

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 facial plastic, and reconstructive surgeon, Dr. Grant Hamilton, and we will be discussing auricular deformity and otoplasty. Dr. Hamilton, thanks so much for being here.

Dr. Grant Hamilton:

Thank you for having me.

Dr. Jason Barnes:

I first just wanted to start with presentation, when you have a patient who presents with auricular deformity, what kind of patient are you typically seeing?

Dr. Grant Hamilton:

It's pretty evenly split between infants who have a congenital, potentially temporary deformity of their ear just from being in utero, younger kids, and adults.

Dr. Jason Barnes:

And any risk factors that we should be aware of when talking to patients or patient's parents that could be more telling of why they might have this deformity?

Dr. Grant Hamilton:

I don't know that there are really risk factors, by the time they see me they already have it. So it's not like a process like diabetes or hypertension where you sort of get an early warning. It's not the sort of thing that you can really predict.

Dr. Jason Barnes:

And if you survey the room do you see that there are parents who often have this issue that the kids have?

Dr. Grant Hamilton:

There is a heritable component, but 60% of people who come for an otoplasty will have a family history of someone else having had prominent ears. So there's some familial trend that can happen.

Dr. Jason Barnes:

And do you often see children with prominent ears or other ear deformities who also have syndromes?

Dr. Grant Hamilton:

Rarely, and I think that's more just due to the fact that those syndromes are pretty rare, and it's also pretty common to have prominent ears. So the vast majority of patients I see don't have syndromes, but if you see a baby and there is something that's beyond typical misshapen normal ear folds, and they've got other facial features that might suggest a syndrome, I have had consultations with medical genetics and pediatric otolaryngology, and pediatrics just to kind of work them up for congenital heart problems, kidney problems, those sorts of things.

Dr. Jason Barnes:

And when you first evaluate a patient who's coming to you for a possible otoplasty, can you talk us through what you're looking for in a physical exam? How do you kind of systematically evaluate them, and do you use any special tools or anything to consider what's going on with their ears?

Dr. Grant Hamilton:

I think the patient population can be divided into two sort of broad categories. When I see newborns who were caught by the newborn hearing screeners, they typically just have sort of misshapen ears. When kids get a little older or in adults, they tend to have more prominent ears, so they can be misshapen also. So the exam is just a little bit different because the problem is a little bit different.

Dr. Jason Barnes:

So for those infants, what are you looking for on exam and how do you evaluate them?

Dr. Grant Hamilton:

In order to properly examine anyone with a misshapen or prominent ear, you have to know the typical surface landmarks. I would encourage anyone listening to the podcast who has an interest in doing otoplasty to be able to really accurately draw an ear for memory. If you can draw it, then you know what all the parts are in their relationships, and a lot of what we describe in the ear are not distinct things. It's a fold that turns into a depression, and so those different contour changes have names, but they don't necessarily have a hard boundary. So when I'm examining someone, I am comparing what they have to that mental model of what the normal landmarks ought to be.

Dr. Jason Barnes:

In those adults who you evaluate, are there any measurements that you make? I know when we open a textbook, and we'll talk about this a little bit what the "normal" measurements or dimensions are, are you measuring these things, or is it more again, using that mental model in adults?

Dr. Grant Hamilton:

I usually don't measure them in an adult or even in an older child, and by older, I just mean five, six, not an infant. But in an adult or in a little bit older child, I think the best thing to do is just to simulate what I think would look good. So, using a Q-tip, my fingers, something like that, I can usually mold the ear into the shape that I think they would like and I give them a mirror, and I say, "What do you think about that?" It's important to keep some context about these measurements that we have in facial plastic surgery, whether it's for the ear, the nose or the face, or anything else they're really guidelines. So it's not the sort of operation where I'm going to measure someone's auriculocephalic angle and then document that, and then in the operating room remeasure it and check.

Dr. Grant Hamilton:

I think the most appropriate and sensitive thing, for example, for intraoperative decision making at the end of the case is to stand above the patient and look at them head-on and make sure that things are symmetric and that you're seeing the appropriate parts of the ears from the front view and that they look about the same.

Dr. Jason Barnes:

And you mentioned symmetry, how often do you see a single-sided ear deformity versus bilateral?

Dr. Grant Hamilton:

It's reasonable to have asymmetry of some kind, whether it's a single prominent ear or whether it is bilateral, sort of misshapen ears but with different problems that's not too uncommon.

Dr. Jason Barnes:

Then going back again to the evaluation, is there anything you're feeling or appreciating regarding the quality of the cartilage of the ear when you're evaluating the patient?

Dr. Grant Hamilton:

Yeah, palpation is a really important part of the exam, in an "ideal" ear the primary structures that make it look normal are the helical rim and the antihelical fold. In fact, when we create an ear out of cartilage or medpor, or something like that for correction of microtia, we only really make the helical rim and the antihelical fold. Those are the most important parts that make an ear look like an ear, the helical rim starts at the root of the helix which is just above the tragus, and makes a gentle sweeping curve up across the top of the ear, and then down along the posterior surface ending with a structure called the cauda helix, or the tail of the helix. That does not really extend into the lobule, and sometimes that cauda helix can be sort of stiff and it can protrude a little bit and that pushes the lobule out with it.

Dr. Grant Hamilton:

The antihelical fold lays within the boundaries of that helical rim and it too is a gentle curve, and it's curved but also sort of cone-shaped in that more inferiorly it's folded more tightly, and superiorly it's folded more gently. That's important to keep in mind because if you have someone with an underdeveloped antihelical fold, you want to try to recreate that conical structure and not just make it a crease. More superiorly, that antihelical fold branches into a superior and an inferior crus, so that from this side it looks kind of like a curved Y-shaped structure. The inferior crus is a very, very tight fold, almost a crease, it's also pretty common to have an underdeveloped superior crus. If that happens, the superior third of the ear can protrude too much, so back to the question that you asked, how do I examine them and is palpation important?

Dr. Grant Hamilton:

It is because the three or four main things that people tend to have that cause a more prominent ear is an underdeveloped antihelical fold, and that will cause protrusion usually in the middle and superior thirds of the ear. An underdeveloped superior crus will lead to a protruding upper third of the ear, a very stiff deep conchal bowl pressing against the mastoid can also cause a protruding ear and palpating that really is helpful to feel how much that is holding things up. If you try to push the ear closer to the head and it's really pushing back, it's probably due to a real strong conchal bowl. Then the last thing is that cauda helix, so if that's kind of curved you can fix the upper two-thirds of the ear but they'll have a really prominent lobule and it won't look quite right. So that's something that has to be assessed and is typically the last thing that I would fix at the end of the case.

Dr. Jason Barnes:

I would like to move on to more anatomy and pathophysiology type stuff, but before we do so I thought it would be worthwhile to touch base on the embryology of the external ear. Could you briefly talk us through the development of the external ear, touching on the hillocks of His?

Dr. Grant Hamilton:

So the hillocks of His and the embryology of the ear are helpful for understanding its development and how it may or may not be related to other problems of the middle or inner ear. Typically, people with problems that are a consequence of outer ear development don't necessarily have problems with middle or inner ear development. That may be different in certain syndromes and things but the vast majority of people who I see for prominent ears or problems with the shape of the ear have hearing that is as normal as anyone else. It's also important to let patients and/or parents know that an otoplasty, for example, is not a hearing correction surgery. The hillocks of His are formed during embryogenesis, typically starting around week five or six or so the first three hillocks come from the first branchial arch and the second three come from the second.

Dr. Grant Hamilton:

They form different structures of the ear, the first hillock forms the tragus, the second the helical root, and the third is the helix. Four through six form the antihelical fold, the scaphoid fossa, and the lobule. So one way maybe to remember that is that the first arch hillocks numbers one through three are really forming the external contours of the ear, and the more internal contours come from the second arch.

Dr. Jason Barnes:

You've talked about anatomy, but if you open a textbook and start to read about otoplasty you start seeing all these measurements, percentages, and angles that we measure. Could you briefly run through those in terms of what a "normal" ear would be?

Dr. Grant Hamilton:

Sure. I think when you look at the ear from the side, if you make a line through the long axis of the auricle, it tends to be about 20 degrees or so from a vertical line which is helpful to know. But that's not something that you're going to fix, so again if you're looking at someone's ear and it doesn't look quite right and maybe it's because it's very vertically oriented, for example, that's worth mentally filing away that you don't get tricked into thinking it's something else. But I don't think that anybody would likely try to rotate the auricle on the side of the head. Other things that are a little more clinically relevant are that the antihelical fold if you looked at it in cross-section, should be about 90 degrees or so. But again, that's not something that I would measure intraoperatively because it would be a pretty awkward thing to try to measure.

Dr. Grant Hamilton:

When you're putting in sutures, for example, you have the ear reflected forward and things are kind of distorted, you're not going to get a little protractor in there or something like that. So it's good to know but again, these are guidelines, at the end of the case if I'm using Mustardé sutures, and we'll cover techniques in a little bit, but if I'm using these sutures, I'll place the sutures first and then tie them down incrementally. So in other words, I won't place a suture, tie it, place another one, tie it because I want to be able to adjust the left and right ears almost at the same time so that I can be comparing them, and I want to make sure that I'm keeping the ear balanced. So that 90 degrees is a helpful idea, but when it comes to just doing the surgery, you just want to tighten things so that from the front view you're seeing the appropriate parts of the ear.

Dr. Grant Hamilton:

Speaking of that, many textbooks will say that you should see just a little bit of the helical rim from the front view and I think that that's a very reasonable thing that will look like a very normal ear, as long as you're not creating what's known as a telephone ear deformity. That's where the superior and inferior thirds of the ear are still a little bit over projected and the middle third of the ear is really over-corrected, causing sort of a C-shape from the front view. As long as you're not doing that, some people just have sort of a prominent antihelical fold., if the helix just a little bit dips behind that antihelical fold on the front view that can still look like a very normal, natural-looking ear. So in other words, I wouldn't sacrifice the overall lateral projection of the ear just to have a little bit of the helix showing. But it should still have a relatively flat contour, if it makes that C-shape, that telephone ear, that's going to look very fake and not good, so just make sure that you avoid that.

Dr. Jason Barnes:

And can you speak to the auriculocephalic angle?

Dr. Grant Hamilton:

Yeah, that's something that again is pretty, I think, impractical to measure either in the clinic or in the operating room, but just the concept is that that's where if you have a prominent conchal bowl, it may be pushing the ear away from the mastoid. So that can be corrected by potentially excising some cartilage and also placing a suture, and so two concepts that are kind of related but have different measurements are the auriculocephalic angle, which is the plane of the ear as it relates to the plane of the side of the head. That's usually about a 20-degree angle, but because of the curve of the conchal bowl, the conchal mastoid angle is usually closer to 90 degrees and that's just because of its shape. But those things are a little bit related in that if you've got a prominent conchal bowl, it'll push the whole ear out increasing the auriculocephalic angle.

Dr. Jason Barnes:

I next want to talk about the types of deformities. Oftentimes, I feel when otoplasty is discussed we automatically start talking about the prominent ear and that's a lot of what we've focused on in our discussion so far. Could you please touch on again, some of the concepts surrounding prominent ear and then walk us through a few of the other more common ear deformities that patients present with for otoplasty?

Dr. Grant Hamilton:

I think probably the most common things that you'll see in either a child, not a neonate but a child or an adult, are either just an overall prominent ear and the sort of medical term for that is prominorous or what's called a Stahl ear. I'm not a big fan of eponyms because that doesn't really tell you what's happening. But a Stahl ear is one where there's basically a third helical crus, so we talked about the Y-shape of a normal antihelical fold where there's the inferior and superior crura. But a Stahl ear with a third helical crus is sort of a more vertical fold that happens superior or lateral, depending on your perspective, to the superior crus. That can cause not only that contour irregularity but changes in the projection of the upper third of the year too. Another common problem is what's called a cup or a lop ear, or something like that.

Dr. Grant Hamilton:

That tends to go with an underdeveloped antihelical fold but has a lot more to do with an underdeveloped superior crus. Other things that are not terribly uncommon are just an

underdevelopment of the helical rim. Sometimes it's not folded over as much as it should be, so the edge of the ear ends up looking sort of sharp, it's unfurled and that can be fixed surgically also. In neonates, it's often a little bit different, they'll typically present more commonly in my experience, with a third helical crus. I don't exactly know why I see that more in neonates than I do in older kids or adults, part of it might be that there are some percentage of those deformities that happen in utero that just work themselves out over time. The problem is we don't have a good way to predict who it will work out for, so if parents come and they have concerns about the shape of their baby's ear, we will typically advocate for splinting because it's pretty low-risk, low-cost. We've got a little bit more control over it and it works better if you can start it earlier.

Dr. Grant Hamilton:

So if you wait and say, "Well, we'll see how it goes." If you do need to splint it either won't work as well or you'll need to splint for much, much longer.

Dr. Jason Barnes:

Next, I wanted to talk about workup, are there any specific things you do to evaluate these patients in terms of lab workup, imaging, hearing tests, anything like that before you go to the operating room?

Dr. Grant Hamilton:

Not typically, in terms of imaging, standardized preoperative photos are really important. So it's not imaging in the sense of a CT scan or something like that, but I would never go to the operating room without a set of preoperative photos. They're helpful intraoperatively to refer to. But it's also helpful that later on, it's surprising to me after surgery how quickly many people will adapt to their new appearance and they completely forget what they used to look like. It's good to be able to compare your results for the patients, and for your own learning as a surgeon, to where they started because if there's something that didn't turn out like you'd hoped you can see did you miss something? Did you forget to fix the underdeveloped superior crus and that's why the top of the ear is still poking out too much? And you need pictures to refer back to, to really diagnose that.

Dr. Grant Hamilton:

But along with the workup, I think this is different from a lot of disease-based problems in that not everyone's a good candidate, and they may not be a good candidate for medical reasons. But more commonly they're not a good candidate just because either they're not ready for it, they don't care about it, and I can tell them no. So I've got extra responsibility to make sure that I'm doing the right thing for the patient, and that gets a little more complicated with something like an otoplasty in someone who's five or six. I like for them to have some interest in doing the surgery, they're assuming the risk, they have to put up with the discomfort. When well-meaning parents bring in a young kid and say, "Yeah, we need to get this fixed." A lot of times there'll be a history of teasing or bullying.

Dr. Grant Hamilton:

When that happens it's unfortunate, but that usually results in the patient understanding why they're talking to me and saying in some way or another, "Yeah, let's do this." So I feel better about that if they come and they're just kind of bored and not engaged in the visit and the parents are very engaged in the visit, and I ask the kiddo, "Do you know why you're here?", "Yeah, I guess so.", "Does this bother you?", "No, not really." I feel a little weird sometimes about operating on someone who does not care because you can always do it later. In terms of the timing, the ear is about 85% or so its adult size by the age of

five or six, and it's a nice coincidence that it sort of works out that that's just about when kids are about to go to kindergarten.

Dr. Grant Hamilton:

So that's why I do see quite a few patients in that age group because their parents are bringing them in before they go to school maybe to prevent some of that teasing that can happen. That can be a real problem, one of the first otoplasties I ever did in practice was on a young guy who had some developmental delay and he didn't talk. He had a real bad home life, his dad brought him in and I'm trying to ask him, "Do you know why you're here? Do you care about this?" And I'm getting nothing because he does not talk, but his dad said he was really getting hassled on the bus going to school. So we decided to do it, did the surgery and I typically see people back on post-op day one, take off the dressing. It's nice, you can show them, "Hey, here it is." It might be a little swollen or a little bit bruised but people get to see where they end up.

Dr. Grant Hamilton:

So it's a fun visit, and I took the dressing off and he walked over to the mirror and still didn't say anything but he had the biggest smile, so he knew exactly what this meant and I thought it was really interesting when he came back at a week that he had a buzz cut. He had had sort of shaggy, long hair to try to cover up his ears, his dad said that that was his idea. So he really wanted to show these off, so this is something that, especially in kids, but for adults too, can make a really, really big difference in their lives. So, patient selection's important because I really want to make sure that I'm helping them, and I don't want to force someone else, assign them some risk with an operation that they really don't care about.

Dr. Jason Barnes:

Is there an official diagnosis for a malformed ear or a protruding ear, or is it more of a subjective kind of gestalt with you talking to the patient determining whether or not intervention is desired?

Dr. Grant Hamilton:

Well, in terms of diagnostic criteria, I think you can revert to some of those measurements and angles that we've discussed. But if someone's auriculocephalic angle is 23 degrees instead of 20, that's kind of a soft call. So it has a lot more to do in my opinion with that mental model that you have and looking at all their other features too. So, you just want to make sure that their ears aren't the first thing that you notice, I guess. It also has to be something that bothers them, if I can't see the problem, then I can't fix the problem. So I have to be able to identify something that deviates from that norm, and usually, it's not just projection, it's something with the contour of the antihelical folds.

Dr. Jason Barnes:

Moving now onto treatment, there are some nonsurgical treatment options and surgical treatment options, could you first start with nonsurgical treatment options in these patients?

Dr. Grant Hamilton:

Yeah, we see quite a few neonates, we've got a good partnership with our neonatal hearing screeners and they'll, when doing the screening, look for abnormalities in the anatomy of the external ear, and they'll carefully broach that topic to the parents. Then luckily, we can often see the babies in the first few days of life, and that's really important because the sooner we see them the easier it is to intervene.

Not every family decides to do something and that's perfectly fine, and as I said, some of these problems will work themselves out on their own. But most people are pretty open to it because it's a pretty low-cost, low-risk thing to do. If you see someone really in the first week or two of life, then you can splint them maybe for just two weeks and get a really good permanent result.

Dr. Grant Hamilton:

But the longer you wait, the longer you have to splint, if you see them at four months you might be splinting them for six months, and if you see them at six months you might be splinting them for a year. So the longer you wait the longer it takes to fix it and it is not as likely to be successful.

Dr. Jason Barnes:

When we talk about splinting, what are we talking about?

Dr. Grant Hamilton:

There are a number of different commercial products that you can buy and incorporate into your practice. The one that we use is a small soft plastic-covered moldable wire, and that can be placed just under the helical rim and taped in place. Then in combination, you can tape the ears back to the head, it's not part of the little kit that comes with it, but sometimes we'll put a cotton ball in the conchal bowl, basically again just figuring out what do you need to do to make it look like a normal ear? The ears are really quite plastic, they're moldable, so even with some gentle splinting whether it's with that little plastic-covered wire or a cotton ball or taping or something like this, can be really effective. But again, the earlier, the better.

Dr. Jason Barnes:

Now moving on to surgical options, can you tell us how you can surgically approach the protruding ear?

Dr. Grant Hamilton:

Sure, there are a number of different types of techniques, but again they're not procedures. So I'll distinguish between a procedure and an operation, a procedure has a set number of steps that you go through basically in that order every time to get the result that you want. But because the anatomy can be pretty variable with these patients, you really have to tailor what you're doing to their individual problem. So the techniques that I'll describe for you aren't necessarily a series of steps there are tools that you can use to apply to solving these problems. Historically, the main way that the ear was reshaped was to cut the cartilage to weaken it so that it would bend. I think now there's really no indication for a cartilage cutting otoplasty, the problem with them is that there are very few sharp corners in the ear and certainly not in the antihelical fold, which is the most commonplace to have a problem.

Dr. Grant Hamilton:

If you make a cut in that cartilage to fold it you'll get a crease instead of that tapered cone that I mentioned earlier, and it just won't look natural, the ear will be closer to the head but it will look like something happened. So we now have much gentler techniques that will create a much more natural-looking result. Some of them use sutures, and some don't, to fix the antihelical fold, the most common way is probably to use a Mustardé suture which is just a horizontal mattress suture. They're typically three of them or so in an otoplasty, just based on their size and the size of the patient's ear. But the bites that you take with the needle are usually about a centimeter apart and you want to have about



two to three millimeters between each of the sutures as you're moving along that cone. To make it a cone that means that you can't tighten them all at the same amount, usually, the one that's most inferior gets tightened more because that's the tighter part of that cone.

Dr. Grant Hamilton:

It's really important when placing the sutures, to do a couple of things very carefully, when you pass the needle through the anterior surface of the cartilage you want to make sure that you're getting some of the perichondrium because if you're just catching the cartilage when you tighten it down it's easy for it to cut through the cartilage and then you've got a bit of a problem on your hands. But at the same time, you don't want the suture to be visible under the skin, and certainly don't want it to poke through the skin. So it takes a little bit of practice, but you can pretty reliably get the suture in that supraperichondrial, but subdermal plain on the anterior surface of the ear. Now in terms of suture, some people will use absorbable sutures, some people use a more permanent suture.

Dr. Grant Hamilton:

If you're going to use a permanent suture I would advocate using something that is very soft. When I use a permanent suture I tend to use Ethibond which is a braided soft permanent suture. I soak it in Betadine so that the Betadine gets into all the little nooks and crannies in the suture. I don't know how important that is but I, knock on wood, haven't had any infections from a suture and I like it because it's easy to tie, it's supple. I think it's broad and soft enough that it's a lot less likely to cut through the cartilage than something like a monofilament might, and I've only had one patient who had a suture extrude posteriorly. So that is one of the potential complications with using a suture-type otoplasty, is that you can have suture extrusion, I suppose it could come through the anterior surface of the ear. But I think most commonly it would be the knot coming out through the posterior surface skin, but that's pretty uncommon in my experience.

Dr. Grant Hamilton:

One trick that I've used to sort of prevent that is to tie a lot of knots in the Ethibond, more than you would think that you would want to do for that is that you create something that's quite long. But now you can tuck that not under one half of the horizontal mattress suture. And so the knot is less likely to be in contact with the incision or the external skin. In reality, I think once things are healed after some period of time you really probably don't need the sutures too much anymore, things just sort of scar down. It's typical to make sort of a dumbbell-shaped excision of skin on the posterior surface, and the reason that it's kind of dumbbell-shaped, so in other words, a typical ellipse is going to be wider in the middle and tapered at the ends.

Dr. Grant Hamilton:

If you make a typical elliptical skin excision in the postauricular skin, you run the risk of having that telephone ear because as you're sewing it back down you're pulling in too much in that middle third and it'll be under projected. Then if it's a consequence of cutting out too much skin, that's going to be a really hard thing to fix. So if you make something that looks almost like two ellipses that are overlapping where the excision is a little narrower in the middle portion of it then you can safely excise some skin and not have to worry about that being a problem. Other sutures that are used to reform the ear are a suture that goes from the concha to the mastoid. When you place that suture, it's important to try to pull the concha either down to the head or posteriorly just a little bit. The reason that that's important is that it's very easy and tempting to place the suture in such a way that it pulls that concha anteriorly.

Dr. Grant Hamilton:

If you do that, you run the risk of blocking the external auditory canal as that conchal cartilage can kind of slide into it and they may end up having some neonatal stenosis and you don't want that. That's a little bit less of a problem if you end up excising some of the conchal bowl because it's very prominent and stiff. So you remove a kidney bean-shaped piece from the depth of the conchal bowl and then that allows the concha to sit back closer to the mastoid without being under compression. Then you don't have to place a stitch, but I'll typically place a stitch to the mastoid periosteum just to kind of hold that in place.

Dr. Jason Barnes:

I know we're trying to avoid eponyms, but is there a name to this type of stitch?

Dr. Grant Hamilton:

That's a furnace stitch, probably better called a concho or conchal mastoid suture.

Dr. Jason Barnes:

Could we next talk about approaching the superior crus?

Dr. Grant Hamilton:

Yeah, when people have an underdeveloped superior crus, that's typically hard to get to through the normal postauricular approach, it's just too far away. So what I'll do there is make a little incision through the skin and through the cartilage just at the end of the superior crus, and the reason that you want to go through the cartilage is because you want to be able to bend the superior crus independently from bending the helix. So if I hadn't cut through the cartilage, those would still be connected and I'd have to put a lot of tension on that suture to get that superior crus to be folded. So if you just take a small two-pronged hook and slightly evert the helical rim, you can make a cut right through the skin on the anterior surface and through the cartilage and then dissect a pocket under the skin anteriorly and posteriorly enough that you can then place a suture. It's again, same sort of horizontal mattress suture as Mustardé, but that releasing incision and the better access that you have makes it a lot easier to appropriately form that superior crus.

Dr. Jason Barnes:

I next want to talk about the outstanding lobule. Is this a complication of otoplasty or is it an anatomic variant that needs to be fixed?

Dr. Grant Hamilton:

Technically it could probably be both. It is a normal anatomic variant that needs to be fixed, but it's a complication if it's failed to be diagnosed and then fixed. So if you don't correct it, then people will still have a pretty prominent over projected lobule and the rest of the year may look fine. This is almost always due to the shape of the cauda helix, that tail of the helix. It almost always goes along with an underdeveloped antihelical fold, so this is not a rare finding. There are a number of ways that that can be corrected with varying levels of invasiveness, if it doesn't seem like it's very firm cartilage, you can just take a 20 gauge needle and sort of subsize the cartilage, scoring it, a weakening it with the needle, doing that percutaneously.

Dr. Grant Hamilton:

If it seems like you're going to need to remove a little skin, you can remove an ellipse from the posterior surface of the ear overlying the cauda helicis. But you don't want to just cut out the skin because then it's going to be under a fair bit of tension, you should dissect around the cauda helicis a little bit, especially on the anterior surface of it because you want that to be able to move independently. There's not a ton of harm, I think, in just truncating it, sometimes they're kind of curved and as long as you've got the projection okay, you don't really need the structure of that cauda helicis too much. Other techniques involve making a pocket between the anterior and posterior surfaces of the lobule and then you can place a stitch where you sort of slide them against one another and by sliding them against one another you can pretty precisely adjust the projection of the ear.

Dr. Grant Hamilton:

If anyone's interested in a couple of papers to look at one of them is called Repair of the Protruding Lobule, and that was something that I co-authored with Hermann Raunig and it goes over a lot of these techniques. Another one that I think is worth looking at is called the Filet Technique and it's written by Holger Gassner, who is in Germany and is also a graduate of the Mayo Clinic.

Dr. Jason Barnes:

Finally, I want to talk about some complications related to otoplasty. Could you touch briefly on the early and late complications involved in these techniques?

Dr. Grant Hamilton:

Sure. Fortunately, complications are relatively uncommon, I think the thing that's probably most likely is some asymmetry. So I always talk to patients about the possibility that things will still be a little bit asymmetric, luckily it's pretty hard to see both ears at the same time equally. I mean if you turn your head even a few degrees off of midline, already they're going to look different. So luckily, it's a pretty forgiving thing to operate on but if people really square up against the mirror and can see them both, there might be a little bit of asymmetry. Luckily, that's not a very common thing but because you're trying to get them to match, that's something that people need to be counseled about. I've never really had somebody have a sort of a complete relaxation of what I did or failure and a return to having a real prominent ear, but patients should be counseled about that.

Dr. Grant Hamilton:

We talked about suture extrusion, not typical but it can happen. Other things that are a little bit more generic with any surgery, bleeding, infection, I think that having real good sterile technique in the operating room goes a long way to preventing most of those infections. I do typically give people a short course of antibiotics afterwards, but mostly it's just for skin flora. With the postoperative care, it's important to have a dressing initially and then a headband after that, and occasionally the headband can press on the antihelical fold, and people can get a little bit of skin breakdown. I use a neoprene headband like the type that is used for holding ear molds in place in kids who've had PE tubes. If I'm concerned that it's going to put too much pressure on the antihelical fold, you can make a little slit in the headband so that it doesn't press quite so much in that spot.

Dr. Grant Hamilton:

It's important to counsel the patients or their parents that the headband just needs to be sort of snug, it shouldn't be real tight. So I think it's really helpful to see people back on post-op day one so you can

show them the early result, you can show them the wound care that you want them to do, and you can show them things like how tight the headband should be, for example. You could have an auricular hematoma, I've never had to deal with that, so luckily, most of these things are pretty rare but I think for informed consent you should talk with people about certainly, things that have been reported in the literature.

Dr. Jason Barnes:

You mentioned telephone ear, can you briefly tell us a little bit more about that and some other postoperative deformities that can happen after otoplasty?

Dr. Grant Hamilton:

Yeah, I don't know if I'd even really classify those as complications. I would classify them as more errors in judgment or errors in technique because those things should be identifiable in the operating room. The telephone ear is where there's over-correction in the middle third and so from the front view, the ear has sort of a C-shaped contour where the upper and lower thirds protrude but the middle third is really plastered down to the head. It doesn't look very natural, so that should be avoided and the way to avoid it is to not over-tighten those sutures in the antihelical fold. You can get what's called a post-deformity or something and that's where you're tightening the suture too much that's more superiorly placed. You can get a reverse telephony ear deformity where you overdo it at the top and at the bottom and not enough in the middle, what people sometimes call the hidden helix. That's where maybe you don't see hardly any of the helical rim because it's so close to the side of the head.

Dr. Grant Hamilton:

But all those, as I said, it's not the sort of thing that you see someone back at two weeks and say, "Oh my gosh, that thing happened." Those things are very, very preventable because you can identify them in the operating room. But in order to avoid them, I'll emphasize again how important it is to have a really accurate 3D mental model in your head because if you are just doing the steps, then you might tighten things down and feel like, "Okay, we're done." And at the end, you may have something that you really don't like, and doesn't look natural.

Dr. Jason Barnes:

Well, Dr. Hamilton, this has been a really great discussion about auricular deformity and otoplasty, before I move on to our summary is there anything you'd like to add?

Dr. Grant Hamilton:

Yeah, I think that there are some really interesting newer ideas, my collaborator on that Lobule paper, Hermann Raunig, has a very, very high volume otoplasty practice and has really perfected some techniques using a small file to perform otoplasties, in children in particular, without the use of sutures, and that has a couple of advantages. One, you don't have to worry about suture extrusion, two, you can get a very natural-looking fold to the ear and you don't have to worry about creases or corners or anything like that. The idea behind it is that ear cartilage microscopically is made up of a couple of elastic layers, so you can almost think of it like a sandwich where the bread on the sandwich or these elastic layers and the middle is more sort of just the bulk of the cartilage.

Dr. Grant Hamilton:

So the way that you can reshape the ear using a file, which is very different from cutting because by filing you're creating a very smooth surface and just removing just enough of that elastic layer on the anterior surface of the cartilage so that the posterior elastic layer will contract and bend the ear. So with the file, you have a lot of control over making that gentle sort of curved tapered cone that is the antihelical fold. The drawback to it, the challenging part is that you don't always get to see the final result in the operating room because what happens is that that curving, that bending happens over four to six weeks or so after surgery. But it's a very, very natural-looking and very natural feeling ear and you don't have to worry as much about haircuts where the barber wants to smash the ear forward to cut behind the ear or kids who play football and are taking helmets on and off maybe kind of pulling a suture through, those sorts of benign activities that could be traumatic to a post-operative otoplasty patient.

Dr. Grant Hamilton:

So, I would encourage people, if you're interested in learning more about otoplasty, to look up his paper which is called Antihelix Plasty Without Modeling Sutures because I think it's a really interesting read and he's got a lot of experience with that, and it's an interesting technique.

Dr. Jason Barnes:

Well, thanks so much. I'll now move on to our summary, to start, auricular deformity can affect up to 5% of the population and can have a familial component when assessing the presence of a deformity. Although, this isn't where we put all of our efforts, remember the normal anatomy that the projection of the ear is about 25 degrees, that conchal-scapal and conchal-mastoid angles are about 90 degrees and there's a slight posterior angulation of the whole auricle at about 15 to 30 degrees. The auricle is derived from the first and second branchial arches forming the six hillocks of His. As we said, the first three are derived from the first branchial arch and become the tragus, helical root, and helix.

Dr. Jason Barnes:

Hillocks of His four through six become the antihelix, scapha, and lobule, and they are derived from the second branchial arch. The most common ear deformity is prominourous, which can be caused by a number of etiologies including an underdeveloped antihelical fold and a deep conchal bowl. Ear deformities if caught early, can be corrected in a nonsurgical manner such as with splinting. For surgical correction of ear deformity, this can usually be performed as early as age five or six, but as Dr. Hamilton said, it's nice to have patient buy-in a when you're going to the operating room. The two most common methods for correcting the protruding ear are the Furnace technique which addresses the conchal bowl, and the Mustardé technique which addresses the antihelical fold.

Dr. Jason Barnes:

Complications include hematoma, infection, telephone ear, and other ear deformities but as Dr. Hamilton said, some of these can be avoided with careful inspection in the operating room, and when done correctly otoplasty can result in improved quality of life and self-esteem. Dr. Hamilton, anything else you'd like to add?

Dr. Grant Hamilton:

I just want to thank you for giving me the opportunity to talk with you today, and I think this is an interesting topic and hopefully, your listeners enjoyed this.

Dr. Jason Barnes:

Awesome, thank you so much. We'll now move onto the question asking portion of our time together. As a reminder, I'll ask a question pause for a few seconds and then give the answer. So the first question is, describe the hillocks of His, from what branchial arches are they derived and what do they become? So, Hillocks of His one through three come from the first branchial arch and become the tragus, helical root, and helix. Hillocks of His four through six are derived from the second branchial arch and become the antihelix, scapha, and lobule.

Dr. Jason Barnes:

Next question, describe the normal angles of the following the conchal-mastoid angle the conchal-scaphal angle, and the auriculocephalic angle? So these terms can be somewhat confusing because they're long, descriptive words, but the conchal-mastoid angle is the angle of the conchal bowl off of the mastoid and that's 90 degrees. Then the conchal-scaphal angle is also 90 degrees which is about the fold of the antihelix. Finally, the auriculocephalic angle, which is the angle at which the ear protrudes laterally off of the side of the head is about 15 to 30 degrees.

Dr. Jason Barnes:

Next question, describe the Furnace technique? The Furnace technique addresses the conchal bowl and generally speaking, this is a pinning back of the conchal bowl to the mastoid periosteum. The final question, describe the Mustardé technique? This is used to address the antihelix and generally speaking, this creates a more defined antihelix and is done by placing horizontal mattress sutures to pin the scaphoid fossa to the posterior aspect of the conchal bowl. There are specific measurements regarding how long these should be, they should be about 15 millimeters long and 10 millimeters wide and separated by one to three millimeters. Thanks so much for listening and we'll see you next time.