

Dr. Alyssa Smith:

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Dr. Jason Barnes:

Hey there, welcome to another episode of ENT in a nutshell, my name's Jason Barnes and today we are joined by rhinologist and skull-based surgeon, Dr. Garret Choby, and we will be discussing nasal obstruction. Dr. Choby, thanks so much for being here.

Dr. Garret Choby:

I appreciate the invitation.

Dr. Jason Barnes:

Dr. Choby. This is a pretty wide differential in terms of what causes nasal obstruction so we'll try to break this down kind of one step at a time. And we'll mainly be focusing on adults today. But can you tell us when someone presents with nasal obstruction, what are the primary symptoms they're presenting with?

Dr. Garret Choby:

Yeah, I think before we get too deep into those things I just want to mention that we'll try to do a good job today of talking about a thorough workup and evaluation and probably touch on treatment, but really kind of focus in on the adult patient and how we think about the problem of nasal airway obstruction. The first thing in regards to symptoms that I'll mention is I find it very important to really get the patient to be specific with you in their symptom description. For instance, we have a lot of patients who may come in and say, "Doc, I'm coming to see you because I have nasal congestion." And it's difficult to know what congestion translates to from what they're thinking compared to what we're thinking. There's been some data that shows that when ENTs hear the word congestion, we think nasal blockage, but when patients say congestion, they actually mean a feeling of pressure or mucus production. So again, I think it's really important to talk to them specifically about the symptoms that they're experiencing and have them describe that to you in detail.

Dr. Jason Barnes:

And what are some specific questions that you're asking them regarding their symptomatology that helps you tease out what might be going on?

Dr. Garret Choby:

So when they tell me that it's a blockage or an obstruction symptom, I like to focus on a couple of things. I often ask them, of course, how long it's been there and how significant or severe it is. If it's a mild problem that's been there for a long time, that may lead you down a certain pathway in a differential, versus a severe problem that's unilateral, that's come on quickly over two or three months, that may lead you down a different aspect of your differential. I also ask about if it's worse during a specific time of the day, for instance, at nighttime, or when they lie down versus during the daytime. We of course talk about the laterality, left and right. We talk a little about if they have any associated symptoms like rhinorrhea or drainage or other sleep difficulties in the evening time. We of course ask the straightforward questions like history of known allergies or a history of nasal trauma. And I'll also

highlight for them a little bit, the normal nasal cycle in which one side of the turbinate tends to be in gorged every few hours throughout the day and may switch sides. And for some patients that may be interpreted as nasal obstruction, when in fact it may be more symbolic of the natural nasal cycle.

Dr. Jason Barnes:

And what are some risk factors you might ask about?

Dr. Garret Choby:

So a few of them I've mentioned already. Certainly folks with a history of allergic rhinitis do have a pretty high incidence of having nasal obstruction symptoms. In other podcasts, we've discussed chronic rhinosinusitis, and folks with that condition or recurrent sinusitis also are of course at risk for having nasal obstruction symptoms. We also think about things like nasal trauma or history of a broken nose can lead you on a pathway to think about things like septal deviation or a narrow internasal valve. And the last one that I'll also mention is pregnancy. There is a condition of nasal obstruction that tends to occur during pregnancy. It's thought to be due to the estrogen effects during pregnancy. And that can cause some vasodilation changes in the nose and engorge when the mucosa especially of the inferior turbinates.

Dr. Jason Barnes:

And as you were evaluating this patient, you've kind of gone through your HPI and touched on symptoms and risk factors, but there're some other aspects that are probably important. What are you paying attention to in terms of medications that patients might be taking and other aspects of their past medical history?

Dr. Garret Choby:

So I think that the medication history is important in this particular issue, both from a previous treatment standpoint, as well as things that may help to induce congestion in some scenarios. I certainly ask them about a history of use of nasal decongestants. This can be... A number of them are out there on the market. They can either be a topical spray, things like Afrin or Neo-Syneprine or pills that can be just as well that are decongestants. I also talk about previous use of nasal steroids, sprays and rinses they've used in the past, and the technique in which they've used them. Then we also talk about things that they have maybe a history of helping to induce some nasal congestion or nasal blockage symptoms. And those can be things like oral contraceptives, which again, likely due to the estrogen component, can induce some blockage symptoms. Certain blood pressure medicines have a history of this, as well as a few antidepressants or benzodiazepine medications.

Dr. Jason Barnes:

In terms of past medical history, what are some kind of red flags or things that might be contributing to nasal obstruction that might make you think more outside the box?

Dr. Garret Choby:

Yeah, great question. We've already discussed some more routine things like chronic rhinosinusitis or allergic rhinitis, but other things can peak your interest a little bit, things like a rheumatologic diseases. So we think about GPA or Wegener's disease, or even a little bit less common things like sarcoidosis or EGPA are things to think about as far as outside the box conditions that can also cause nasal obstruction. Nasal polypsis we've discussed a bit already, and that can certainly cause blockage. In certain things,

maybe in a kid, cystic fibrosis, or an adult AERD, can contribute to those particular issues. And then of course we always ask about things like a history of nasal surgery, as you mentioned earlier, that is going to lead you down a certain thought process when you evaluate these patients.

Dr. Jason Barnes:

And taking a quick detour, can you talk to us about a few questions or things you might consider specifically for the pediatric population with nasal obstruction?

Dr. Garret Choby:

Absolutely. And I'll just mention a few things because they're probably high yield in many regards from a pediatric standpoint when talking about nasal obstruction. I think it's important to always ask if that condition that the patient is experiencing, usually to the mom or the dad, has been present since birth or developed after birth. It's also important to ask if they had trouble with nursing or bottle feeding. It may make you think about things like choanal atresia. Of course, that's bilateral, that's more of an acute problem if you will, but if it's just unilateral or a partial membranous choanal atresia, they may still have normal growth and development but have the classic history of it being present since birth and having trouble with nursing and bottle feeding. And then of course we always ask about things like foreign body or purulent drainage, which may make you think that a kiddo has put something like a little Lego in their nose that may need to be removed.

Dr. Jason Barnes:

And kind of heading back towards the adult side, we've done the full history. Can you walk us through what you are looking for in physical exam when you evaluate someone with nasal obstruction?

Dr. Garret Choby:

Sure. There's a couple of things that are important. With every new patient that I see, I perform a complete head neck examination to look for any other associated or even non associated things that may be playing a role in their current issue, or even outside of that, to be honest with you. But specifically looking at patients with nasal obstruction, I think it's important to look at the external part of their nose. If they've had previous trauma or even just congenitally, they could have very pinched intra-nasal valves or shifted nasal bones, which can make things just narrow from an external standpoint. A standard speculum exam with a headlight is important, especially to assess that caudal septum on the area of the external nasal valve. And then I typically do an endoscopic exam in all of my patients look more posteriorly in areas that I can't see well with my nasal speculum exam and have a thorough examination of the middle meatus, So you might want to re access in those areas as well.

There is a maneuver that's been described through the years called the Cottle maneuver. And that's an external maneuver where you sort of gently pull on the cheek next to the extra nasal valve laterally. And the thought is that that may help you to diagnose a valve issues in a patient if they have improvement with that maneuver. What I'll tell you is that anybody including myself who... I don't really have a nasal breathing problem. If I pull laterally on my cheek, it makes me feel like I'm breathing better. So that's, that's not a very specific test I wouldn't say.

There is a modified version of that called the modified Cottle maneuver. And that's where you place a small instrument, like an ear curette, for instance, just inside of the internal nasal valve, near the upper lateral cartilage, and gently lift that laterally. And that can also help you to better diagnose an internal nasal valve issue in those patients. Again, almost anybody will have some improvement with it, but if the patient tells you it's an aha moment and you've noticed there's a high deflection in that area

or a narrowness in that internasal valve, it may make you think that perhaps it's more of a valve issue than a routine septal issue or otherwise.

Dr. Jason Barnes:

And moving on to pathophysiology, could you describe to us how you think about the etiologies of nasal obstruction and then maybe give us some relevant anatomy that might be helpful as we consider this?

Dr. Garret Choby:

Yeah, absolutely. And, and I talk about this sort of differentiation of pathophysiology both to my residents and trainees as well as to the patients themselves, to help them to understand things. And we'll get into the differential diagnosis in a little bit, and there can be things outside of this, but just as a basic outline, I tend to think of nasal obstruction from both a mucosal standpoint and then a structural standpoint. I think we'll start with a mucosal standpoint first. And this really refers to conditions that are cause edema in the lining of the nasal cavity and perhaps the sinuses as well, which then narrow the nasal passageway and can contribute to a sensation of blockage in these patients. Chronic rhinosinusitis or nasal polyposis can certainly play a role in this regard. And then other things that are more specific to the nasal cavity are also big players here, and that's allergic rhinitis and non allergic rhinitis.

And these are conditions that can really cause a edema swelling in the lining of the nasal cavity mucosa, again, contributing to nasal blockage symptoms. Also something we think about from a mucosal standpoint is rhinitis medicamentosa, and as I mentioned earlier, I always ask these patients if they have used a topical decongestant spray in the past, and with prolonged use of this over time, classically over three to five days, they can begin to get rebound congestion of their mucosa, which can then cause symptoms of a blockage, even though they're using this medicine regularly.

And the last thing I'll mention here is that, from a mucosal standpoint, is the inferior turbinates do play a big role in nasal obstruction symptoms. These are important structures, both for humidifying and moisturizing the air as you breathe it in, but they can also become engorged from a number of conditions.

Allergies I've already mentioned to you a few times, but these are really controlled by the parasympathetic and sympathetic nervous system. So the parasympathetic system in general stimulates congestion and sometimes increased nasal secretion production by causing vasodilation of the sinusoids within these turbinates. And in contrast, the sympathetic system provides a nice vasoconstriction of these, which is why some of your decongestant sprays will actually work via vasoconstriction via this sympathetic nervous system pathway.

So those are a number of things I think about from a mucosal standpoint. Now on the contrary, many folks also have structural issues in the nose that are playing a significant role in their nasal obstruction symptoms. And I think it's prudent to take a quick detour and just talk about anatomy for a little bit. It's not the overall point of this podcast today, but it really plays a vital role in understanding these structural components.

The first thing I'll mention is that the nasal septum is of course very important. Everyone I'm sure is quite familiar with that. And it's really made of three main components. So interiorly you have the quadrangular cartilage and then posterior, in your bony septum, you have a two bones that really make that up and that's the inferior vomer and the more superior perpendicular plate of the ethmoid.

And as we'll talk about a little bit, there can be deviations throughout the septum in a number of these areas, both cartilaginous or bony. The internal nasal valve has already been mentioned before. And this is really, really important to understand from a nasal obstruction standpoint. The internal nasal

valve is an area in the nose that's really bounded immediately by the nasal septum and then laterally it's really the pure form aperture or about the head of the inferior turbinate, and then more superiorly and laterally it's bounded by the caudal end of the upper lateral cartilage and then finally the nasal floor.

And this is really important because this internal nasal valve area is thought to account for up to half of the resistance in the nose. So it's the narrowest part of the nasal cavity and creates the most in regards to nasal resistance. So even more slight alterations in his internal valve area can cause significant symptoms for patients in regards to their nasal obstruction symptoms. The external nasal valve also plays a role here. The external valve is really the area between the ala more laterally and in the caudal septum, the columella more immediately. And especially in older folks who have very weak cartilage or have had previous surgery, this can also be an area of narrowing and collapse in folks who have obstructive symptoms.

When we talk about structural things, again, I think we focus largely on those structures I just mentioned to you. Paying attention to deviations in the nasal septum and where they are is very important. There can be simple spurs that are causing obstruction or slight deviations in the valve area. There's also folks who had trauma or other things and they have their septum completely other side of the nose, which of course is a major obstruction area for them. There can be also things to pay attention to, things like concha bullosa, which is an air cell in the middle turbinate, which can take up some space and cause blockage. And then of course the one that's crossing both the boundary of the mucosa and the structural is the inferior turbinates. And we see some folks who have very large bulky inferior turbinates with a very large bony core, which is more of a structural reason than a simple mucosal swelling for their obstruction in regards to their inferior turbinates.

Dr. Jason Barnes:

So kind of a big question here, but what do you put on your differential diagnosis for someone with nasal obstruction?

Dr. Garret Choby:

Yeah. Great question. This is a pretty high yield area. And as we've alluded to already, the differential diagnosis is very wide in these patients and you can pick your favorite mnemonic if you'd like to think about these things. I mentioned a few things from a congenital standpoint and I'll mention those again. So, choanal atresia, there can be even deviated septum in kids. There can be things like nasolacrimal duct cysts, which can cause problems in kids or foreign bodies as I mentioned earlier. Infectious things or inflammatory etiologies are common. So allergic rhinitis, chronic sinusitis, rheumatologic conditions, or turbinate hypertrophy as we mentioned earlier. Medications we talked about like rhinitis medicamentosa or estrogen or birth control pills can also contribute to things.

There are some things that can be caused from surgeons as well. So empty nose syndrome, which we'll get to in a little bit is something where the turbinates have been resected and the patients feel like they have a nasal obstruction, even though their nose is quite wide open. And again, we'll talk about that in a little bit.

There can be things like drug abuse, cocaine, where there's crusting and those kinds of things in the nose. And then of course a big one in this differential is also neoplasm. So a number of benign and malignant tumors can grow in the nose and cause symptoms of obstruction. And in many cases is actually the presenting symptom for those tumors. And we will cover both benign and malignancy tumors in other podcasts that we're doing.

Dr. Jason Barnes:

A couple of more specific causes that I wanted to touch on today. Could you talk about empty nose syndrome?

Dr. Garret Choby:

Sure. This is a really challenging condition to treat in many regards and it's a condition that is thought to have both a structural or a physical component as well as a bit of a psychogenic component. And in some ways I think it can be considered along the lines of conditions like fibromyalgia, where there is both a physical component as well as a psychogenic component to it.

Empty nose syndrome patients classically are those who have had partial or complete inferior turbinate reductions, or excuse me, resections if you will. In other words, a turbinate has been cut out. And the thought is that there are some sensory components to those inferior turbinates that may sense airflow. And even though when you look in the nose, there's a lot of room in their nose, the patients can not feel that air passing by and therefore they have symptoms of blockage congestion, or even in some cases they consider suffocation or anxiety a component of this condition as well.

And also as a result of having their turbinates resected, a lot of their moisturization is gone. So they may complain of things like chronic dryness in the nose or crusting in the nose as well. And it really causes a lot of distress for many of these patients.

Historically, this has been a challenging condition to treat because there hasn't been a lot of great options for rebuilding those turbinates, if you will, or restoring that moisturization component. Jayakar Nayak, who's at Stanford, is doing a lot of great work in this area. And he's developed some evaluative questionnaires to these patients and is even doing some submucosal implants or injections to try to restore that bulk of tissue, which can then better allow them to feel the airflow. And in some cases, maybe even improve their moisturization. But again, a condition typically associated with complete or partial inferior turbinate resection, that was something that was done a long time ago versus the more typical submucosal reduction that we do nowadays.

Dr. Jason Barnes:

And moving on to workup, what is your next step after performing a good history and physical for folks with a nasal obstruction? Is imaging usually a part of your workup?

Dr. Garret Choby:

Great question. And I think that this can become a little bit controversial. What I would tell you that the textbook answer is for routine nasal obstruction after a physical exam and a good history, imaging is not necessary for most routine cases of nasal obstruction most likely caused by things like septal deviation or big turbinates. However, it does play a good role if you're worried about other things. So if other symptoms suggest chronic rhinosinusitis, things like recurrent infections or hyposmia or facial pain and pressure, a CT scan can help to work up those things which are not visible on physical examination. Other things can also be important to image. So if you're worried about a tumor or a neoplasm, of course, that's important to image. Or again in pediatrics you might consider imaging for things like choanal atresia or stenosis or those kinds of things. But the textbook answer for routine standalone nasal obstruction with a more likely septal or inferior turbinate source, imaging is not necessary for most patients.

Dr. Jason Barnes:

And can you tell us about acoustic rhinometry and rhinomanometry and where it fits in the workup?

Dr. Garret Choby:

Great question. I would first start off by saying that these two investigative techniques are largely done from a research setting standpoint and are not part of our routine clinical care and in most scenarios. Acoustic rhinometry is really a static technique that uses acoustic waves to measure the cross-sectional area within the nose. So again, that's a static thing looking at cross-sectional area to find the narrowest part of the nasal cavity, which is typically the internal nasal valve area.

Now contrast that with rhinomanometry, which is a more dynamic technique where you measure the respiratory airflow and resistance, both at the front of the nose and at the back of the nose, which helps to identify the difference in those two and then a relative difference in resistance patterns you see from the front of the nose to the back of the nose.

Dr. Jason Barnes:

So what else do you include in workup if imaging isn't required? These other studies are more for research. What other things are you thinking about when you're assessing people with nasal obstruction?

Dr. Garret Choby:

So I think two things come to mind from a workup standpoint for most routine patients. And those really come down to allergy testing and then potentially a medication or an intervention trial. I'll touch on allergy testing first. I don't think that every patient that walks in with nasal obstruction needs to get allergy tested, but if they have any seasonal component or other things in their history that suggests allergies may play a role, I think it's certainly worthwhile to consider getting allergy testing. Now for most patients, their next step in workup is really a medication or intervention trial. This can be a number of things. If they have not had previous therapeutic intervention from a topical steroid spray or rinse, then a routine trial of this for six to eight weeks is very appropriate. It's more to counsel them about the proper use of these in pointing them laterally in the nose towards their ear instead of onto the nasal septum.

And this can both be a therapeutic as well as a diagnostic trial for many of these patients. If we think it's maybe more of an internal valve problem and want to work that up further, a trial of Breathe Right strips to be used at nighttime or during the day can also be a nice both therapeutic and diagnostic trial for these patients. Then lastly, if it's really an inferior turbinates mucosal edema problem that I'm seeing, I may actually do an Afrin trial. And that's where we use a topical decongestant spray like Afrin about three days or so. And if they get significant relief with this, you may be able to replicate that with an inferior turbinate reduction. And again, I counsel them about rhinitis medicamentosa, but from a diagnostic trial, that's also a valuable thing to consider doing.

Dr. Jason Barnes:

So we've talked about history and physical. We've talked about our pathophysiology and the workup. So I wanted to next move on to treatment. Can you describe first what the medical therapeutic options are for nasal obstruction?

Dr. Garret Choby:

Sure. The backbone of medical treatment of nasal obstruction is really topical steroids. This can be delivered in a number of ways, the classic ones that are out there are things like fluticasone or mometasone in a topical spray. They've been around for a number of years and can be quite effective for most patients. Things like fluticasone are actually available generic now over the counter, so they can

be purchased by the patient. And as I've mentioned already, it's important to really counsel them about the proper use and technique of these sprays and the fact that they don't work right away. So most of these sprays take at least 10 days to 14 days to really start working. So as opposed to decongestants which work right away, they really need to stick to these topical steroid sprays to get benefit from them. Topical steroid rinses are also very commonly utilized more so for chronic rhinosinusitis, but can also play a role potentially in these nasal obstruction patients.

And that's things like budesonide or mometasone rinses delivered with a saline rinse. And those are really the backbone of therapy for most of these patients. If an allergy component is there as well, things like azelastine can also be utilized, which is an anti-histamine topical spray. And then I'll also mention in this area non-surgical options. So some patients don't want to, or don't need to undergo surgery, and they'd rather do things like use a Breathe Right strip at nighttime or there're things like nasal cones that will utilize... that kind of dilate that external valve to help people sleep at night. And those are reasonable options for folks who don't want to undergo any procedural interventions.

Dr. Jason Barnes:

And can you tell us about surgical options?

Dr. Garret Choby:

Sure. And we won't get too deep in the weeds today with these options. I think we'll have some other time dedicated to some of these things, but the most common things we end up doing for patients with nasal obstruction are septoplasty inferior turbinate outfracture, or an inferior turbinate reduction.

And then when needed a concha bullosa resection. Now there are many nuances to these things. And I'll first touch on septoplasty. A septoplasty operation is a relatively common outpatient operation in many ENT practices. It can either be done with a nasal speculum or an endoscopic approach. And these are really intended for more routine septal deviation that can be accessed through typical incisions and options. The lining is raised in a submucoperichondrial and periosteal plane on one side. Typically an incision is carried out through the cartilage or bone on the other side and the chondrial side is raised, and then those deviated portions of bone and cartilage are removed. It's important to leave a reasonable dorsal and caudal strut in order to allow for nasal support. And you can find these written different measurements in various places, but about 1.5 centimeters is a pretty safe bet on what you need to leave behind in order to have adequate support for the nasal tip.

Now, I will also mention that not every septum is a quote unquote "routine septum", and each one needs to be approached very specifically and individually. If I have a patient who has a very significant internal valve component to their septal deviation, like a high dorsal septal deviation, or folks who have a significant caudal deviation, that very caudal aspect of the septum, I will have a low threshold to involve one of my partners in facial plastic surgery who has expertise in opening the nose or rebuilding or reinforcing these areas when needed. And again, those nuanced conversations I think are going to be had in another podcast coming up.

The next thing I'll mention is the concha bullosa, and that's not present very commonly, but when it is, it can be helpful to remove the lateral aspect of this in order to improve the patient's area in that middle meatal space.

And then finally, the inferior turbinates can either be simply outfractured where the bone is sometimes in and then outfractured and pushed to the side or a more formal submucosal inferior turbinate reduction. And this is a technique where an incision is carried out near the head of that inferior turbinate, and then a submucosal dissection is performed, and then the underlying bone and the sinusoidals of blood flow, if you will, or that submucosal component can also be reduced with a small



microdebrider while leaving the outside aspect is important for moisturization and sensation intact. They seem to have a nice reduction in the size of their turbinates without resecting them. And I talked to patients about this and tell them it's similar to taking the stuffing out of a pillow, but leaving that nice covering of the pillow intact for functional reasons.

Dr. Jason Barnes:

And how do you counsel patients on outcomes and expectations and kind of what they should expect regarding their nasal obstruction when they're pursuing therapy?

Dr. Garret Choby:

So I think there's a couple of important things to talk about. First of all, I always counsel these patients, even if we're undergoing an intervention for them, that the goal is to improve their symptoms. And it may never be perfect or exactly symmetric between the right and left sides. We're looking for overall improvement in their sensation of nasal airflow. No matter what we do surgically, there's always going to be that natural nasal cycle where there's some increased swelling from one side to the other a few times throughout the day. That's going to be normal. And in many folks who have another reason for things like allergic rhinitis, they may need ongoing treatment medically for that allergy component. And that may be long-term even if they've had things like their septum straightened or their turbinates reduced.

Dr. Jason Barnes:

And how do you follow up with these patients?

Dr. Garret Choby:

So for most of these patients, assuming they've had an operative intervention, we'll see them a few times post-operatively to make sure they're healing well. Then I may check again on them in about six months or a year, just to ensure that their symptoms have stayed at bay and they've been doing well for a more longer-term outcome. If they've done well through that timeframe, then I'll usually release them back to their primary care doctor for longer-term management or back to their allergist for ongoing allergy management for most of these patients.

Dr. Jason Barnes:

Well, Dr. Choby, I think we've had a great discussion about nasal obstruction. Before I move on to our summary, is there anything we haven't talked about that's worth mentioning?

Dr. Garret Choby:

No, I think we've done hopefully a thorough job in talking about the workup differential diagnosis and at least the nuts and bolts of management of these patients. I will mention it's really important to work with doctors and other surgeons who have expertise in different areas. So in our practice here, we have a very low threshold to involve our facial plastic surgery colleagues who have great expertise in, again, that caudal and dorsal septal area, as well as our allergy colleagues as well, who have a lot of expertise in managing more challenging allergy patients.

Dr. Jason Barnes:

Great. We'll now move on to our summary. A nasal obstruction is a common complaint that presents to many specialties and has many different etiologies. A thorough history can help elucidate the etiology, which is necessary given the broad differential diagnosis. Physical exam should include nasal endoscopy when possible and carefully performing the Cottle maneuver or modified Cottle maneuver to further distinguish the cause of nasal obstruction. Workup can include allergy testing depending on symptoms. Sometimes a CT scan can evaluate structural abnormalities. And we did talk about acoustic rhinometry and rhinomanometry, which is typically reserved for research purposes. Treatment should be directed to the cause of the obstruction and oftentimes starts with medical therapy. Obstruction that's refractory to medical therapy can be addressed through many different surgical options, including septoplasty, inferior turbinate reduction or outfracture, concha bullosa resection, and as Dr. Choby alluded to, possible nasal valve correction. Patients often achieve satisfaction once the appropriate intervention is offered, though some might require ongoing medical therapy depending on the etiology. Dr. Choby, anything else you'd like to add?

Dr. Garret Choby:

No, I appreciate the time, Jason, thanks so much.

Dr. Jason Barnes:

Thanks. I'll now move on to the question asking portion of our time. As a reminder, I'll ask a question, pause for a few seconds to give you some time to think about it or press pause yourself, and then we'll give the answer. So the first question is what should be performed on physical exam and the evaluation of nasal obstruction?

As always, we should perform a complete history and physical exam, but more specifically, the general exam should be ruling out any obvious signs of trauma or craniofacial abnormalities. And more specifically to the nose, we should evaluate the nasal valve using the modified Cottle maneuver, and we should perform nasal endoscopy to evaluate the septum, inferior turbinates possible presence of a concha bullosa, and signs of inflammation infection as well as possible neoplasm. It is worthwhile performing an endoscopy both before and after nasal decongestant is applied.

For our next question, what is empty nose syndrome? As Dr. Choby discussed, empty nose syndrome occurs in patients who have previously had sinus surgery with resection of their inferior turbinates. This creates a paradoxical sensation of nasal blockage despite an open pathway in the nasal cavity.

And for our last question, what are the components of the internal nasal valve? When we talked about the internal nasal valve medially this is the nasal septum. Laterally is the pyriform aperture and the head of the inferior turbinate superolaterally is the caudal end of the upper lateral cartilage. And inferiorly is the nasal floor. And this is typically the narrowest part of the nasal cavity. Thanks so much. And we'll see you next time.