neutral position.

Then the head is turned towards the left side maintained for again another three minutes. And from there the patient gets up with the neck bent. The neck is bent for some time. And then we can elevate the neck for some time like after the maneuver. So that is about the Guffoni maneuver.

And now coming to the last part that is anterior canal BPPV. The diagnostic testing is supine state head extension. And the nystagmus which is seen is down beating torsional variety of nystagmus. This is the supine straight head extension. Patient is in sitting.

Then the head is taken down and you know, it is ideally it should be like this but as far as the patient can tolerate we can do that. And then the patient is taken up. And what happens in terms of the canalith is from here the canalith goes down. It is, it moves ampullo fugally and ampullo fugal is excited in case of anterior canal. And that leads to down beating torsional nystagmus.

This is nothing but the supine straight head extension test. So the clinical pearl here is the character of character of the nystagmus decides the canal affected than the positioning positional testing. Okay. Now in case of anterior canal BPPV, down beating nystagmus is definitely seen. But torsion can be upper pole beating to the right or left which is less prominent.

In case of anterior canal BPPV. And it is not important whether it is right sided anterior canal or left sided because the treatment maneuver is the Yakovino maneuver and it is same for both the canals. So that is the beauty of this anterior canal where you don't need exact site determination. So side determination is not important in anterior canal. And the pearl, another pearl is anterior canal is nearer to the sagittal plane than the posterior canal.

And down beating component is predominant than the torsional component as compared to the apogee tropic. And in case of anterior canal the maneuver is Yakovino maneuver. And how Yakovino maneuver is performed is nothing. But the head is taken down like supine straight head extension. Then the chin touches to the chest in the second.

This is third position and the fourth position the patient sits up. So all these maneuvers, how they are performed, all the diagnostic testing, how they are done will be shown in the live demonstration while in the, in Dubai. When we are going to meet, I'm going to show this live with, with the help of the video stagmography equipment, how all this diagnostic testing is done, how the positional maneuvers are done. And this is what happens in case of, you know, while doing the japanese maneuver, the Canalith, as I told it moves ampullofugally. And then you can take it out by doing this series of steps.

And at our clinic we have one special table where we perform the Dixel pipe right, left. This is supine stated extension head roll right and head roll left. So algorithm to approach the positionally triggered BPPV is nothing but either. It could be objective BPPV, that is typical symptoms and typical nystagmus. Sometimes symptoms can be seen without nystagmus.

That is called subjective BPPV. There are certain differential diagnosis for that. And there are typical nystagmus can be seen with symptoms. There are other causes. It could be either central causes and typical nystagmus suppose is seen without symptoms.

Either it could be patient is on vestibular suppressant, it still. It could be bPPV or it could be again central causes. If the patient doesn't have nystagmus, doesn't have symptoms while doing the positional testing, either it is a probable BPPV, spontaneously resolved or false negative positional testing or in this group of patient follow up is important to check what is happening and atypical nystagmus, we have to think of atypical causes, that is like central causes. So whenever there is a typical nystagmus and atypical history, the most common central cause of positional vertigo is or nystagmus is vestibular migraine. Or it could be some other central causes, or there

could be peripheral causes like vestibular paroxysmia can also present with recurrent positional vertigo.

So central positional vertigo, the most common type is vestibular migraine. And of course it can be seen in fog, demyelination, tumors and degeneration.

Now coming to the, you know, this like differentiation between the central and peripheral variety of nystagmus, that is dispositional nystagmus, there can, there is latency in case of peripheral, but there is no latency in central. And the other characteristics like fatigue, ability, rebound, habituation can be reproducibility. These are the things which are, you know, like. It can help in differentiation between the position peripheral and the central variety. So whenever you do, you see a beating torsional nystagmus.

If the upper pole is beating towards the right, it is right posterior canal, BPPV. Upper pole is beating to the left. It is left posterior canal. When the symptoms are severe and nystagmus is also severe. Uh, in geotropic, that is the side involved.

And in apogeotropic, when the. The side towards which the. There are less severe symptoms and less severe nystagmus is the side involved. And in anterior canal, VPP, the side determination is not important. But in apogeotropic posterior canal, BPPV, if the upper pole beats to the right, it is left apogeotropic posterior canal.

The upper pole beats to the left, it is right aposotropic posterior canal. And this is my registry of initial 177 cases of BPPV. Now, this registry has grown up to around 400 to 500 patients with BPPV. And this is that time when I analyzed the patients with BPPV and typical posterior canal. DPPV is very common.

Then comes the geotropic lateral canal. Then comes the anterior canal. Then comes the apogeotropic posterior canal. And then comes the apogeotropic lateral canal.

It's all about the stones. 50% of the patients with BPPV undergo natural resolution. Whatever you do, they will recover in like, in a few days time. And then the patients claim they got better with the medicine, they got better with the neck. Physio.

Some patients. There are, of course, patients who don't improve with medicines, don't improve with maneuvers. Some fraction of the patient who receive maneuvers. But all these 50% patients may not improve with maneuvers, with medicines. And these patients, when we do maneuver, it is rewarding.

You know, BPPV is one of the vestibular disorder where it is so much rewarding. You do the manu, appropriate testing, appropriate canal localization, and you do the appropriate maneuver. And the patient gets rid of the vertigo which was there. And they are, they. They are so happy, they.

With your treatment. And that's why it is very important to learn the. All the positional testing and maneuvers. And I would recommend all of you to, you know, read this article, which has really helped me, like, you know, in my clinical practice, to diagnose patients with positional vertigo. And once again, this is our team and I'm really thankful to Mister Shinju, who is our audiologist and vestibulogist and he is playing instrumental role, you know, in like, you know, in day to day diagnosis as well as like helping me in the presentations.

And so we have, we have, you know, completed all the three webinars and our live session will be on the 8 June. I'm really excited for the live session. During the live session, I'm going to demonstrate everything, like how the sake testing is performed, smooth pursuit, optokinetic testing. I'm going to discuss about how the spontaneous

testing is done with fixation without fixation, gaze testing, head shaking test, hyperventilation test, all the positional testing and maneuvers. Everything I'm going to discuss in person and I'm going to, you know, we will, we are going to have hands on session for whole one day.

And I'm really excited for that. And, and with that, you know, I'm really sorry for the hiccups in between. There was some issue with my laptop. And with that, we end the third session. If there are any questions you can put in the chat box, I will, one by one, read and answer them.

So I will like question and answer session.

Currently as of now. Yeah, I can see different questions in the question and answer folders. Can you check it, please? Yes, I received one question. Yeah.

Like one of my, you know, I colleague, I can say, miss Shinju is asking, will you do the complete test battery for all patients? Complete test battery I like means I didn't get. What does the complete test battery means? Means, you mean to say VNG, video head impulse test or other testing or all the test protocols you are talking about in one VNG? Suppose I will give answer to both of them.

Suppose you are talking about all the test protocols in the VNG. Then what I do is, you know, like VNG testing has a specific CPT code and it mandates, you know, we have to do the all the testing. But if a patient presents with positional vertigo, we should first, you know, go to do the positional testing as a first thing. And that will majority of the times, you know, it will give the diagnosis. And if you are talking about all the test battery like other testing, in that case, like, you know, we can reserve the testing for a specific group of patients.

For example, if you are dealing with vestibulopathy, then clinically, then video head impulse test is very helpful. And if you are dealing with positional vertigo, we can go ahead with VNG testing first and then we can plan the remaining investigations. Then, uh, what is the treatment of apogeotropic posterior canal? Bppv? Yes.

Very good. Question. So in case of apogeotropic posterior canal BPPV, demi Simons maneuver, there are two, three maneuvers which have been described. The first thing is uh, like, uh, quick liberatory rotation maneuver which I have already shown. Instead of doing the second step, like, you know, when once you take the patient in the Dix hall pike position, that is step one, instead of doing the second step for the epilepsy, you directly go turn the head towards like, instead of turning 90 degree, you are going 180 degree.

That is one maneuver which you can do for patients with apogee tropic posterior canal. Second thing, what you can do is demi Simone's maneuver. In that what you can do is, for example, I have right typical posterior canal BPPV. I take the patient's head towards the right and then take towards the left. Okay.

These are the two parts. One part is taking towards the right and the second part is taking towards the left. In. In demi Simonds maneuver, what is done is already. This part is already done.

The patient already has the canalith in the non, non ampullary side. So you take the directly the patient towards only one side that is on the left side. Suppose the patient has right apogeotropic posterior canal BPPV. From this position, take the patient directly towards the like as if you are doing Simone's maneuver, but you have already performed. Suppose the first part as if you are performed directly take the patient down and then take up.

That is the treatment for Apu geotropic positive and Al BPPV. I hope I answered that question. Then. Coming to the another question, how to manage pseudo BPPV in vestibular migraine. Amazing.

Thank you for this question. In fact, I'm going to talk on this entity that is pseudo BPPV in like balance Belgrade forum, which is in Serbia of late. Like off late means. From beginning I have been saying maybe earlier days I might have missed. But pseudo BPPV presentation of vestibular migraine is so common, it will clearly mimic like BPPV.

But there are certain differentiating factors. That is, the attacks start after typical migraine triggers. If they sleep late night, they eat outside food or they use excessive electronic devices, they wake up with severe positional vertigo. Then they come and they have, you know, bilaterally positive Dixsalpike testing. Same sense nystagmus, opposite sense nystagmus.

The nystagmus is behaving haywire. Like you. You cannot determine the site many a times. Even if you determine the side and you do the maneuver, the patient doesn't improve with the maneuver and or the patient will have partial response to the maneuver. So until and unless two things are done.

One is lifestyle modification. That is, they should have a proper sleep routine. They should drink enough water, reduce the electronic device exposure, have their meal timing same every day, reduce their stress. So these are the things, if they do in the lifestyle and they do this, they are started on prophylactic medications, then these patients improve. So that is the treatment of pseudo BPPV.

Then, like another question is, I see many patients with horizontal geotropic nystagmus, but no history of positional dizziness. Only mild loss of balance while walking, for example. Could it be central positional nystagmus? Yes, it's a very nice

question. And in this group of patient, I would recommend you to take the history of headaches in the past or in the current majority of the times.

These are the patients who are suffering from, again, the pseudo BPPV. And that is the most common cause of, like, you know, positional vertigo after BPPV. And so horizontal geotropic nystagmus can be seen. In these patients with pseudo BPPV. There may not be associated positional dizziness and mild loss of balance while walking.

That is unsteadiness, which is happening for a second. That is again typical of vestibular migraine. So this is how the vestibular migraine can present sometimes as a pseudo BPPV. That is the first thing we should be considered. And of course, there are like other imaging should be done in patients who are not recovering with repeated maneuvers.

Or there are red flags for the diagnosis for BPPV, for example, there are associated neurological signs. So in these patients, it is very important that we should investigate and try to find out the correct cause. Then the next question is, what is your experience about BPPV canal anterior? What manure do you prefer? So in like anterior canal BPPV, my experience is I have seen cases of interior canal BPPV.

Of course, differentiation between anterior canal BPPV and apogeotropic posterior canal BPPV is very important. If the torsional component is predominant, it is more of a geotropic posterior canal. And if the down beating component is more predominant, then it is more of a like more of an anterior canal. And the maneuver which I prefer in this group of patient is the Yakovino maneuver. And it works for both the sides.

There is no need of side determination in anterior canal because the anterior canal is located, you know, it is nearer to the sagittal plane. That's why for both the. Both the

anterior canals, the same maneuver works. Yeah. Then Miss Shinju is asking again, will you repeat the maneuver or do only once?

Will you repeat the assessment maneuver on the same day? Can you please explain the follow up criteria and counselling part after repositioning? So very important question she has asked. The first question is, will you repeat the maneuver or do only once? So like majority of the times I do it only one time.

The first time I do the maneuver, for example, it is whether it is Epley's or whether it is Guffoni manure. Suppose we do it first time. Okay. Then what I do is I ask the patient to wait for 15 minutes. Minimum 15 minutes.

I ask them to wait because you have done the maneuver. The. The autolids have gone into the uterus and they have. They may not be settled down. Okay.

And they must. Might be pre floating still. And if you do immediate testing, they can again re enter and there can be autoconial reflux. It can come back again and it can cause either canal switch or it can be in the same canal. So that's why we have to wait for a minimum 15 minutes.

Meanwhile, I see another patient, you know, I consult another, depending on how much time it takes for me to consult another patient, minimum 15 minutes we wait. Or it can go more than that. Also, then I do the reassessment on the same day. And in the reassessment, if the patient has completely recovered, if the patient doesn't have symptoms and nystagmus, then we don't do redo the maneuver. Second time, if the patient still has symptoms when then we do the maneuver again.

Again we follow the same protocol like we ask the patient to wait for 15 to 20 minutes and again we recheck. And suppose in the repeatedly we are doing and the patient is

not improving on the same day, you can diagnose the pseudo BPPV. You don't have to wait for another day. That is the advantage. That's why I do the testing on the same day.

Because you call the patient after one week. Majority of the books and literature mentions that you do the maneuver once and ask the patient to come after one week. I don't follow that. I just wait for 15 minutes, then I call and I recheck. And if the patient is still having symptoms, then I diagnose it as pseudo BPPV and start the migraine prophylaxis in the same.

On the same day. And if I suspect any other central cause, then we can do imaging. Why? To wait for another week. If.

Suppose there is a central cause and we should not wait for another week. So that was her second question. Then the third part of her question is, can you please explain the follow up criteria? What I do is, on the same day, I don't let the patient go unless they say, okay, I'm feeling okay now. That is, I am obsessed with that thing.

And I. Once they get better, then I ask them to come for follow up in case they feel symptoms. In that case, I tell them, in case they feel symptoms, they can come back, or if they are feeling good, they can, you know, no need to come. Then the counselling part, after repositioning, is I tell them not to create undue anxiety and worry. My school of thought is, I don't give any special positions.

Like you take you posterior canal, you give high, you know, keep the head high and all. I don't give that. Even the guidelines don't mention that. Only for lateral canal, geotropic. I asked them to lie down on the opposite side for opposure tropic.

I'll ask them to lie down on the same side in wall side. That is the only thing I tell them apart from this. I like, you know, there is a counselling part. I tell them not to create undue anxiety, fear. And I tell them there are.

There are three stages of BPPV. The first stage is positional vertigo. The second stage you may or may not get. If 40% to 50% patients do get that while walking, suddenly they can feel imbalance, or while moving the head, they can feel dizziness. I make them aware about that because they.

They feel that I went to the doctor and something else is happening. So they should be aware about the post BPPV dizziness. And the third, 3rd stage is nothing but the resolution stage. Then coming to the last question is cause of positional vertigo in migraine. So it is, again, interesting question.

So there are two causes in patients with vestibular migraine, why they get positional vertigo. The incidence of BPPV is three times common in patients with vestibular migraine than in general population. So that could be one cause. And second thing is there. There are various hypotheses and there are some certain central mechanisms which are leading to the positional vertigo in patients with vestibular migraine.

That's why maneuver may not help in these patients. Repeated maneuvers may not help because there is a dysfunction of the central vestibular pathways. And that dysfunction can be in the nodulous, it can be in the flochulus, and that is leading to the positional vertigo in this patient, positional vertigo and positional nystagmus in these patients. So migraine prophylaxis, lifestyle modification helps and maneuvers help partially if it is related to the canal lithiasis, if it is related to the autolyts, then it will lead to. It can be because of, you know, because of this they can have partial response.

So that was the last question and I really thank you all for patient listening. And the session got extended a little because of little hiccups. And I'm really excited to meet all of you sometime in some of the conferences and those who have like coming to the live session. I really welcome and we will be meeting in person and discuss, discussing various manuals. Sure doctor Pawar, sure.

We are all excited, believe me. So, so many questions. So the webinar was even this time well received. But now we have arrived at a conclusion. So thank you very much doctor Vishal Pawar for your presentation even this time.

It has been a fantastic learning opportunity. So as I said, today marks the conclusion of our online course, fundamentals of vision, nystagmography, theory in practice and clinical cases. Please remember that the practical session will take place in Dubai on June 8, which is an absolute must attend. So if you are interested and would like more information, you can find it on the inventees website. Or please feel free to email us at Academia it.

Academia inventees it. So I would like to thank doctor Pawar once again and wish everyone a good continuation. See you in Dubai next June. Bye.