

Dr. Jason Barnes:

Hey there. Welcome to another episode of ENT in a Nutshell. My name is Jason Barnes and today, I am accompanied by Dr. Eric Moore, head neck surgeon, and we will be discussing benign parotid lesions. Dr. Moore, thanks so much for being here.

Dr. Eric Moore:

Yeah, Jason. I'm happy to do it. Thanks for having me.

Dr. Jason Barnes:

So the first question I have for you is we'll be talking about benign lesions. When you have a person who presents to your clinic with a benign parotid lesion, how do they typically present?

Dr. Eric Moore:

As opposed to a lot of other things that we see in the head and neck clinic these days, parotid benign tumors are almost always found by the patient and treatment is sought out by the patient. The reason for that probably is that the parotid gland is so prevalent on the face and fairly superficial to the skin. So most people do not have an incidentally discovered lesion on imaging or something like that. Most people have felt their parotid mass themselves. Probably the most typical thing I hear is, "I was shaving and I felt this lump in my cheek or I was rubbing my cheek or feeling around my ear and I just noticed this lump and brought it to the attention of my physician and that's why I'm here." Occasionally, parotid masses will present with pain, ear symptoms, things that are mistaken for temporomandibular joint pain, but most often, the benign lesions especially are just a mass palpated by the patient and otherwise asymptomatic.

Dr. Jason Barnes:

What are some questions that you're asking to kind of parse out what this might be?

Dr. Eric Moore:

The most important thing in the history in parotid tumors is some trajectory of the growth phase, how long it's been there. So I usually ask the patient, "When did you notice this," and want to hear something like, "Oh, I felt it a few months ago or more and have just sort of been gradually noticing it more or feeling it more and noticed that it's still there." You want to try to suss out that this isn't a rapidly expanding lesion because that puts it into a higher risk category usually. You want to try to sort of whether they have other symptoms aside from just mass effect. So I usually ask them if they have pain, do they have deep earache, do they have pain on chewing. A painful parotid mass is less likely a benign mass than a painless mass.

Then you also want to ask about paresthesias. Do they have any numbness over the mass? Do they have any shooting sensations? Do they have any tingling? Specifically, you want to ask do they have any facial nerve symptoms because the parotid mass is always intimately associated in location with the facial nerve. You want to ask have they noticed any difference in their brows elevating or any change in their blinking or have they noticed an asymmetry in their smile to try to sort out do they have subtle facial nerve symptoms. Finally, I ask about lymphadenopathy. So benign parotid masses are usually singular and masses that associated with other lumps or lymph nodes down in the neck are more often malignant.

Dr. Jason Barnes:

And are there any risk factors that you're asking about that could cause a benign parotid mass?

Dr. Eric Moore:

One of the most common questions I get from patients after we're talking about a parotid mass is, "How did I get this? What did I do to get this? Was I exposed to something? Was this hereditary?" Parotid masses by and large don't have known risk factors or etiologies. Some of them are associated with smoking such as Warthin's tumor. There's possibly slightly higher incidents of pleomorphic adenomas even in smokers. Radiation has been implicated in certainly malignant parotid neoplasms and it's unclear if it's associated with benign parotid neoplasms, but most parotid tumors don't have a known etiology and a known risk factor associated with them.

Dr. Jason Barnes:

So once you've kind of finished your history with the patient, you'd move onto physical exam. What are you evaluating in the patient on physical exam?

Dr. Eric Moore:

The first thing I'd try to figure out is is it something that I can feel too. Sometimes deeper parotid masses that the patient can feel are actually difficult to palpate for the examiner, but I feel their parotids mostly by manual palpation of feeling both parotid glands at the same time to compare their thickness and their consistency and then see if I can feel the mass and kind of get an idea of how large it is. Is it mobile or is it fixed to the overlying skin or the underlying masseter muscle or the zygoma or to the ear canal? Mobility is a useful sign to try to determine resectability and benign versus malignant lesions. After I've done that, then I ask them to go through all the grimaces of facial expressions, so elevate their eyebrows, close their eyes tightly, show me their teeth, smile, pucker their lips, move the platysma muscle in the neck to try to get some idea of is there any facial nerve symptomatology at all. Pain or painless sensation on palpation is helpful.

Then the last thing is sometimes the low parotid masses, it's difficult to tell is this actually a lymph node that I'm feeling in the neck or is it a parotid mass. The most useful thing on physical examination for that is can you sort of get your fingers around it or your hand around it. So the parotid masses that are low in the gland overlying the sternocleidomastoid muscle are superficial to it, and most of the lymph nodes in that area are deep to the sternocleidomastoid muscle. So you'll be able to get your fingers two-thirds of the way around or three-quarters of the way around most inferior parotid masses where you can't do that, you can only feel the top surface of lymph nodes. That's a really useful clinical sign of this is a parotid mass versus a deeper neck lymph node.

Dr. Jason Barnes:

Sure. I imagine when you evaluate a patient and they have a mass in their parotid gland, they're probably worried they might have a malignancy. How do you generally counsel patients at face value what the risk of malignancy is?

Dr. Eric Moore:

Yeah, most people who come in with a parotid mass are very concerned that they have something, one, that's going to be disfiguring to them since it's on their face and subsequent treatment is going to be disfiguring or that they have a malignant tumor that's going to cause them ill health and significant

effects after that. So reassuring the patient right away that most parotid masses just off the board are statistically benign, a good 80% of the parotid masses are benign and 20% are malignant goes a long way to help organizing your differential diagnosis and reassuring the patient that what they have is not likely a malignant tumor. Then most malignant tumors of the parotid gland are not subtle, I would say. So most of the time you're dealing with a parotid malignancy you know it from those things like pain, rapid growth, facial nerve symptoms, associated lymphadenopathy, fixation. So if you don't have those findings and the patient's presenting with a mass that they've felt themselves in the parotid gland, by and large that's going to be a benign tumor.

Dr. Jason Barnes:

Next, I wanted to move onto pathophysiology. We're going to break from what we normally do in our podcast episodes and instead of talking about general pathophysiology, we'll eventually talk about specific types of tumors, but before we do that, could you speak to some of the theories around how we think these tumors occur?

Dr. Eric Moore:

Yeah, so the parotid gland and the salivary glands are arranged into different cell types by structure. So they have both mucinous and serous acinar cells at the proximal portion of that salivary system, and then they have a series of ductal cells, the intercalated ductal cells, the striated ductal cells, and the excretory ductal cells. There's theories about the different types of parotid neoplasms and how they arise. One theory is that they arise from their individual counterpart cells. So certain cells give rise to a certain type of tumor and other cells give rise to another type of tumor based on whether it's those intercalated duct cells or acinar cells or striated duct cells. The other theory is that there's a bicellular theory in that the intercalated duct cells have stem cells that then can differentiate into both myoepithelial components and epithelial components and give rise to all the different types of tumors. It's generally thought that that bicellular stem cell theory wins out in most people's minds and is the pathophysiology of most parotid tumors.

Dr. Jason Barnes:

When we talk about the most common parotid, benign parotid tumors, usually at the top of the list is pleomorphic adenoma, Warthin's tumor, [oncocytoma 00:08:53], and monomorphic adenoma with a few others, but would you mind kind of marching through this systematically and telling us the important aspects of each of these tumors, maybe starting with pleomorphic adenoma?

Dr. Eric Moore:

Just like most parotid gland tumors are benign, most benign parotid gland tumors are pleomorphic adenomas. Pleomorphic adenomas make up the greatest share of all of the parotid neoplasms. Pleomorphic adenomas have a lot of interesting characteristics to them. For one, they're usually slow-growing masses. They can occur in any portion of the parotid gland or in other salivary glands like the submandibular gland or minor salivary glands or sublingual gland, but they're most common in the parotid gland. They have a fairly characteristic shape to them. So the classic pleomorphic adenoma is a very lobular or multinodular surface tumor, particularly when they've been there for a long time. They usually have a fairly well-defined border to them, both on palpation and on imaging. Histologically, that border is not as complete as it looks on imaging and grossly, but they're usually fairly well encapsulated.

Pleomorphic adenomas almost never cause any facial nerve symptoms. There's been a couple patients that come to mind that have had pleomorphic adenomas right at their stylomastoid foramen

who presented with facial nerve intermittent weakness from mass effect, but almost every pleomorphic adenoma does not have facial nerve symptoms even though it can be intimately associated either above or below the facial nerve. Although this is a little bit controversial, they almost never metastasize. There are reports of metastasizing pleomorphic adenomas, but it's a little bit unclear whether those are just multifocal recurrent tumors versus true metastases. They never seem to cause any type of life-threatening problem even though they can get quite large and impinge on the pharynx for parapharyngeal extension and things like that.

Dr. Jason Barnes:

And how about the histopathology for pleomorphic adenoma?

Dr. Eric Moore:

Yeah, so pleomorphic adenomas, the pleomorphic portion of it is that they have sort of multiple cell types within them and this can make it very confusing sometimes, particularly on small biopsies or fine needle aspiration in that pleomorphic adenomas can masquerade as other types of tumors and be misdiagnosed. But pleomorphic adenomas have a typical heterogeneous cell population which gives rise to their other names of benign mixed tumors. They may have a differing degree of both epithelial and myoepithelial components to it. Sometimes they can be almost predominantly one cell type at which point they're called monomorphic adenomas, and sometimes they can be predominantly myoepithelial and be called cellular pleomorphic adenomas and even have unique imaging characteristics like [PET avidity 00:12:04] in those cases.

Dr. Jason Barnes:

What's the risk for malignant transformation of pleomorphic adenoma?

Dr. Eric Moore:

So when we get into treatment of benign parotid tumors, many patients have been told that it's a benign tumor based on their characteristics of their examination or even their biopsy and that they don't need to do anything about it, but one of the interesting things in pleomorphic adenomas is aside from perpetual growth and mass effect, they can de-differentiate into a more malignant tumor called a carcinoma ex pleomorphic adenoma over their lifetime. This is particularly perplexing because this is not a common occurrence. It's estimated to occur in about 10% of all pleomorphic adenomas. It seems to be a fairly late occurrence after they've been there for quite some time in a patient, but there's no pre-differentiation to malignancy test that can be done to predict which ones are going to do that and when that's going to happen. So that creates a conundrum in that you're sitting on a benign tumor that may eventually become a malignant tumor, and malignant de-differentiation of pleomorphic adenomas is a particularly worrisome malignancy. They have a high metastatic rate. They have a relatively poor outcome even with treatment. So we like to intervene in most pleomorphic adenomas before that happens.

Dr. Jason Barnes:

Moving onto Warthin's tumor, can you tell us a little bit about that?

Dr. Eric Moore:

So Warthin's tumor has some very unique features to it that help differentiate it from other parotid tumors. Warthin's tumor, or cystadenoma lymphomatosum is their pathologic name, are usually cystic

tumors that can have a significant solid component, but the classic Warthin's tumor has a cystic space within it that's fluid filled. They usually occur in the tail of the parotid gland or the bottom inferior edge of the parotid gland for unknown reasons. They're much more common in men than women. They have an age predilection that they're more common in people over the age of 60 and on up into 70s and 80s. Finally, they're one of the few parotid tumors that presents as bilateral or multifocal tumors occasionally. So the classic Warthin's tumor is a 70-year-old male with a significant smoking history with a mass in the tail or both tails of the parotid gland is almost pathognomonic for Warthin's tumors.

Dr. Jason Barnes:

How about oncocytoma?

Dr. Eric Moore:

Oncocytomas are the other parotid tumor that have multifocality to them. So oncocytomas also can present as cystic masses in the parotid gland, not typically in the tail like Warthin's tumors. Oncocytomas and Warthin's tumors are found, if not noticed by the patient, most often incidentally on PET scans because they both have a high degree of FDG avidity. Oncocytomas are often multifocal and patients can even present with very extensive oncocytosis type oncocytomas where they have multiple foci in a single parotid gland.

Dr. Jason Barnes:

And anything else more to add to monomorphic adenoma?

Dr. Eric Moore:

Monomorphic adenomas, the only thing about them is that they're sometimes confused, I think, as malignant tumors by the pathologist particularly on frozen section pathology because of their monomorphic cellularity rather than the classic pleomorphic adenomas, but they basically behave similarly to pleomorphic adenoma.

Dr. Jason Barnes:

And what else should be on our differential diagnosis apart from these main tumors that we see?

Dr. Eric Moore:

So there's other less common parotid tumors that it's useful to know about because you'll run into them or get the pathology diagnosis and want to be able to put it into categories of behavior, but there are myoepitheliomas that are also well demarcated and well circumscribed tumors that can be sometimes difficult to differentiate from pleomorphic adenomas and have a similar behavior. There are lipomas that can occur in the parotid gland. There are other ... There are lymph nodes in the parotid gland so you can get all of the lymph node pathology including inflammatory lymphadenopathy and even lymphoma in the parotid gland. There's a rare entity that I just ran into in a patient not too long ago in a 13 year old called sclerosing polycystic adenosis which was thought for some time to be possibly an inflammatory lesion, but is now thought to be a neoplastic benign tumor etiology that's higher associated with recurrences and multifocality within the salivary gland. Chronic inflammatory conditions, Kuttner's tumor can occur actually in the parotid gland although it's more common in the submandibular gland. Vascular malformations, hemangiomas can occur in the parotid gland and are other benign masses that can be there.

Dr. Jason Barnes:

So you see a patient in clinic, you suspect a benign parotid mass for all the reasons we talked about. What's your first step in workup of these patients?

Dr. Eric Moore:

You'd like to get some idea after all that history and physical examination as to am I dealing with a benign versus a malignant lesion. This can be handled in multiple different ways depending on your resources and your institution, but it's really disappointing to go to the operating room and treat a tumor that you think is benign and find out later that it's malignant and that you wished you'd done more or have to go back and do more. So I think the workup after you've done your history and physical examination and you're pretty certain that you're dealing with a benign parotid tumor, it's helpful to do some type of imaging. You don't have to do this on every patient, particularly for very superficial tumors that are easily palpable, but sometimes what you're palpating is just the tip of what's there. I do find it reassuring to get imaging to confirm yes, this is a well-circumscribed tumor, yes, it's more in the lateral portion of the parotid gland or the superficial portion or more towards the deep side because that can help me counsel the patient for what I'm going to have to do for treatment and whether the sequela of that.

So I typically get CT scan with contrast on almost every parotid patient that I'm going to take to the operating room. Many people use ultrasound. Some people exclusively use MRI, but CT scan gives me a lot of information on the gland itself, the thickness of that gland, the vasculature associated with that gland, the location of the tumor in the gland, the periphery of the tumor, whether there's any lymphadenopathy. All those things can be attained very quickly within CT scan and gives me a good picture of the anatomy of where I'm going to be operating if I'm going to treat it.

The other thing that's helpful is diagnosis. So most places and most practitioners use fine needle aspiration, and fine needle aspiration with the help of a good cytopathologist is highly accurate in diagnosis of parotid lesions, in helping sort out malignant versus benign. Unfortunately, it's not 100% accurate either direction. So you can't totally hang your hat on it and say, "Well this is definitely a benign lesion. I'm going to sit on this for a while or put it off or this is definitely a malignant lesion. I'm going to need to take out the entire gland," because you'll have error rates both ways, but it's probably the most reliable thing that you can do to solidify the diagnosis prior to the operation. In our particular institution, I don't use it all that much because we have very, very good frozen section pathology, but frozen section pathology admittedly is difficult with salivary gland tumors and it takes a very experienced pathologist to be accurate on frozen section pathology with salivary gland tumors.

But because we have that at our disposal, then I usually skip the fine needle aspiration step because the fine needle aspiration, one, almost universally people say, "After I had this done, my tumor was more painful and harder and swelled for a while." So there is some discomfort associated with it. It can occasionally make the tumor a little bit more sticky and difficult to take out because of the inflammatory response. It can potentially weaken the capsule and make keeping the capsule intact difficult during some parotid tumor removal. So there are some downsides to fine needle aspiration, but the upside is that it's very helpful to know the diagnosis going in. So a physical examination, history, imaging, plus or minus fine needle aspiration, almost always you have the whole picture in front of you and can develop a good treatment plan.

Dr. Jason Barnes:

Do you feel that on imaging, you can determine whether or not the mass is in the deep lobe of the parotid versus superficial lobe?

Dr. Eric Moore:

You can try and you can be fairly accurate, but you can't be 100% accurate. The reason for this is it's basically impossible to tell exactly where the peripheral facial nerve is on both CT and MRI and ultrasound. The tumors, you can get an idea that they're in the deeper portion of the gland or the more superficial portion of the gland, but the problem with parotid tumors is that glands all the same cellularity and tissue type. The tumors can occur anywhere in that gland and they can elevate the facial nerve over the top of them or they can depress it down deep. So some tumors that look like they're deep are actually still overlying the facial nerve. I find that more common than some tumors that look like they're more superficial that are actually deep tumors that are just pushing outward laterally and have the facial nerve over the top of it.

It is helpful in counseling the patients to try to get some idea of that. The reason being is that the deeper tumors and the ones that are underneath branches of or the trunk of the facial nerve can certainly be removed easily, but cause more facial nerve manipulation during the removal and are associated with a higher chance of temporary facial nerve paresis during that surgery. So it is helpful to try to get an idea and counsel the patient on that, but it's impossible to be 100% accurate with that.

Dr. Jason Barnes:

And you mentioned incidentally found tumors. Specifically you said on a PET scan, Warthin's and oncocytomas can be found. Is there any difference in how you manage these incidentally found tumors?

Dr. Eric Moore:

Not usually because a lot of incidentally found tumors are still benign pleomorphic adenomas that probably still need to be managed in the vast majority of patients. The one parotid tumor situation that we'll often sit on is incidentally found tumors that appear to be benign in patients with comorbidities or advanced age or frailty. So this is fairly common that you'll pick up a lot of Warthin's tumors in patients that are found incidentally that the patient didn't know about and wasn't symptomatic from that are found on imaging, but the patients not an ideal candidate to go to the operating room and you're fairly convinced that the morbidity of this lesion with observation is going to be very low. Sometimes we'll needle biopsy those to try to convince ourselves that it's a benign tumor and then sit on it and sometimes even without that if the patient's a very poor surgical candidate, we'll just sit on it, going with our history and physical examination that it's likely benign. But most times incidentally found tumors in healthy patients still need to be managed in the ways that we've talked about.

There's one other situation that we could bring up and that's lymph nodes that are found incidentally in the parotid gland. So the parotid gland has between 10 and 15 lymph nodes within its parenchyma, and those will be found on imaging a lot. Most of the time you can get an idea that that's a lymph node because of its ovoid shape and fatty hilum and characteristics that help you associate it with a benign lymph node or you can help straighten that out sometimes with needle biopsy. That's another situation where you really don't need to do anything about those in the vast majority of cases, and if you can convince yourself that it was an inflammatory lymph node, you'd sit on it.

Dr. Jason Barnes:

And we're moving towards treatment. My first question for treatment is how do you counsel patients on the required treatment or your recommended treatment for this parotid mass?

Dr. Eric Moore:

Well one of the nice things about parotid tumors in comparison to many, many other neoplasms in the head and neck is that almost every single one of them needs surgical therapy. So aside from those situations that we talked about with comorbidities and frailty, even the benign parotid tumors need to be addressed because for one, they will grow and cause a cosmetic deformity and sometimes mass effect that affects function and two, because that malignant degeneration that we talked about that we're trying to avoid. Almost every parotid tumor that we think is benign we still address with surgical therapy, and the vast majority of the malignant parotid tumors we address with surgical therapy. So surgery is going to be in the treatment planning in a good 90% or more of these situations.

The real question is the extent of the surgery. So after we've done our exam and our workup and our imaging and we have a good diagnosis in our hands, the thing to talk about with the patient is what type of surgery they need. You can do parotid surgery under local anesthesia, but the vast majority of it is done under general anesthesia. You can do some salivary gland surgery transorally, but the vast majority of parotid gland surgery is done with external incisions. So the first thing that comes up with the patient is where am I going to place this incision, and patients are very cognizant now of the different types of parotid incisions that can be made and the cosmetic implications of those. So we usually talk to patients about hiding their incision in a preauricular crease or even taking the incision retrotragal to hide that portion of the incision. The preauricular portion of the parotid incision is a good cosmetic incision in the vast majority of cases. It's the inferior limb of the classic modified Blair incision that most people are concerned about if they have cosmetic concerns.

The modified Blair incision is modified because traditional parotid incisions just came straight down in front of the ear and onto the neck. The modification is to curve it around the mandibular angle and bury it in a skin crease that could be used for further neck dissection, and that's a very classic parotid incision and in the vast majority of patients, that incision will heal very well and look very good. The problem is that on younger patients, patients who have a tendency for hypertrophic scarring or pigmentary changes in their scar or lack skin creases, that inferior portion of the incision will be visualized and you can modify it even further by bringing that incision back behind the ear into modified facelift incision or back down the hairline like a facelift incision, getting good access to the parotid gland. Many people these days are even really shortening that incision up and just working through a very short preauricular and lobular incision that gives them good access to the facial nerve and then elevating a flap or a tunnel to assess the parotid gland.

Dr. Jason Barnes:

Can you briefly tell us what the procedure looks like?

Dr. Eric Moore:

Yeah, so the parotid gland incision can be divided up into putting the patient to sleep under general anesthesia and then not paralyzing the patient because you want to have feedback on the facial nerve during the operation and then making your incision and elevating a flap over the parotid gland. The classic parotid flap is elevated and then a plane between the parotid fascia below and the SMAS or superficial musculoaponeurotic system above, and that's a good avascular plane that allows you to separate the parotid gland from the overlying tissue and keep a healthy skin flap. After you've exposed your parotid gland, then there's several different steps in the management and exposure of the facial nerve. You want to separate the parotid gland from the tragal cartilage. That can be done very easily with blunt dissection because there's a nice plane between the parotid gland and the tragal cartilage, and you want to expose the tragal cartilage down to its apex of what's called the tragal pointer because that's one of the landmarks that can help you find the facial nerve.



You want to separate the parotid gland from the digastric muscle below it, and I usually teach doing that fairly posteriorly behind the mandibular angle so you stay out of the gland at this point and out of the vicinity of the marginal mandibular nerve and separate the entire parotid gland with its fascia from the sternocleidomastoid muscle and the digastric muscle to expose the posterior belly. The posterior belly, the digastric muscle gives you your level from superficial to deep of the facial nerve as that plugs into the digastric ridge just about the level of the stylomastoid foramen. You want to manage the greater auricular nerves. So the greater auricular nerve passes up over the sternocleidomastoid muscle and sends branches into the parotid gland and posterior branch back towards the lobule in the ear and although you can't usually preserve those branches that go into the parotid gland, you can preserve the trunk of the greater auricular nerve and the posterior branches to the lobule. It's not an essential step, but it helps people retain and regain quicker sensation loss that they get to their ear and their earlobe after parotidectomy.

After you've done those steps, those things are all extraparotid steps. So you're outside the gland and you haven't put the facial nerve at risk at all at this point, and it should be relatively bloodless because you're outside the capsule of the gland. The next maneuver of identifying the facial nerve within the gland has to be done with intraglandular dissection. So at this point you should have pretty wide exposure of the parotid gland being able to be retracted forward and it's loose from the sternocleidomastoid muscle and tragus, and then you want to approach the facial nerve. There's several landmarks for the facial nerve that help you approach it. The tragus and the tragal pointer as we've mentioned kind of gives you the superior to inferior direction of where the facial nerve trunk is going to lie. The groove between the mastoid tip and the tympanic ring of the mastoid bone is palpable at this point and if you run your finger down that groove, that will take you directly to the stylomastoid foramen. So that gives you another vicinity superior to inferior landmark to help you find the main trunk of the facial nerve. The digastric posterior belly as we've mentioned gives you sort of a high to low, superficial to inferior landmark.

So with those landmarks in view, you should have a fairly good idea of where you're going to encounter the facial nerve trunk within the parotid gland, and then it's a matter of, in my hands, blunt dissection through the parotid gland tissue from posterior to anterior towards the cheek and towards the nose. As you dissect through that glandular tissue within about a one centimeter range of those landmarks that we just talked about, you will encounter the facial nerve trunk. If you just move from posterior to anterior, you have to encounter the facial nerve trunk at some point as it goes from the stylomastoid foramen up towards the [pes 00:32:15] out towards the peripheral branches and on towards the cheek. You will have to encounter the facial nerve trunk.

The facial nerve is very distinctive when you encounter it. It usually has a small amount of fascial capsule just over the surface of it and sometimes blood vessels running right over the surface of it you'll encounter first. Then it's very white in color compared to the surrounding glandular tissue. Although many people early on think that they've seen the facial nerve before they've seen it, once you encounter the facial nerve, it's very distinctive if it's in a normal setting and not invaded by tumor and will be very obvious. You can use your facial nerve monitor to help you with feedback as it will give you signal if it's hooked up appropriately when you are close to the facial nerve, and then the help of a surgical assistant giving you any information that the face is moving or twitching also helps you when you encounter the facial nerve.

Once you've found the facial nerve, the majority of the parotid operation is over at that point and then it just becomes a matter of separating the tumor and the gland from the facial nerve trunk and branches. There are many, many different types of extent of parotidectomy and they all have their indications and their situations and proponents. The classic parotid operation is removal of the superficial lobe of the parotid gland or that portion of the parotid gland that's above the facial nerve

from the trunk and the pes and the peripheral branches with the tumor encased within that superficial lobe in most circumstances, in 80% of benign parotid tumors that are in the superficial lobe. You can do less operation than that.

So there's become renewed interest. This is not a new concept, but it's a renewed concept of doing partial parotidectomy or even capsular dissection of the tumor. These were more commonly done several decades ago, and they were abandoned for a long period of time because it was felt that the recurrence rate was much higher when you did a subtotal parotidectomy, in particular a capsular parotidectomy. That's been refuted and confirmed in multiple studies and I think it's all situational dependent on the size of the tumor, the judgment of the operator, the technique of the operation, but if you don't remove the superficial lobe with the parotid gland, then you separate the tumor and some capsule parotid gland around it to try to obtain an adequate margin from the facial nerve branches and leave more of the parotid gland behind. The proponents of that say that they get less cosmetic defect because they've left more gland behind so they have less depression and they also have less Frey syndrome because they've exposed less of the cut surface of the parotid gland to the overlying skin. The opponents of that say that they get more sialoceles because they've left more gland behind and cut edge that can leak saliva into the wound and that they have less appreciation for the capsule of the tumor in complete removal than they do when they perform more extensive superficial parotidectomy.

Dr. Jason Barnes:

And moving into that direction, how do you counsel patients on possible complications or outcomes with surgery?

Dr. Eric Moore:

I think the thing that patients are worried about the most, and different patients have different priorities, but most of the time people would prioritize, "Well I want to get rid of my tumor as completely as possible and not have it come back." So the first thing I talk about is extended parotidectomy and looking at the tumor with the pathologist and making sure that it's completely removed, technique of operation not violating the capsule of that tumor which is highly associated with tumor recurrence particularly in pleomorphic adenomas, and making sure that we appreciate the whole tumor and get the entire thing out with the capsule intact, whatever that requires of manipulation of the parotid gland. Recurrence is rare, but recurrence is a problem because going back into the parotid bed in the re-operative setting certainly increases the complication rate and makes the operation much more difficult. So first and foremost, you want to make sure you get the whole tumor out completely and decrease your chance of recurrence as much as possible.

The second thing people are worried about is facial nerve weakness. So facial nerve weakness is fortunately not a common problem with well-performed parotid surgery, but it can be a problem depending on where the tumor sits in relationship to the facial nerve and its peripheral branches. So if the tumor is intimately associated with the facial nerve trunk and the trunk is draped over the top of it or it's displaced around the side of it, you're going to have to manipulate that facial nerve some to adequately remove that tumor and that can give people some facial weakness after the operation. If the tumor is intimately associated with the inferior division marginal mandibular branch or the superior division frontal nerve branch, those branches are very sensitive to dissection around them. They're much less forgiving than the mid-facial branches and they can be weak after the operation temporarily from neuropraxia.

Fortunately, and we've studied this quite a bit and looked at it in patients, almost every time that a patient gets temporary weakness after a parotid operation, it goes away and recovers to normal.

So I reassure patients that if you have some facial nerve weakness, this is what it's going to look like. This is how long you're going to have it. It's typically several weeks in recuperation before it goes away and it can be as long as three to six months in some patients depending on the manipulation of the facial nerve, but it almost always recovers to normal eventually which is reassuring to the patient and reassuring to the surgeon.

The less common things that happen or the things that are maybe less of concern to patient still should be discussed in the operative discussion. So Frey syndrome is a very, very common symptom for people to get after parotid surgery, particularly if they have had complete superficial parotidectomy. So Frey syndrome typically doesn't manifest itself until nine to 12 months after the parotid operation. It's a very late occurrence. It's gustatory sweating or parasympathetic stimulation of the sweat glands upon stimulation of the salivary gland with eating or thinking about food. It's manifested by flushing of the face and sweating in the vicinity of the parotid gland and sometimes even outside or superior to or anterior to the [inaudible 00:38:54] parotid dissection. Almost every patient that you talk to two years after of complete superficial parotidectomy will tell you, "Yeah, I have a little bit of Frey syndrome." So I think it's underestimated in the literature how often it occurs. It's just that not many people do that query two years after an uncomplicated superficial parotidectomy. Most patients don't tend to bring it up or complain about it bitterly, but they do notice it.

Cosmetic deformity is an issue after parotidectomy and so the parotid gland has a variable amount of bulk to it depending on the patient, and so how much you take out and how thick the parotid gland is will correlate with how much deformity they have after the operation. For most superficial parotidectomies we've found, even though there's a slight difference in the symmetry of the face between the normal side and the operated side, most patients are not particularly bothered by that asymmetry with superficial parotidectomy. It's much more commonly a problem and noticed by people if you perform more complete total parotidectomy.

Greater auricular nerve hypoesthesia and numbness to the cheek is very commonly noticed by patients and it last a long time. So I tell every patient that they're going to have some numbness to the cheek, some numbness around the ear after the operation. It's less of a problem with smaller incisions and less dissection and more of a problem with larger incisions and larger dissection, but almost everybody gets it and it almost always returns to normal. But this is a nine month to 12 month return to normal sensation for most people.

And then there are the perioperative issues of parotidectomy that are complications that are not common but have to be dealt with, and those are hematoma which is most common within the first 24 hours after a parotid operation if it happens unless the patient is anticoagulated after the operation at which point it can occur several days to even a week later. And sialocele. Sialocele is a collection of saliva from the cut edge of the gland underneath the skin. Sialocele is much more common with very limited parotidectomies than it is with more superficial complete parotidectomies. Sialocele almost always resolves spontaneously. In fact, I almost never try to open it up or drain it unless it's causing a lot of discomfort to the patient because that'll just keep it draining through the wound edge until it fully resolves, but it's always a self-limited condition and will go away by itself.

Dr. Jason Barnes:

And how about first bite syndrome?

Dr. Eric Moore:

First bite syndrome is not common with benign parotid tumor removal of the superficial portion of the parotid gland. It's much more common with deep lobe manipulation even with benign tumors. So first

bite syndrome is thought to be unopposed innervation of the parotid gland where the sympathetics have been damaged and you have a strong unopposed parasympathetic innervation to your parotid gland. So when you first start to think about food or first start to chew, you get this rapid contraction of the myoepithelial cells within the gland and a rapid egress of saliva which is uncomfortable or painful to people akin to sucking on a very sour candy every time you take your first bite of food. It fortunately is also self-limited. Like I mentioned, it's much more common with deep lobe parotidectomy or parapharyngeal salivary gland tumor removal where you're encountering those sympathetics coming up off the carotid. It also will go away usually by itself. It can be treated with neuropathic pain medication and it can also be treated if it's particularly bothersome and lasts more than a few weeks with Botox injection of the gland.

Dr. Jason Barnes:

And how do you follow up with these patients after surgery?

Dr. Eric Moore:

It depends a lot on the extent of the operation and the tumor pathology and the patient. So almost every completely removed benign parotid tumor is going to be a completely successful operation with no need for longterm followup and very little likelihood of recurrence. It's the more complicated operations that require, I think, more followup. I think it's a good idea to touch base with every patient after the operation, and I usually do this about three to four weeks after the operation just to ensure that the wound is healing appropriately and that their questions have been answered and that the symptoms that they're getting are normal and I can reassure them. Most people when you have the preoperative discussion don't remember every single thing that we just talked about about the sensation loss and the facial nerve weakness and is it going to come back. So that touch point of several weeks after the operation with the patient either face to face or by video is very helpful.

Fortunately, most parotid operations don't require any treatment after the operation. So use dissolvable sutures or glue. You don't have to take anything out. They don't require longterm drainage. They don't require re-operations for hematoma or sialocele very often. They don't require re-operations for tumor recurrence very often, but if you have a very complicated tumor particularly in the setting of recurrent parotid tumors that you're taking out, if you have facial nerve weakness after the operation, then I think you should follow up longer with those patients. There are situations where I'm more worried about recurrence such as in a multiple recurrent pleomorphic adenoma that I've operated on a third time or something like that. Those patients require longterm followup and imaging.

Dr. Jason Barnes:

Dr. Moore, this has been a very helpful discussion. Thanks so much. Before I head into our summary, is there anything you want to add?

Dr. Eric Moore:

I want to just point out that there's a lot of nuances to parotid surgery and it's fascinating surgery and it's a great thing to do as a surgeon because there's so much intraoperative decision-making and extent of surgery and what type of incision should I make and how should I handle this facial nerve situation. Almost no two operations are alike and it'll throw you a lot of curves that challenge your operative dexterity. So it's really fascinating, but you really need to study the tumor, really talk to the patient, find out what their desires and concerns are, and come up with a very, very good operative plan because you only want to do this once. The nightmare of parotid surgery is having to go back in a second or third

time and try to do it well. It becomes very challenging. So if you can set everything up well, then you can be more assured of a success in the operation and it'll be much more rewarding. Really watch your pathology and make sure you have as good a possible idea of what the pathology is before you leave that operating room so you don't get fooled and have to come back.

Dr. Jason Barnes:

Well I'll just summarize here real quick. In summary, benign parotid lesions occur as slowly growing masses in the parotid gland, and 80% of these masses are benign. The differential diagnosis includes pleomorphic adenoma, Warthin's tumor, oncocytoma, monomorphic adenoma, and plenty others. Workup includes physical exam and CT scan with contrast and FNA can also be considered, but aren't necessarily always required. Treatment usually consists of superficial parotidectomy with possible deep lobe depending on location and as Dr. Moore said, the superficial parotidectomy can be adjusted depending on the tumor as well. Outcomes are generally very favorable with minimal complications.

Dr. Moore, anything else you'd like to add?

Dr. Eric Moore:

No, that was a perfect summary. Thanks for having me, Jason.

Dr. Jason Barnes:

Yeah, thank you so much.

Before we close, I'll go onto the question-asking portion of our time here. As a reminder, I'll ask a question, pause for a few seconds to give you time to think, and then give the answer. So the first question is what are some characteristics of pleomorphic adenoma? More specifically, what's the pathology and what's the risk of malignant transformation?

Pleomorphic adenoma represents up to 70% of benign parotid masses. They're composed of myoepithelial, epithelial, and stromal components. Up to 10% of these can become malignant or undergo malignant transformation which can happen over 15 years with a greater risk with more time that passes.

Next question, what are some special characteristics of Warthin's tumor, both the type of patients who present and the possible tumor behavior?

Warthin's tumor has a strong correlation with smokers. So if you have a patient who has a long smoking history, you might think about Warthin's tumors. These tumors are more likely to be multicentric or bilateral and as a reminder, they can be PET avid on PET CT scan.

Next question, what are the five landmarks for identifying the facial nerve in parotid surgery?

The five common landmarks that we talk about for identifying the trunk of the facial nerve in parotid surgery is first, the tragal pointer where the trunk will be about one centimeter inferior in deep to the tragal pointer. It'll be about six to eight millimeters deep to the tympanomastoid suture line. The nerve can be found at about the depth of the level of the digastric ridge. Then the other two that we think about are a mastoidectomy could be performed to find the facial nerve and you can also perform retrograde facial nerve dissection from facial nerve branches.

Finally, what are the most common complications in parotid gland surgery?

When we're talking to patients about the possible complications of parotid surgery, the first of course is the possibility of facial nerve weakness. There's also a possibility of sialocele. We talk to them about a change in the facial contour when the parotid gland is removed depending on the extent of

gland resection. Greater auricular nerve hypesthesia which is hypoesthesia to the ear lobe and then Frey syndrome which is the gustatory sweating and then we talked briefly about first bite syndrome which can happen here, but is more often in deep lobe parotid surgery.

Thanks so much and we'll see you next time.