Beyond Hearing: Exploring Candidacy Through Cases

Presenter: Hilary McManus, AuD; Rebecca Chiffer, MD

So, hi, everyone. My name is Hilary McManus. I'm an audiologist and the marketing manager for Oticon Medical. And today we're going to be looking at some Ponto candidacy, surgical considerations, and some interesting surgical cases with doctor Rebecca Chiffer from Thomas Jefferson University Hospital.

So let's briefly go over some audiologic candidacy before we get into the more fun stuff with doctor Chiffer.

So patients of all ages with either conductive mixed hearing loss or single sided deafness can benefit from a ponto system. That system meaning the Ponto processor on a softband for children under five or anyone who is not a candidate for surgery. And the Ponto processor, abutment and implant for surgical patients.

Patients are a candidate for for a ponto system with bone conduction pure tone averages of 65 decibels or better, and that hearing loss can be unilateral or bilateral. We see a good amount of children with microtia atresia, but really, anyone with a conductive pathology within the fitting range can be a candidate for ponto.

For Ponto users, a bilateral fitting should strongly be considered for candidates with bilateral conductive or mixed losses, primarily when that loss is symmetrical in terms of the bone conduction thresholds. With this symmetry, we can be sure that users are going to receive the benefits of binaural processing, like improved sound localization and speech recognition and noise.

There are a few things to consider when you're presented with a candidate with an asymmetrical conductive or mixed loss. So if you decide to only provide a unilateral fitting, remember that the ponto processor should be placed on the side with the better bone conduction thresholds. If the device is placed on the side with the poorer thresholds, it will act in part as a cross device, receiving sound and delivering it to the

better cochlea. If bone conduction thresholds are largely asymmetric, users may not benefit from localization abilities and improved speed, speech perception, and noise, but they'll likely still benefit from the reduction of the head shadow effect and just picking up sound on that other ear.

For patients with single sided deafness, Ponto should be considered for patients with essentially normal hearing through three k Hertz in the better ear and any patient that may be a candidate for a cross system but for some reason cannot or will not use a traditional air conduction cross.

So we have two processors in the Ponto five family, the Ponto five mini. Our smaller device allows for bone conduction losses up to and including 45 decibels, and our Ponto five superpower device fits losses, bone conduction losses, up to and including 65 decibels.

And as we shift into discussing surgery, I'll just touch on our Ponto BHX implant and abutments. Our implant is designed for optimal osseointegration. And as for our abutment, we really do prioritize patient choice and know that for many this is a lifelong solution and a lifelong choice. So we designed our abutment to be universal. It's compatible with all percutaneous bone anchored processors on the market.

So this means that patients have the benefit of future choice when they're implanted with our system. They aren't just locked into one processor or one company forever.

And overall, our system has been proven to provide excellent outcomes. A recent literature review found that 98% of patients report an increase in quality of life. The increase is not small and is in fact not far from the magnitude in quality of life improvement seen with cochlear implant patients. In addition, 95% of follow up visits

need no skin related aftercare, meaning the skin around the abutment and implant. They don't need anything like antibiotics, steroids, any sort of treatment of that area.

And there's an excellent implant survival rate of 98%. So it's truly a small procedure that changes lives.

Now I'll pass it on to Doctor Rebecca Chiffer. Doctor Chiffer is an assistant professor of otolaryngology at Thomas Jefferson University Hospital in the division of otology and neuro otology. She's also the co director of the hospital's new temporal bone and skull Base lab. And she's a member of the admissions committee for the Medical College and the Education and Resident selection committee within the otolaryngology department.

Thanks, Hilary. All right, this is Rebecca Chiffer. Thanks for everybody that's joining us today. I'm going to talk a little bit about the surgical considerations for bone conduction devices and to reiterate a little bit about what Hillary said earlier, these are excellent devices for patients with the ability to basically bypass the outer and middle ear for folks that have pathology in those regions, and they directly simulate the cochlea. And these are done either via percutaneous or transcutaneous bone vibration.

Again, as noted, we can use these in patients with a conductive loss, mixed loss or single sided deafness. And it's excellent in patients that are not good candidates for conventional hearing aid use. So, for example, chronic odor, chronic otitis externa, chronic otitis media, just a chronically draining ear where the conventional hearing aid would get consistently clogged, very messy, or patients with mastoid cavities, in particular, either large mastoid cavities or chronically draining mastoid cavities. It's also an excellent option for patients with congenital external or middle ear pathologies, such as microtia or atresia. Again, as noted earlier.

All right, so the MIPS procedure stands for invasive ponto surgery. It's an excellent procedure. I do this very often, and it's very quick, it's very simple, and it really gives us the opportunity to do something that's truly minimally invasive. No stitches involved, excellent quick healing time for the patients. It gives patients wonderful aesthetic outcomes.

Again, very fast recovery, very fast operative time, and relatively few postoperative complications.

All right, so the candidacy for the MIPS procedure, it's pretty straightforward for adult patients. We want people with normal bone quality and a bone thickness that's over 3 when we mean normal bone quality. We're looking for patients that have not had, for example, radiation, a history of osteo, radio necrosis of the bone, maybe extensive craniotomy or cranioplasty in that location. And then for children, again, we would want normal bone quality and a thickness above 4 mm.

Those would be for kids that we've deemed appropriate for a single stage surgery. For all patients, we would like them to have a skin thickness of 12 mm or less, and that's pertaining to the scalp thickness.

All right, so we'll review the basic steps of the MIPS procedure here. It's, again, very straightforward, very quick, and relatively easy. The first step, after prepping, draping, and measuring the location that we want the device, I shave a little bit of hair, maybe the size of a quarter or a half dollar. We do inject some local at the beginning of the procedure for hemostasis. And then we use a five millimeter punch biopsy all the way down to the bone and try to scrape the periosteum off the bone.

So we're on nice, clean bone, insert the cannula so that it's flat and flush against the bone with no periosteum underneath the cannula. That could interfere with the

osteointegration of the implant. And once we have the cannula nicely seated, we drill a guide hole. The drilling is first done to 3 ensure that we have a proper bone thickness. Once we ensure that the three millimeter hole does have a little bit of bone at the depth of that hole, then we remove the spacer drill to 4, then switch to the widening drill again, either three or four depending on your bone thickness, in most adults, it would be a four millimeter widening drill to widen the guide hole.

Once the hole has been properly widened, the cannula comes out and we place the implant. The implant comes attached to the abutment. The abutment has already been properly sized based on our measurements of the skin thickness. And then the implant and abutment are inserted into the hole to a proper torque setting, usually somewhere between 40 and 50 a Newton centimeter of torque. And after that's complete, the drill sputter just comes right off.

And then we place a little dressing around the abutment and that's that patient wave and that's it.

So the mono procedure is even quicker than the MIPS procedure. So this is the world's first one drilling step procedure. The complete osteotomy is done in one drill step. So this is suitable for multiple anesthetic options. For example, you can do this under local, with sedation.

You can also do this under general anesthesia. You can do this in a surgery center, a hospital, et cetera. There is a tailor made kit designed to protect the soft tissue. And as in the MIPS procedure, there's a tiny incision, essentially just the punch biopsy, which eliminates the need for sutures, reduces the scarring, the numbness, and it provides excellent cosmetic outcomes. So basically with the mono procedure, it's really just one drill.

So there's no need to drill first the guide hole and then the widened hole. So it's one drill bit, sort of all in one candidacy for the mono procedure. So this is for adult patients 18 and older, with again normal anatomy, normal bone thickness, we want at least 5 mm, since in the mono procedure, we're drilling immediately to 4 mm without going the 3, then checking, and then the four. So this is straight down to 4 mm. So ideally we would want the bone thickness to be at least 5.

Will typically get scans on these folks beforehand to just do some measurements of the bone thickness. But again, most adult normal patients which have not had, for example, radiation in the past should have at least five to 6 bone. Again, same with the mips. We would like the soft tissue or scalp, the scalp thickness to be 12 mm or less. And it's contraindicated in patients with a bone thickness less than 5 mm.

So the mono procedure, as stated, very, very similar to the mips, with even less steps to punch biopsy, again, straight down to the periosteum, scrape the periosteum, same cannula is used, and it's just the one drill bit, which creates a widened hole down to immediately a four millimeter depth. And after that hole is created, the cannula comes out and the implant goes in just as before. And then the healing cap is placed around the abutment.

So in contrary to one of the competitors percutaneous surgeries, the really nice thing about the mips and mono procedure with oticon medical is that there's no linear incision required. There's no sutures required at the end. And again, this is a nicer option for patients with better cosmetic outcomes. No numbness of the scalp, and it's really a shorter surgical time. In the competitor options, it does require a linear incision to be made and either a punch biopsy through the, or just adjacent to the incision for the abutment.

And in this procedure, a retractor is placed, you have a wider surgical field. And then at the end, again, the, the incision is either closed around the abutment or the skin flap is lifted over the abutment, and then sutures are placed to close the skin. Often this will require a little bit of a pressure dressing, depending on how much undermining is done, and a little bit more healing time for the patients.

So the benefits, again, of the MIPS procedure is small incision, just the punch biopsy, no sutures, less scarring, less numbness, excellent aesthetic outcomes, very fast recovery time, and very few complications. Again, operating setting is flexible. You can do this in a ambulatory surgical center, a hospital, not at our institution, but I have heard of some folks even doing this under straight local in the clinic, although we don't do it that way. And there's, again, multiple anesthetic options. This can be done very easily under local with sedation as well.

So just briefly on the non surgical options for the ponto. So this is a ponto on a soft band, for example, it's a great option for trialing the device prior to surgery. So patients can wear this either in the office, maybe at home for a couple of days or a week or so and see how it would perform in the real world setting. It's also an excellent solution for children under the age of five who wouldn't be a candidate for the surgical ponto, or adults who are not surgical candidates for one reason or another, in particular, poor bone quality or who cannot get anesthesia.

Okay, so now we're going to discuss a few surgical case studies. These are all actually real patients of mine that we're going to go through that have elected the Ponto. And I should mention that a few of these are some nontraditional patients or non traditional, say, procedures that I'll go through just to let you know that the procedure can be modified a little bit and it can be used for patients that might not fit the quote unquote typical mold for Ponto mips. So I'll go through a couple of those as well. The first one here is a case of a conversion, an intraoperative conversion to the linear incision.

This is a 46 year old male, patient history. He had an idiopathic sudden sensorineural hearing loss. You can see the audiogram to the right of the slide. He has a normal left ear and a severe profound sensorineural loss on the right. Very poor speech discrimination.

So he elected a ponto. And when we got into the operating room, I attempted the mips. And several times, I. When I began drilling, I drilled right into a mastoid air cell. If this happens intraoperatively, you have to go to a different bone site.

If we're drilling into air cells, you're not going to get good osteointegration of the implant. If this happens, basically, just choose another area of bone to go into. This happened at least twice intraoperatively, where I switched the location of the punch biopsy close to the other skin site with one little stitch, and again, kept hitting mastoid air cells. So I elected intraoperatively to convert to a linear incision again just for better surgical exposure so I could kind of see the bone and the surrounding bone as well a little bit better. So I near incision right in the operating room, and then I actually still use the MIPS technique.

As long as you're drilling through the cannula, it is safe to do the MIPS procedure. You don't necessarily need the non MIPS kit in order to do this. So anyway, as soon as I opened the incision, I found a nice, solid piece of cortical bone, and again, just drilled right through the cannula. And I just closed the incision around the abutment, and it was placed successfully, and he healed very well. He did great.

So in cases where the MIPs is not working all that well, there's always the option to just convert to an incision for better exposure. And in surgery, wider exposure is always better, always easier. So if things are not going well, certainly an option. And in this

case, too, this patient healed beautifully. There were several other punch biopsy sites around the linear incision, and from my previous attempts, I closed those with a stitch.

And when we. When he healed up, you could not even where the punch biopsies had been. And again, he healed beautifully and did very well.

Okay, so sometimes we have to do a vertical incision rather than the mips or monotechnique. So that's what we're going to demonstrate next. So I've already marked out the place where I'd like the implant to go, which is again about five to 6 cm posterior, superior to the EAC, and then again approximately the processor would match up to the, to the top of the auricle. So I've marked that out. So a couple reasons why I might want to do the linear approach or the open approach rather than the mips.

If I am concerned about the bone quality, if I just want better visualization, for whatever reason I want, I might want more exposure. So I'd want to open the scalp rather than doing this straight through the cannula. Okay, so this is what we're going to demonstrate. So I'll often use a 15 blade. Today I have a ten blade.

Go straight down to the bone, put in a retractor. Okay, so we want to make sure in a normal patient, scrape all the periosteum. Periosteum is already up. So we're down to straight bone. And my purple mark was in the middle of this.

So that's where I'm going to place the implant, which is in the middle of this incision. Okay, first thing we're going to do is drill our guide hole. So these drill bits are slightly different from what comes in the MIPs kit. So if you're doing the linear incision, obviously we're not, we're using different drills. So this is the guide drill.

And with the spacer, this will drill to a three millimeter depth. We're always drilling at 2000 revolutions per minute.

And again, in real surgery, we're always drilling under continuous irrigation as well.

All the way down until it stops, all the way up. So there's our guide hole, and then as long as I have bone at the depth of my guide hole, which I do, I can take this spacer off and drill an extra 1 mm down to a four millimeter depth and again enter the same hole all the way down, stop me all the way up. So this guide hole is now at a four millimeter depth. After that I'll switch to the widening drill.

So this is the four millimeter widening drill actually has a number four right on it. So this will automatically go down to a four millimeter depth. And again, continuous irrigation, 2000 revolutions per minute. I just want to make sure that the tip of this is centered within the guide hole. So I am widening the same area that I just drilled.

Press down. There's a countersink on this drill bit.

There we go. Thank you.

So you can see the countersink with this technique. The rings around. And this is our four millimeter widened hole. Alright, so now we place the plant.

All right, so this attachment goes on.

So pick up the implant with the abutment and then switch the drill over to the torque setting. And generally again in normal bone, I would be about 40 to 50 newton centimeter of torque.

And again, this is done under irrigation. You start irrigating after a half turn. I can do a one of the ways. If you don't have the counter, this is what I like to do in the. Or if

there's no counter that is placed on the drill, then you can mark one side with a purple or black marker and then use that mark to count the number of rotations.

So that's what I'll do on this, this case. And ideally I want about four and a half rotations if possible. So first thing I'm going to do is get my implant seated within the hole. And I check all directions to be sure I'm completely 90 degree perpendicular. So I do not want to be drilling at an angle.

So I'm seated and foot goes down and stays down the. The whole way. So there's one, two that was about three and a half, can go up a little more on the torque setting.

That would look about three and three quarters.

One of the things you can do, you don't get quite as many rotations as you were hoping is use what I call the hand wrench and actually just do another quarter rotation by hand and you start to feel it gets tight tighter and tighter. So this I kind of use. I use my, you know, my fingers to be sure that it feels tight, but I don't want to over torque it. So I can go an extra half or quarter rotation if needed. So once it's in, then I close my incision.

There are different ways to do this technique. Some people will punch a hole first. I generally don't feel it's needed. And you can just close the incision then with a couple of stitches on either side, maybe two, a couple of deeps, and then through the skin and close the skin right around, excuse me, right around the abutment like that. All right.

So I wanted to make one note about the previous case and the video. So that video was made using the non MIPS technique or third technique. And if you're planning a linear incision in advance, we would not order the MIPS kit. In the case that I presented, I was planning to do the mips, but had to convert to the linear incision

intraoperatively. So if I did not have the non MIPS kit with me or the drills are slightly different, then what I did was just used the MIPS procedure through the cannula, but through an open incision.

So I just wanted to make that differentiation, since in the video, we had been, say, pre planning the linear incision. All right, so our second case is a case of a thick scalp. So this is an 18 year old obese african american male, very large kid, with a scalp thickness of 14 mm. So ideally, we, this would not be a ideal candidate for the MIPS technique. We really would prefer the patients have a scalp thickness no more than 12 mm.

But again, we can loosen the criteria just a little bit if needed. I thinned the scalp after the punch biopsy. I made a punch biopsy all the way down to the bone. This does require some pressure. I was able to get the punch biopsy all the way down to the periosteum, and then through the punch biopsy site, I used instrumentation and scissors, et cetera, to thin the scalp.

So mostly removing fatty tissue, some subcutaneous tissue, to get the scalp thickness a little thinner. And then again scraping the periosteum. We want to preserve the periosteum and really just thin the soft tissue, scrape the periosteum gently out of the way. Then I was able to, again, work through the cannula, and I placed a 14 millimeter abutment in this patient. It worked very well.

It was seated nicely, and he did great. This is an example audiogram of what his hearing would look like.

Okay, so to start with the ponto mips, first thing I'm going to do is mark out where I want to go. So this is the right ear. I taking a ruler, and I want to be about somewhere between five and six, maybe approximately five and a half centimeters from the

external canal. And I'm going to go about a 45 degree angle or so up posterior and superior to the EAC. So approximately, let's say, here.

And then I always check with a mock up processor to ensure that the processor, once it's hooked up to the abutment, is not too close to the auricle. Because if it's too close, then it will. Will hit the skin and the cartilage, and it's very uncomfortable for the patients. The other thing that I check is that approximately. If I'm in the right place, the top of the processor will again approximate the top of the auricle.

So I always check it with the mock up to be sure I'm at a right position. And then let's check my distance again. That looks about right. I could probably go a little bit closer, but that looks to be about at the right distance. So after I mark shave the hair, before injecting any type of local anesthesia, we want to measure the scalp thickness.

This is very important to do before any local because the local will inflate the skin and you're not going to get an accurate measurement of the scalp. So the way that I measure the scalp, we use a needle. This is a large needle, but generally a small 25 gauge needle or so. I put it on a syringe and then go perpendicular all the way down, straight to the bone. I take some type of a clamp, this is a hemostat or mosquito.

And then clamp the edge of the needle without pushing down on the skin. Again, just feel the skin clamp, pull out. And then this approximates the, excuse me, the thickness of our scalp. Then we take the oticon little measuring stick here to tell us what size abutment to use based on the scalp thickness. So you can just stick the needle right in here.

And this would, this would approximate a nine millimeter abutment. So the abutments come in 6912 and 14 mm, depending, again, on the thickness of the scalp. So this person's scalp thickness is about, I'd say almost 5 mm. So again, we're going to be

choosing a size nine abutment. And I do this generally more than once to make sure I get an accurate measurement.

And then after we've chosen our abutment size, we'll go ahead and inject the area with local anesthesia. Typically use 1% lidocaine, one to 100,000 epi, and let that sit at least a good 510 minutes, if possible, while you're prepping. So after prepping and draping, the next step is going to be punch biopsy. So this is a five millimeter punch biopsy that we use. And again, it's very important for all of the steps to be completely perpendicular, 90 degrees to the scalp or the bone.

So first step is punch down all the way to the bone. I want to make sure that the punch biopsy is down on the bone. And I'm actually scraping the periosteum a little bit to score it and then take out. I usually do this with a small iris scissor let's say, and a pickup, anything that you have to cut out this core of scalp that just gets tossed. And then once we have our punch biopsy done, we should be looking down straight at the periosteum.

The next step is going to be scrape the periosteum. So I use the periosteal elevator that comes in the ponto set, and I use this end and make sure I scrape, scrape, scrape. I want all of the periosteum out of my surgical wound so it doesn't interfere with the osseointegration. So ideally, I want to be looking at straight bone, no periosteum. So it should be gritty, and you can actually feel the grittiness and hear it right on the.

Right on the bone. So after all the periosteum is scraped away, next thing we're going to do is insert the cannula. It comes in the MiPs kit. This is the MIPs surgical kit that we open on the field. So the cannula goes in.

All right, there we go. So when you're doing mips, all of the drilling is done through the cannula, which is very important, so it has to stay in. The other thing that can be a little

tricky is getting it onto flat bone. So we do want to make sure we're as close to 90 degree perpendicular as possible. Sometimes you can rock a little bit, depending on the contours of the, of the temporal bone, but ideally, you want to get it as flat as, as possible.

So let's say about there. And then once you get it in a good spot, hold it and don't let it go.

In a real case, we're going to be also doing this under continuous irrigation, anything to cool the bone down. It's very important that we don't heat up the bone because that will interfere with osseointegration of the implant. We're not going to be using irrigation today, obviously. So once we get the cannula in, I'm looking through the lumen here to be sure that, again, I'm on straight bone. No periosteum has snuck underneath, and everything is nice and clean.

Then for the first drill bit we're using.

Okay, so for mips, the first drill that we're using is the guide drill. So there's two drill bits that come in the mips kit. One is the guide drill. One is the widening drill. So the guide drill is the thinner or narrower of the two, and it comes with a 1 mm spacer.

And that's important. Because every once in a while you have a patient that might have thinner bone than others. Typically, you know, adults should have at least five to 6 mm. But for safety reasons, we want to start drilling to the three millimeter depth to make sure we're not through Dura. So the spacer's on to make, to make sure that again, that we don't go past three.

So this drill bit goes in good. And then I always test it. We start this drilling at 2000 revolutions per minute and we drill through the cannula. As I said, this would be done

under continuous irrigation, so either a nurse or resident would be irrigating the entire time. Me drill in, I'm down to the bone all the way down.

It stops me all the way up. Good. So once the guide hole is made, I generally will take an instrument. You can use something like a gimmick on a middle ear set, but any type of a sort of dull pick. This is a little bit sharp, but you can use the other side of the periosteal elevator and just feel that the depth of the hole to be sure that there's still bone.

If I feel dura, then I would stop at a three millimeter depth. But again, before I take off the spacer and drill, the additional 1 need to be sure that there's bone at the, the depth of my hole. And there is, I can feel it and I can, I can hear it. So I'm good to go ahead and take off the spacer. It just slides off.

And now when I put this drill back again, I'm going to enter the same hole and it's going to let me drill an additional 1 mm.

Good. So that's the same hole, but now it's at a four millimeter depth. Okay, next step is we switch drills to the widening drill. And it actually has a number four on it. So you know this is a four millimeter widening drill.

In this case I'm going to drill to four. So I'll use the four meter millimeter widening drill. It's on same 2000 revolutions per minute setting and I want to make sure that I'm. Yep. So you can almost feel that it, I'm in my guide hole and now I drill down.

It stops me all the way out. And now I have a four millimeter depth hole that's widened. I can always check again to be sure that I'm not down at Dura. I'm not. Even if you are down at Dura, it's fine to go ahead and proceed as long as you don't drill, you know, deeper than that.

But the, the drills are, are made such that it really shouldn't penetrate the dura. So it's not a problem if you end up on Dura. You just need to acknowledge it and then stop drilling at that point.

So after the guide hole has been widened again, we're at a four millimeter depth. I, then I take off the widening drill. And now we place, we're going to be placing the implant. So I want this attachment on the drill with this is a counter so that we can count the number of rotations. So this now goes onto the drill.

Good. And then this will pick up the implant. So the implant and abutment come as one piece. I took off the COVID place it down into the holder and then you can either hit the foot pedal or.

Very pretty, but there you go. Snap it on so that the abutment and the implant are now attached to the drill. Once I have this attached to the drill, I never want to touch the implant to anything on the field to pick up any threads, etcetera, anything that touches this could interfere with the osseointegration. So it's very, very important to, to keep this sort of held up. The other thing that we have to do is switch the drill setting to the Newton centimeter, which is a torque setting, typically for adults.

I'm going to start probably up at 40. You can go up to 50 newton centimeter of torque. But this is determined by the health and of the bone, radiated bone. You want to go less torque. Normal bone, 40 to 50 is generally fine.

So now I'm ready to insert the implant.

Well, ideally I want to keep the hole in view. Sometimes when you take the cannula out, there can be a little bit of bleeding or swelling of the tissue. So the cannula should

come out and then the implant goes into the pre drilled hole. Before I start the drill, I want to make sure that I'm again completely 90 degrees perpendicular so that I'm not twisted or turned. Otherwise the implant will, will stick out at a funny angle.

So I usually put the implant in and then I have me, the nurses, etcetera, look from all directions to be sure that I'm nicely perpendicular to the bone. Once I feel that I'm in a good position, I'm going to use the counter to count rotations. Ideally I want about four, four and a half rotations to get a full insertion. So we put the petal down and I just hold it down one until it stops on its own. Once it hits the proper torque setting.

Two, three, four and a half. And again when it stops on its own, I lift my foot and then gently rock the drill off and our implant is in excellent position. Sometimes if I'm at all concerned, or let's say I didn't get the full 4.5 rotations for whatever reason, I can also do a use the hand wrench and I will do this in the operating room sometimes where I'll just clamp it on and make sure that I'm tight enough. In a real patient, I want it to be about two finger tightness, so I don't want to over tighten, but I can do an extra half or one rotation if needed. So I want to make sure that it feels tight enough.

So that's an option. So once it's in, clean everything up. And then we place the dressing and this, usually what we do is cut a little opening in this alum. This goes over the abutment and then the healing cap, the little nubbins go down, goes over the site and you're done.

So the next video we're going to see is an example of an abutment change. So even though I do everything I can to measure the proper scalp thickness and choose the proper abutment length in the operating room, there are cases where later on the patient might request either a longer or shorter abutment for various reasons. And this can be done pretty easily, we make sure that it's done after osseointegration. So after twelve weeks, and then this can be done very easily in the office to take out the

previous abutment and screw something in that's either a little bit shorter or a little bit longer. So that's the video we're going to see next.

If a, if a patient comes into the office and says for whatever reason, the abutment that you chose in the operating room is either too long or too short. Some instances that I've seen are occasionally a little bit of skin growth. If the abutment is a little bit short and the patient has a history of hypertrophic scar or keloid, for example, the scalp can have a little bit of overgrowth and then the abutment can look a little bit too short, needs to be lengthened. The problem is that if the processor starts rubbing on the scalp, so if there's not enough distance between the two, then that can also cause some skin hypertrophy. So if the abutment is too close to the scalp, it might need to be lengthened.

On the other hand, I have a patient, for example, who was quite obese when we did the operation and I put in a very long abutment because he had a very, very thick scalp, he lost an incredible amount of weight. And now his abutment is sticking out way too far and it's bothersome and a little uncomfortable. So for various reasons, you might have a patient that comes in and wants to switch the abutment length, which is completely fine. Fine and easy, as long as you're past the osseointegration time. So I would never do this before a full twelve weeks of osseointegration.

Okay. But once I know that it's secure in the bone, we can do this straight in the office. We need the gold tip screwdriver and the wrench. So what I'm going to be doing is just unscrewing that green screw in the middle. And I just use this.

It's kind of a holder. And the patients generally don't feel pain. They just feel a little bit of pressure and you unscrew. There we go.

So this about it comes out and then a new abutment can go right in and you just line it up, make sure screw it in, should be finger tight and you're done. Very secure.

Okay, so moving on to our third case. This is an example patient that we did a sleeper implant on. This was an eight year old boy. He had a history of a hemifacial microsomia. He had unilateral microtia atresia.

Again, an ideal candidate for a bone anchored device. This is his audiogram on the right. So completely normal hearing on one side, large conductive loss on the other. In this case, I elected to place a sleeper implant because one side of his head, his face was a little bit smaller and I was concerned about some thin bone. And so I elected to have a sleeper implant next to the main abutment implant complex just in case there was, let's say, if it fell out, didn't get proper osteo integration for some reason, I wanted an extra implant that was already placed and available in case I needed to, let's say, you know, redo the, the abutment placement.

And then all you have to do is hole punch right over the skin, take off the COVID screw and then screw on the abutment. So this was a case where I did a sleeper implant. And again, I would do this about one to one and a half centimeters away from the first implant, and it would be completely covered by the skin, but available for future use if needed.

Okay, so I'm going to show how we would place a sleeper implant so this is the second implant in a patient without an abutment. So the implant in the bone and then cover the skin over it. If it's a patient that you're concerned, say, about bone quality, maybe a pediatric patient, radiated patient, a patient that might have a history of, let's say, hitting their implants or picking at their implants if they've fallen out in the past, you might want a sleeper implant which would be accessible just with a skin punch to

place an abutment right through the implant. So we're going to show an example of that right now. So in this patient, we already have the main implant with the abutment.

And if I'm doing a sleeper, I want to be at least 5 mm away from the initial implant. And in this case, I went about 1. You just want to make sure that you're not too close, make sure that they're not touching. So I've already drilled the holes down to a four millimeter depth with the widening drill, and I already have my countersink. So at this point I'm ready to place the sleeper implant.

So for this part, I'm using this attachment on the drill.

And then this is the sleeper implant.

And again, I'm at a torque setting.

Make sure I'm lined up at the hole. Make sure I'm exactly 90 degrees perpendicular.

Good. The drill stops automatically.

Take the drill with the attachment off. Now I need to remove this fixture mount. So I use the other end of the wrench, hold the square portion, unscrew with my gold tip screwdriver.

And then the fixture mount comes off and you can see. So this implant is now it should be approximately flush with the bone, too. We don't want to see any of the threads coming out. So this looks like it's at a perfect depth. And then for sleeper implants, before we close the skin over it, I need to put a cover screw to make sure that the tissue doesn't grow into the implant.

And then if you ever wanted to use it in the future, you take the COVID screw off and you screw in the abutment.

Finger tight. There we go.

All right, moving on to our fourth case. This is an adult patient that is using a softband. This patient is a 73 year old female. She has a very complicated cancer history. She has or had hypopharyngeal squamous cell carcinoma.

She's had multiple surgeries in the past, radiation, some postoperative complications. Back and forth to the operating room. She developed bilateral temporal bone osteo, radio necrosis, and bilateral tympanic membrane perforations for a very long time. She's been suffering bilateral chronic otitis externa for years with chronic drainage requiring multiple frequent debridements in the office, and she has a bilateral severe to profound mixed hearing loss. This patient does have binaural BtE hearing aids with large custom molds.

They work well for her. The problem is that she gets chronic odor, and the more she wears her hearing aids, they occlude the ear canal, do not allow for aeration, and she gets more drainage. The bone within the ear canal is exposed, doesn't heal, and it's a bit of a messy situation. So we were looking for an alternative, which would be a bone anchored device. The problem in this patient is her significant medical comorbidities.

She has very poor bone quality on both sides. She's not a good surgical candidate. She would likely not be cleared for anesthesia, either sedation or general anesthesia, nor would I feel comfortable actually bringing her to the operating room and putting her to sleep because of the extensive surgical complications she's had in the past. So we tried to find something different for her, and in this case, we fitted her with a pontificate

superpower on a soft band, and she actually gets very good results with it. So she wears the headband, she gets to pick out a color.

She has them in pink and blue, and she matches it to what she's wearing. She's a fair, I should mention, she's a fairly small woman, so she doesn't have a very, very large skull or scalp, which I think to her, the softband. But she wears it, and she gets excellent results with it. And when we switched her to the soft band and she was using her bte hearing aids less and less, it was very obvious that her ear canals started to dry up a little bit. There was less odor.

I even started to see a little bit of healing of the ear canal skin, less bone exposure. It made a huge difference, and she gets very good results with this.

Okay. And our case number five, this is what I would say is maybe more of a standard case for a ponto or any bone anchor device. So this is a 63 year old gentleman, long history of chronic ear disease, many, many years of chronic odor that he sort of ignored. Happens to be a truck driver, actually, and he just went about his days with chronic bilateral odor. When I finally met him, I noted a bilateral cholesteatoma.

He underwent bilateral canal wall down to Panama, sequentially, of course. Did one side let that heal several months later, went back and did the other side. So he was not a good candidate for conventional hearing aids, again, due to the open cavities and his history of recurrent odor. And he was not a very compliant patient with dry ear precautions as well. So that complicated this scenario.

I wanted to find something that would be an alternative for him without occluding the cavities. His audiogram had a bilateral mild sloping to severe mixed loss. So a very good candidate for a bone anchored implant. And when I took him back to do the

second tympanomastoidectomy, so the second side, that is when I placed the ponto, and again, he got excellent results. In this case, I only placed unilateral.

You could argue doing a bilateral implant on this patient, but in him, I just chose to do unilateral. But if he ever elected to do the other side, I would be happy to do that for him.

Okay, so I'm going to demonstrate the mono technique now, which is similar to the mips, except that with the mono technique, we are combining the guide drill and the widening drill. So it's just one drilling step. So this is the drill bit that comes in the mono kit. It drills immediately to a four millimeter depth. It says the number four on there.

So this can be used for patients that you're very confident, have a thick enough skull that you don't need to do the three. The first step to three and then the second step to four. So in this case, I've already done my hole punch. My cannula's in. I've scraped the periosteum.

So I'll attach my drill bit. And again, I'm drilling at 2000 revolutions per minute for this under continuous irrigation. I'm always drilling through the cannula, and I make sure that my cannula is seated nicely on the bone, hold it steady and all the way, feel the bone all the way down. The drill stops me all the way out.

All right. So I did have some questions for Doctor Chiffer. Just we can get a little bit more into your experience with ponto surgery and the Ponto procedure. So how, when a patient comes in, how do you approach patient education and counseling in terms of the benefits, the risks and any expectations associated with the ponto surgery? Sure.

So once evaluated, the patient deemed them to be a good candidate, good surgical candidate, good candidate audiometrically. So when I'm talking about the surgery, the

risks I describe are pretty basic, a little bit of pain. The pain is actually quite minimal in this. Every once in a while there is a patient that experiences a little bit more pain than I would predict. But most of the time I'll tell them tylenol or motrin is fine.

I will give a couple narcotics if needed, but they will expect maybe a day or two of pain. We go over the risks of the anesthesia. I do this under general anesthesia, mostly because I'm working with residents and they'll be helping me, I'll be teaching, et cetera. So I choose to do this under general anesthesia. So we do have to talk about the risks of going under general with the breathing tube.

The reason for the breathing tube is because when you turn the patient's head, if they have something like an LMA in it, can get dislodged. So I do tell them that this will be done under general anesthesia with an endotracheal tube. Although it is quite quick, I think I've gotten the procedure down to, I think about seven to nine minutes or, not that it's a race, but it is very quick. Other things, probably the most common thing I can see is some scalp infection. Some patients have an oily scalp or very thick scalp, really thick hair, follicles.

There can be little areas of scalp infection or folliculitis. That's pretty easily true. Treated with either some oral or topical antibiotics, sometimes a little bit of a steroid cream or an oral steroid pack. So scalp infections can happen. And then I do tell them the risk of lack of osteointegration.

So I counsel them to just be cautious that there's an implant in place and that the company's guidelines are ideally twelve weeks of osseointegration. And so I'm most concerned in folks that, let's say younger kids that play sports, football, rugby, anything, contact sports. I am a little bit concerned about them hitting the head, having some type of head trauma. And if you hit the implant and it's less than that twelve weeks, there is a chance that you can displace the implant or disrupt the

osteointegration so that it helps folks. If that happens, then we do need to go back to the operating room and place a new implant so that that can happen.

So I tell them to just be cautious. They're fine to lay on that side, they're fine to shower in a couple of days, but just be careful with any type of contact. And then bleeding is probably the other thing that I talk about the most. The scalp obviously can be very vascular and every once in a while, you know, you can have a lot of intraoperative bleeding, which is not dangerous, more of an annoyance than anything else, again, just because it's a vascular area. And every once in a while, I do have patients that have some bleeding, eating at home, calling for that reason.

Very easy to treat with just some pressure, a little pressure dressing, and generally it's no big deal. But those are probably the most common things. And then the benefits, you know, like we talked about previously, it's great to have something that's not in the ear canal. So for folks that are chronically draining or for folks that just don't like to have a hearing aid, either on the oracle, the BTE, or in the canal, there's a lot of patients that just can't tolerate it for one reason or another. And this is a great option for somebody that just can't wear a conventional, on the ear, in the canal or Rick aid.

And then one of the other things that I do tell patients and they'll actually come and ask me about is the cost. So oftentimes this is covered by insurance, where conventional hearing aids are usually not. So this, you know, for the appropriate candidate, it can be an excellent option financially for them. And again, if it's covered by their insurance, I tell them it's a very quick recovery. They can usually go back to work maybe in a day or two.

So it's very, very quick and easy. And is there anything sort of when a patient comes in that makes you automatically think Ponto or this is a Ponto candidate? Definitely. I think

the most obvious would be a microtia or atresia. So somebody that absolutely cannot wear a conventional hearing aid, I think those are, again, the most obvious candidates.

Other candidates. Mastoid cavities, chronically draining cavities, or very, very large cavities. There are folks that have, let's say, had their canal down mastoidectomy 20, 30, 40 years ago. And sometimes the mastery cavernous, it's like you can drive a truck through them, and it's really hard to get a, it's a very big mold. It's just not an ideal situation to wear a conventional hearing aid with a huge mold.

And the other thing is, most likely all of their ossicles would have been gone, especially if this was done years and years and years ago. They probably had multiple surgeries as a kid. They have no ossicles, so they have a very large conductive or mixed loss. Those are, again, ideal candidates for a bone anchored device. Yeah, the ear mold impressions on a mastoid cavity are tricky.

So I'm sure your audiologist. Thank you for that. Yes, I will say, actually, just as an aside, I did have a patient that had a large mastoid cavity done a long time ago. Not by me, I don't even know where. But she was seen at a community hearing aid place, and they were fitting her for hearing aids, and they did a mold, and the mold material actually got stuck in the cavity to the point where I actually had to take her to the operating room because she came in and she was in a lot of pain, and nobody could get the mold out.

And it was so uncomfortable for her. I took her to the operating room, got it out, you know, no problem under anesthesia. But, you know, she was not a great candidate for a mold. So she would be somebody. Absolutely.

That could use a bone anchored device. That was like my worst nightmare when I was in the clinic. Oh, yeah. I felt so bad for her. But we got it out again.

She had no damage to the earth. Poor woman. She was in a lot of pain.

And is there any advice that you would give patients who are considering Ponto surgery and sort of just starting their process of thinking about it?

I counsel patients that are, let's say, on the fence. So let's say they're trying to decide between a conventional hearing aid, maybe a cross or a bicross, and depending on what their audiogram looks like, or a bone anchor device, I tell everybody to demo them in the office. And, you know, if you have, I have an excellent audiology team, obviously, that I work with. So I do request that they come in of the conventional hearing aids demo, the cross hearing aids, or by cross hearing aids to see what they sound like, what they feel like in their ears. And then we always have somebody do a demo of the on a softband demo, the ponto, and maybe even walk around the office with the hearing aids on or with the softband on, or maybe do the visit with me with one of the, with, let's say, the softband on their head and just to get an idea about what the sound quality would be like in a more day to day scenario.

So not just in a soundproof booth, not just in a little consult room, but let's say, have them walk in the waiting room, walk in the hallways, and just get an idea of what it would sound like. So I tell folks that I'm happy with whatever they choose. I would want them to choose something that is going to give them the best sound quality. So I tell them to take as long as they need. I mean, this is not something urgent.

So I don't want somebody to be, you know, disappointed or something like that. So I tell them to do as many demos as they need to with the audiology team to choose thing that they think gives them the most hearing. One of the things that sways them besides the financial decision is whether or not they need something on the other ear. So that's a big one. So let's say somebody has a normal ear on one side.

They don't love the idea of wearing two hearing aids for like a cross system, so they don't want a hearing aid on their, on their normal ear. So the bone anchor, the ponto, for example, is just going to be on one side, and they do like that option. So that's one thing I counsel on. Thank you so much for sharing your expertise and taking the time to meet with me today and talk about this. And thank you for everyone watching.

My email is in the first slide in the handouts. If you have any questions at all about Ponto or anything, you can reach out to me, as always, and thank you again.