Facial Rehabilitation: Treatment Strategies for the Patient with Facial Palsy

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- [Calista] Okay, and our title is Facial Rehabilitation, Treatment Strategies for Facial Palsy, Part Two. It is my pleasure to introduce Mara Robinson of PhysicalTherapy.com. Mara earned her bachelor in science degree in physical therapy at the University of Delaware, and a masters in neurologic physical therapy from MGH Institute of Health Professions. Before settling in Boston, she worked as a PT at John Hopkins Hospital, and then was a PNF instructor at Kaiser Permanente in Vallejo, California. Specializing in neurological and pediatric disorders, Mara then worked at Mass General hospital in Boston, and earned the Stephanie Macaluso Excellence in Clinical Practice Award in 2003. She began working at the Massachusetts Eye and Ear Infirmary's Facial Nerve Center in 2004, and has been instrumental in growing the Center's facial rehabilitation program with Dr. Tessa Hadlock. In addition to evaluating and treating all types of patients with facial palsy and synkinesis, Mara lectures on facial rehab at the university level and at the International Facial Nerve Symposium. She's a member of the Sir Charles Bell Society and Facial Palsy UK International groups of Medical Professionals, and is dedicated to sharing ideas about the treatment of facial palsy. So thank you so much for returning to phsyicaltherapy.com today and presenting part two of this series. And at this time, I'm gonna turn the classroom over to you, Mara.

- [Mara] Great. Thank you so much for having me back. And I see that the majority of the participants have logged back in, so that's a good way for me to get started today. I hope you enjoyed it and are ready to dig into learning about the treatment strategies used for people with facial palsy. I'm also gonna spend some time discussing the use of Botox for our patients, specifically how we use it to treat synkinesis that you learned about. I'll also spend a chunk of time explaining the types of surgeries that our center does to help reanimate the smile. And that's kind of exciting cutting edge that our doctors are doing, so I'm excited to share that with you briefly. And then I will end with a few case studies, hopefully, again, having time to pull it all together. Let's just do a

quick review of what we went over just briefly on webinar one. We talked about the different types of facial palsy, and how we could at least categorize the level of palsy. So we first looked at patients with flaccid facial palsy. Those are the ones that have a complete loss of movement. And typically seen in the acute stage of Bell's Palsy. Patients with tumors, facial nerve tumors like hemangiomas, and also you'll see flacid facial palsy in people who've had tumor excisions. Can see it in tumor excisions. Secondly, we talked about the patient that presents with what we refer to as facial paresis. This is in the subacute stage of Bell's Palsy, Ramsay Hunt and Lyme. But you also may see it in congenital facial palsy and other patients with facial tumors. Thirdly, I introduced the concept of synkinesis. Hopefully that was eye-opening, no pun intended, or interesting for you folks to learn about.

And that phenomena of synkinesis is typically seen in the chronic stage of Bell's Palsy, Ramsay Hunt and Lyme, when the patient has not been in the fortunate category of making a full recovery. So we'll see synkinesis in that incomplete stage as well as other types of facial nerve injuries. Things like temporal bone fractures that result in facial nerve damage can recover, but they can also recover with synkinesis, tumor resections where the nerve has been damaged can recover their nerve function, but also can end with synkinesis. So it spans a variety of etiologies. And last category was the patient with bi-lateral facial palsy.

That can be seen in Lyme disease, some other rare syndromes like Moebius syndrome, which is a congenital neurological disorder, and F2, neurofibromatosis type II, which causes benign acoustic neuromas, facial nerve schwannomas that can cause facial palsy. There's a slew of other very rare conditions that can present as bilateral. And that's a tough group to treat, but we do our best. And hopefully when we tap into the facial reanimation procedures, you can extrapolate a little bit in how those surgeries are appropriate. All right, so that's just a brief review. And we also ended the session learning about the main outcome measure tool that we use, the Sunnybrook Facial

Grading Scale. We're not gonna review that in detail today, so if anybody does have any questions, I'm happy to discuss that, the grading part of that, at the end. So just to review the learning outcomes. After this course, participants will be able to identify the stage of rehab and use at least three strategies in the management of facial palsy. So today I'm going to be talking about how we categorize the paresis, palsy, paresis and kinesis, and teach you a few strategies, not all of them, but at least a few to start putting in your toolbox to begin treating these patients. I'm gonna help you, as I said, identify the rehab strategies, specifically addressing impairments and functional limitations. And again, talk about the strategies or the indications for synkinesis. And recognize the timing and need for Botox and for surgery.

And also just a brief review just to get us all on the same page thinking facial palsy. In the acute stage, you get a unilateral, usually unilateral motor loss of the facial muscles, occasionally bilateral. That facial nerve that I describe will result in impaired taste sensation because of the nerve supply to the anterior 2/3 of the tongue, patients in the acute stage will have impaired vision, and this is not because of an ocular motor problem, but it's due to incomplete eye closure. So the patient that can't blink their eyes will have impaired vision because their eyes are watery or even dry, so that's why they have impaired vision. If you also wanna extrapolate just a bit, they'll have impaired vision in the chronic stage as well, and that is due to the severe synkinesis they may develop.

As you recall in those photos I showed you, when there is severe ocular synkinesis, that can start to reduce the peripheral vision. And so people can complain of impaired vision in the chronic stage as well. In the acute stage, they have some sensitivity to sound because of the connection to the middle ear, and they will complain of auricular pain typically as one of the first signs in facial palsy, primarily because of that tiny little canal where the nerve exits the skull. In the chronic stage of facial palsy, we see similar impairments plus muscle atrophy of those muscles involved in facial expression. And

then because of synkinesis, patients develop muscle stiffness and hyper tonicity that they'll complain of muscle pain and tightness. One of my first patients in this area was a gentleman who said, "I really don't care how I look. "I'm 70 now, and I'm over my cosmetic appearance "or my aesthetics, but I am in so much facial pain." And that really taught me a lot about how important massage, that I'm gonna show you today, is necessary for managing the synkinesis and hyper tonicity associated with synkinesis. At the functional limitation level, due to facial nerve involvement, as I said, the patient will have trouble closing their eye, they'll become dry or teary, and at risk for developing corneal abrasion.

Functionally, as I went over, and as you know, they have trouble moving the corner of their mouth, complaining, obviously, of the inability to smile and laugh, inability to pucker their lips. They complain of impaired articulation, simply because they can't cleanly bring their lips together, not because it's dysarthria from a cortical lesion, but impaired articulation due to the lack of lip approximation. And a very common complaint is limited expression of emotions. And we talked about that. At the disability level, it leads to social isolation, anxiety and depression. Lots of studies that describe that. Kind of in the theory, though, quite honestly that if you had a history of anxiety and depression prior to getting Bell's Palsy or facial nerve involvement, you're more likely to be more depressed.

If you're a relatively happy person and you can handle some of these life challenges, I've seen that happier person, so to speak, handle the disability associated with facial palsy a little better. Just yesterday, I had a patient in and she was a young woman with pregnancy-associated Bell's Palsy. And she was 10 months into things and she said, "You know, Mara, I'm really in a good place. "I've accepted where I am. "I'm very grateful, I have a healthy baby boy "and this is what it is. "It's not what I used to be, but I'm shifting my mindset "into being more grateful." And I'll talk about that 'cause we do play a big role in supporting our patients through this process. So from a disability

level, they are hesitant to eat in public, eat at restaurants, and they're limited in their work environment due to articulation difficulties, visual dysfunction, pain and appearance. And I did say, all of them complain about being in photos. Okay, so that was just a overview just to get us all back on the same page. Hopefully you can have a visual in your mind. Think about those patients as we move forward to the physical therapy evaluation. Or as I said, some occupational therapists do this as well. Occupational and speech. So while the patient is likely coming to you with a diagnosis from a neurologist or an ENT, it is up to you to take a thorough history and understand the nature of onset and the amount of recovery to date. Remember that these two factors, the temporal pattern of onset and recovery of movement to date will be the identifying factors of Bell's Palsy.

Remember, acute Bell's Palsy, Ramsay Hunt, Lyme Disease, acute infectious facial nerve damage happens in 24 to 48, 24, I'm sorry, to 72 hours, and typically recovers fully by six months, or recovers with the synkinesis about the four-month mark. Remember, the patient who describes a more slow, insidious onset of facial palsy that was like, happening over weeks or months, is not Bell's Palsy. Okay, you may get a referral to you that says, from the neurologist, Bell's Palsy, evaluate and treat, but this patient is saying, tells you in their history, oh yeah, this has been bothering me for about six months, and it hasn't gotten better. I'm still, like, drooped.

That's not Bell's Palsy, either. 'Cause remember I said they start to make some changes at about that four-month mark. And they start to develop that synkinesis at that four to six-month mark. Okay, so keep these histories in mind. Again, I don't expect you to diagnose, but I'm expecting you to keep these things in mind as you're treating patients. And if they're not getting better, if they're still in that flaccid state at eight months, please refer them back. Perfect. So when I ask about their history, their onset of their facial palsy, how much recovery they've had to date, the other thing I ask is what the prior intervention has been. Have they had acupuncture? Have they had

physical therapy elsewhere? Did they go to a chiropractor? I just like to know that, it helps my clinical practice. But the facts of the matter is there are no studies that show acupuncture makes a difference. Plenty of people, and I have some references for that, plenty of people will say, oh I went to acupuncture, and that's what got me better. But remember, the studies support that it's prednisone and valtrex that are helping patients improve their chance of recovery.

And the studies that have been done on acupuncture are done in that acute stage, so they're already spontaneously getting better, and the studies that have been done typically don't have a control group, comparing patients that did get acupuncture to those that didn't. So there's no strong evidence to suggest acupuncture helps. But I just like to gather that information and keep that in my chart. Invariably, a patient a day tells me they've had acupuncture, and our clinical practice, our clinic says, oh it's okay, there's plenty of benefits to relaxation of acupuncture, but we don't support it in the research. Okay. So then, just like any other diagnosis, I spend time getting to know the patient, and asking them what's their chief complaint? Are they having trouble smiling, eating, drinking, speaking, et cetera, what we talked about.

As I said, at the Facial Nerve Center, we see people who have had facial nerve palsy anywhere from three days, acutely, to 30 years later. And so for that patient in the acute stage, they're gonna have trouble eating and drinking. But the patient in the chronic stage has been living with facial muscle tightness, and pain, and synkinesis for a long time. So I like to know what is it that is bothering them today. And everybody is different, as you know. So as we talked about last time, last webinar, the Sunnybrook Facial Grading Scale is the typical scale of choice among physical therapists. The House-Brackmann Scale is the typical scale of choice by the medical community, the MDs. I wanna introduce just one new measurement tool. It's called the eFACE. You can access the eFACE in the App Store, the Apple Store. The eFACE is an electronic measurement tool that was designed by our center's physician, Dr. Tessa Hadlock. It's

an only-digital interface measurement tool. Very similar measurements to the Sunnybrook that I went over, but it's all digital. Whereby you're using your finger to slide the scale across and describe the amount of excursion they have in their forehead. So it's a zero to 100% range, as opposed to a one to five range, and you're using this somewhat subjective measurement to classify all of their movements. It's kind of fun if you have a few minutes and a few extra dollars. I think it's nine or $10 in the App Store to check it out. And it does give you a nice bar graph after you hit submit. And patients like to see their bar graph changing. We are using this in our clinic because it's designed by our doctor.

And it is embedded in our medical record in a graph form. Patients really love to see that. It is graded zero to 100% as well, with 100 being normal movement, and it does break down similar to the Sunnybrook, with resting symmetry, voluntary movement, and associated synkinesis. Additionally, measurement-wise, I do look at the whole patient. I do a cranial nerve screen if I'm suspecting something else. I do a balance brief screen if they have Ramsay Hunt, as I mentioned, they will have a, they often have a vestibular component. And I typically just simply say, have you had vestibular rehab? And we do have a vestibular therapist in our hospital that I often refer to. I screen the TMJ very briefly.

Thanks to physicaltherapy.com, I did a TMJ webinar and learned a lot. But our patients do develop some TMJ dysfunction in an attempt to kind of correct their facial expression, or some patients have underlying TMJ dysfunction. So I do address that to the best of my ability. And there is a little psych component to some patients having TMJ surgery, jaw replacement surgery and having a result facial nerve damage following the TMJ replacement. I've had probably about half a dozen on my case load. So that is a risk factor, just a side note. I screen the cervical spine as a it relates to the whole facial expression. So it's important to remember to do a review of systems. And lastly, we use, in our clinic, a quality of life measurement called the FaCE Instrument.

I've attached that as a PDF for your reference. There is the FaCE Instrument and the Facial Disability Index, available, also, probably online. I didn't supply that. But we do use the FaCE Instrument. The FaCE is a disease-specific, self-reported, 15-item questionnaire that's widely used by most of our clinicians across the country. The domains relate to both impairment and disability categories, and range from the inability, I'm sorry you can't, you may not be able to see this perfectly clearly, but we measure their ability to, they self-asses, I'm sorry, their ability to smile, pucker, move their eyebrows. And then they ask them questions about how their eye is functioning, the degree of pain that they're having, their social interactions. So each of those domains are graded. It's also graded on a scale of zero to 100. And the formula for calculating the FaCE Instrument is available here. But basically, and we are fortunate, we have this computerized on our system as well, but the patient fills it out online for us. But you can give them the old-fashioned hard copies.

They scale themselves, as you can see, from one to five. You would calculate that total number. In this example, the person added up to a 55. You're going to use the formula where they scored all 15 items, unless somebody left one out, that 15 should be 15. And multiply it by four, and then out of 100. So you get a percentage. Somebody is chiming in to ask me, yes, the lower the score, the more disability on both the Sunnybrook and the FaCE Instrument. So if a patient scores in the 80s and 90s, they're having very little facial disability. If they score in the 30s or 40s, they feel like their facial disability is significantly impacting their quality of life. So yes, thank you for asking for that clarification. I'm getting pretty good at multi-tasking, reading those questions as they come in. I'm doing my best, thank you. So yes, we use the FaCE Instrument, or you can opt out for the, opt for the facial disability index. And I can probably get that for you if you need that. But there has been quite a bit of research on the FaCE questionnaire. A group up in Canada, I'm sorry, Canada was the Sunnybrook Scale. I believe the FaCE scale was done in Boston in the '90s, before my time there. But it was developed by Ross and colleagues, and it is a validated measurement showing

that impaired facial impairment is consistent with impaired physical and social function. So yes, the greater the impairment, the more disability they have from a physical and social perspective. However, more recently, Volk and colleagues found no relationship between the psychosocial scores and the severity of their facial impairment. So what that's really saying to me, and I've seen that quite a bit in my clinical practice is that even just the slightest assymetry can really throw somebody into the dark side. So this really bothers people at variable levels. But I have witnessed very, very mild assymetry and people feeling really, really disheartened by it. So I was validated when I saw that study. Okay. So any questions about the evaluations?

It's actually kind of quick. Let's do the Sunnybrook Facial Grading Scale, let's do a facial measurement questionnaire, and let's screen associated systems. Let's move to how we think about these patients. Like, how are we gonna take our evaluation and use what we've learned from the evaluation to the treatment? So when I went to physical therapy school, that was called the assessment, and I believe that when the guide to clinical practice came out, they are using terms like the evaluation of the examination. Nonetheless, we're gonna, I'm gonna teach you how I take my evaluation and decide on the treatment.

So in 2008, two very brilliant women, who are, unfortunately, no longer doing facial rehab to my understanding, two women, Jessie VanSwearingen and Jennifer Brach, both were at the University of Pittsburgh at the time, did a nice job of classifying treatment approach and trying to identify where the patients fall into their spectrum of recovery, and how are we gonna treat them? So I've taken their classification of treatment, I'm giving them full credit, and taken that into my own kind of clinical practice. So I'm gonna explain to you each of these categories. We call the first one initiation. Second one is facilitation. Thirdly is movement control. And lastly, relaxation. So based on our clinical exam, my brain is going, "are they falling "into the initiation category? "Are they falling into the facilitation category? "Are they movement control or

relaxation?" And that's how I guide my treatment. So yes, they often can move from initiation to facilitation very quickly. They can often present in one category and move to another. So hopefully I'll be able to pull that together for you. This is a great article that I've referenced here if you want even more details than I'm going to present. So the initiation category. The patient is going to present with complete facial paralysis due to the acute facial nerve injury. They present with moderate to severe facial assymetry at rest, and on exam, they are unable to initiate any movement on that side of the face. They also will not have any synkinesis. Okay, so if a patient presents to you with moderate to severe facial assymetry, they're flaccid, they've got no movement, and then, clearly, no synkinesis, they are placed in the initiation category. I actually don't see too many of these people, clinically. They usually don't get to us in the very flaccid stage of Bell's Palsy. We typically see these people, they've come to our doctors for assessment. And if they're still in that flaccid stage and they have a tumor, I'm gonna talk to you about the surgical intervention, but I'll say it forthright here. In the very acute stage of Bell's Palsy, Ramsay Hunt, in those first two months, we really only see them one or two times for two reasons.

One, the main reason is that most patients, 80%, make a full spontaneous recovery in that three-month time. And secondly, there are no studies to support that early intervention physical therapy will improve the spontaneous recovery. Will we help them with the other impairments? Yes. Will we help them learn to compensate if they haven't learned to compensate already? Yes. But there are no clinical studies that support that what physical therapy does, what facial rehab does, will facilitate that lucky pattern of 80% spontaneous recovery. The studies that support it are the medications. But when the patients are begging to come in, I want physical therapy, we will do it and I'll explain typically what we do in that stage. It's not that black and white, but that's just the general. So we spend a lot of time with patient education about what to expect in the recovery process. We do a lot of what we call cornea protection. I do teach them some superficial massage. The one thing I tell patients in this acute stage is please

avoid mass movements. Do not practice your big smile. Do not overuse your uninvolved side. That's like trying to turn on the light when it's not plugged in. There is no nerve input, do not practice moving your face. Okay? If they wanna do anything, we do teach them some passive movements. So from a education standpoint, and you're gonna see this photo throughout the stages. We do patient education on everybody. Everybody that comes in gets this diagram. I've attached it, also, as a PDF. It was black and white for some time. We finally colored it in. I love this diagram. Every patient gets this, every patient gets a folder. But I explain how the facial nerve comes out at the, there we go, comes out, I'm trying to use the pointer here. There we go. The facial nerve comes out at the, just below the ear, and exits the skull, and goes, branches into these four or five major branches across your face, supplying each of these individual muscles throughout your face. I see a question.

Do you teach with mirror re-ed using the stronger side with half of the face showing the muscles we need? Yes, I do do that. Hold that thought 'til the facilitation or movement control category. And what are some examples of passive movements? I will get to that in just a second, thank you. So I do give everybody this diagram, and I show them the nerve and how each of the individual muscles of the face are moving. So I use this diagram right here to show, here's your smile muscle, the ZYJ, ZYN muscles. These brothers are the muscles that move the corner of your mouth up into a smile. And I show them these little arrows. That's the direction the muscle moves to make you smile. Here, this muscle down here, the DAO, depression, depressor anguli oris, that muscle brings the corner of your mouth as into a frown. So I just explain how these muscles move, just as you would explain to the patient with an orthopedic injury where their disc is in their spine. Patient education, to me, is huge. And I really spend a lot of time explaining how the face works. So before I go into passive movements, I will take some time to explain what we do for corneal protection in the acute stage. A lot of patients have heard this by the time they get to me, or they've read it online, but they do learn to, or figure out to either patch the eye or tape the eye shut. So here in this

example, this patient would manually close her lid and then use a piece of tape across the horizontal opening as the eye is closed, and tape it across, I say, like a gift that you're taping across the seal, so to speak. And they tape their eye closed at night to prevent the eye from drying out. They also know to use eye drops. The other quick little point here is that in our center, if the patient has not achieved eye closure by usually month two or three, and they're very uncomfortable, our surgeon offers the surgical implantation of a thin profile platinum weight, where the eyelid is just slit open with a tiny little incision, and this thin little platinum weight is placed in the eye, and then the patient is able to achieve full eye closure.

It's barely noticeable to most patients and to the observer. The other thing that we do as physical therapists at about month two, is teach the patient to passively stretch their levator palpebrae superior. That is this muscle here, that is the muscle that opens the eye. And because the eyelid has been open for a couple of months due to lack on input, this little band right here gets tight, or taut. I often say to the patient, it's like you're garage door has not come down all winter, and the spring that elongates when the garage door comes down has gotten rusty. And so you need to stretch that eyelid down. We tell them to hold it down for about 30 seconds.

And by stretching that taut little levator, they can achieve more of a passive elongation into complete eye closure. So that's a nice little eyelid stretch that we teach everybody that does not achieve full eye closure by the two-month mark in the acute initiation stage. So I do like that one. So again, I use the example that there's not a lot of, there's no nerve input when there's flaccidity. So don't try and turn on the light if it's not even plugged in, all right? But patients are dying to do something, so I tell them it's okay to do passive movements here. And simply using that diagram I showed you, I say you can put your fingers gently on the corner of your mouth right to the side of your lip and gently move the corner of your mouth up into a small, gentle smile using your finger pads just to gently move to form a smile. And at the same time you're forming that

gentle smile, you can have your other side going along with it. Don't overdo. So many patients come in and they say, oh yeah, I practice blowing air into my lips. They puff out their air in their cheek, and that's not really doing anything. You can do the passive movements with my thought process being cortical remapping. Let's just remind your brain what that movement was that you're lacking. Any advice about when to use external weights to protect the cornea, plus the upper lid? So somebody asked about the external weights. So I showed you a surgical implantation, but there are external weights on the market called Blink Eze, Blink E-Z-E, or Blink Eze. And they're expensive, they require a doctor's prescription, and patients have complained that they're not comfortable. But if somebody doesn't want to follow through with the surgical implantation, we do recommend that they give a trial of that at any time. Okay, usually the taping does the trick.

There are some other ones on the market, but Blink Eze is the most popular one. So yes, we teach them to avoid mass movements, avoid overuse of the uninvolved side. So it's patient education about what to expect, gentle, passive movement. And I do, you can write in, I do teach people to do some gentle massage. And I'm gonna show you that in the facilitation category. But it is okay to just gently do some effleurage, gentle massage to all of the muscles bilaterally. And hang tight, I'll show you that in just a second. So moving into the second category, the facilitation category. Patients in the facilitation category present on exam with mild to moderate facial assymetry at rest, and they are able to move slightly. So we're trying to facilitate their movement because they have some ability to initiate movement in any or all zones of their face. So this little girl has congenital facial palsy, I'm trying to use the clicker, on her left side. Ah, why is my clicker not working? Anyway, thank you, she has left-sided facial palsy. Or facial paresis. She can move the corner of her mouth just a little bit. Otherwise, if she couldn't, you would see probably no dentition on that left side. So she has slight movement, but she does not have synkinesis. And thus, somebody with partial movement falls into, so to speak, falls into the facilitation category. Patients in this

category, the treatment is patient education, effleurage massage, active assistive and neuromuscular retraining exercises, functional retraining, we'll talk a little bit about biofeedback, EMG biofeedback, and mirror feedback. And I begin at this stage because they might be starting to show a little bit of signs of synkinesis in this stage. I do educate them, at some point, about the development of synkinesis. So again, lots of education. Knowledge is power. So before we run the video, this is just a very simple video to show the general effleurage type of massage that I use for patients in both the initiation and facilitation category. So let's go ahead and watch this together, Kathleen, that would be great. The patient begins at the main smile muscle area, the zygomaticus muscles, by placing two fingertips at the corner of their mouth, and making gentle, circular motions upwards towards the top of the cheekbone.

The general guideline is to make three to five circles in three to five areas, along the trajectory of the smile muscles. Next, the patient can perform a self-massage to the levator muscle groups by placing one to two fingers on the side of the nose, and making a gentle, sweeping motion away from the nasal base. Care is taken not to get too close to the lower eyelid, where the skin is more delicate. Move the fingers down and out with the general guideline of 10 repetitions. The last muscle group to address is the forehead muscles. The patient is instructed to place four fingertips just above your eyebrows and gently massage the muscles in the upward direction toward the hairline.

This is a simple, easy massage the patient can perform on their own, 10 repetitions as a general guideline. Thank you, oops. Media is not my specialty. So as you can see, I have the patient doing it bilaterally. This is to give them that kinesthetic sensory feedback about what their unaffected side feels like compared to their affected side. And they may be overusing their unaffected side just by nature of facial expression, not on purpose, but just if they're talking, their unaffected side may be overused, so the gentle massage feels pretty good. Recently, a patient of mine recommended this thing

called the facial roller. It's the hottest thing on the beauty websites. But it's a rose, quartz, or jade tool that people use to improve circulation. So a patient really loved that. I've been suggesting it to people, and they feel just this general benefit of bringing blood flow to the area. Again, there's no studies, unfortunately, to show that that's going to bring that nerve connection back, that neuronal input to the muscles, but it is, we all know how important massage is for circulation, and I say that when the nerve regenerates there, it's regenerating to a healthy muscle that's been well taken care of with massage and circulation. So the second component of facilitation treatment is to use active assistive exercises. And this is where I begin to introduce the mirror. I have the patient, in this example, is placing her fingers on her oris muscle in an attempt to form a puckering motion. And she's using just gentle finger assist to bring her lips into a forward protrusion.

So you, again, you're showing the patient that anatomy diagram, showing you're using that OOF, that little ring of muscles around your lips. Feel the tension underneath your fingers build as you form a midline pucker. Teaching them to just not overuse their right side. You're gonna hear a theme here. I'm sorry, don't overuse the unaffected side. Work on symmetry as you try and move your face. A lot of times I give people this tug of war example where you wanna have the two sides equal. We're in a society where everybody wins, I say. So you don't want all the strong people on one side doing all the work. You wanna dampen that strong side and ask the weaker side to have a chance. So just small assisted movements, dampening their strong side, so the weaker side has a chance, okay? Think about, like, that length/tension relationship, and that if your strong side is overworking, particularly in the smile and in the lip motion, if your strong side is overworking, it's just gonna keep pulling that weaker side over, like that game of tug of war. It's going not to give that weak side a fighting chance. So we work on these small, controlled, symmetrical movements. That's the beginning of this neuromuscular retraining. Okay, so what you can see here is, this may be a little bit, okay, sorry. What you can see here is how I worked on the smile. Sorry, I didn't have the slide up here for

the visual. What you can see here is how I worked with this young girl with congenital facial palsy on dampening her right side of the smile, while trying to get the left side to balance it out just a a little bit more. Okay, so it's that tug of war between the two sides. We really want an equal playing field. The other thing we begin to do in this facilitation category is spend a lot of time doing, what I call functional retraining with midline control. A lot of patients have adapted drinking from their strong side. They're like, oh, it's just easier if I just put the straw on this side, my strong side. So I begin to work on doing what I call midline control.

We use a straw to get that feedback from them, or I use the thin rim of a cup when they're trying to drink a thick, thick coffee mug is very, a mug is very difficult to drink out of, and we work on taking slow, small sips, as well as eating strategies. Slow, small, soft movements, beginning to eat on the left side. A lot of people have compensated by eating on only their unaffected side, and we spend some time just gradually introducing the use of their affected side through this gentle midline mindfulness of movement.

All right, so a lot of this facilitation category is about just beginning to use the available muscle through active assistive movement patterns, dampening the strong side and helping to activate some slow movement motor recruitment their affected side. There's a question. For the neuromuscular retraining symmetry, you tell them to just make sure the movement is symmetrical? Correct. It's all about the symmetry between the two sides. If that isn't clear, I apologize for that. I'm gonna really drive that point home in the movement control category as well. So in the facilitation category, it's about symmetry, slow motor recruitment, as well as in the movement control category. A lot of this is about symmetry, mainly, interestingly enough, mainly because that's what people really want, but also because that is what we have learned maximizes motor recruitment on the affected side. That's what we've seen through EMG and ultimate outcomes is that they're more likely to gain movement in their affected side when it's

symmetrical and slow and controlled. And it leads us to the movement control category when synkinesis starts to kick in. They need to learn how to control the synkinesis through these symmetrical movements as well. Okay, so thank you for clarifying that, if I haven't driven home symmetry, I'm going to now as well. So in the movement control category, the patient still has asymmetry at rest, they have the ability to move their face. In different zones they may be able to move their midface into somewhat of a smile. They may have full eye closure. They may be able to partially pucker. But they need to have some ability to move their face. But the differentiating factor now is that they have synkinesis. This is the differentiating factor here. Then it becomes a little more dicey and a little more challenging. So the movement control interventions. Education, education, education.

Synkinesis, synkinesis, synkinesis. They have synkinesis and they have not labeled it, identified it, recognized it, heard of it. So when a patient comes in to me in the chronic stage of incomplete recovery from Bell's, acoustic neuromas, et cetera, and they've had it for years, I spend probably a good 20 minutes going over the phenomena of synkinesis. And I'm gonna explain how I do that in a second. Part of the intervention in movement control is the soft tissue mobilizations, specifically to the affected facial muscles, specifically to the muscles at synkinesis.

I'm gonna show you some videos on the details of the neuromuscular re-education, and how we work very hard concentrated movement patterns to control the synkinesis as they express it themselves. That's the meat of movement control. And I'm gonna explain how we use the concepts of relaxation and meditation in this category. So again, I drive home the point about synkinesis. I use these diagrams, I use the nerve being injured, so to speak, by these axons going to different parts of the face when there's nerve injury. I don't know why I'm having technical difficulties with the pointer, I'm sorry. But you can see that the, thank you, again, how the axons are going to the top of the face and the axons are going to the lower part of the face, just a simplified

two-branch version. And then when there is facial nerve damage, those axons redistribute themselves, so to speak, to different parts of the face. So I use this diagram as well, whereby I'm showing here you have this smile muscle that, the zygomaticus in this branch, this buccal branch goes to your smile muscles to make you smile, but now as that nerve has regenerated, it's rerouted, so to speak, to the eye muscle. So that when you're going to smile, you've got some fibers going to your smile, but now you have some fibers also going up to your eye. And that's when I pull the mirror over to them and I say, oh look, look at your smile. And I explain it to them. They look in their mirror and they're like, oh gosh, I didn't know what was going on. I couldn't explain that. I'll never forget this one woman. She was probably a good 15 years out from her Bell's Palsy, pregnancy-associated Bell's Palsy, and she goes, I've had this for 15 years. Is this a new term?

Because nobody has ever, in 15 years, used that term on me. And here she was with near complete eye closure from her rather severe synkinesis. So 15 years later she's been walking around with this eye closure. I just think it's really important to understand what's happening with your body. Kind of like I say, I wouldn't go invest my money in the stock if I really didn't understand what that business or company did. Knowledge is power. Applied knowledge is power. So again, I spend a lot of time on educating patients about synkinesis, they all get this diagram marked up. We can spend some time asking the patient to identify, what muscle do you feel? Do you feel this pull right here in your smile, when you're going to smile? Do you feel some synkinesis in your chin muscle pulling you down? Well yeah, that synkinetic little muscle is pulling when you're trying to form a smile. It's like that game of tug of war is now going on in your, on the affected side, not just from the unaffected side. But now you've got an antagonistic pull from those synkinetic muscles. Hopefully you get the point of synkinesis. So synkinesis, 15 years of synkinesis leads to 15 years, or six months of synkinesis leads to six months of hyper tonicity, facial tension, muscular changes, lots of changes to those involved tiny little muscles. So what we begin to do

is more aggressive soft tissue mobilization. And I have a slew affecting all of these muscles. I spend time palpating each of their muscles and examining, I guess I didn't say that in the exam. Oh, I palpate all the muscles on examination and identify those tight muscles with them, and teach them how to massage each of those individual tight muscles. So let me just show you a couple of those in this video now. Self-massage to the zygomaticus is taught to the patient by asking them to place their thumb inside their mouth. It is most comfortable that the patient use their right hand inside their left cheek if they are addressing synkinesis on the left, and vice versa, right hand in the left mouth. They are then instructed to place the pointer and middle finger on top of the cheek about an inch below the corner of the outer eye. Gently squeeze the zygomaticus between your fingers and your thumb and slowly drag the fingers down towards the corner of the mouth.

It is best to add some stabilization up at the zygomatic arch by using your fingers and then gliding down towards the corner of the mouth. The general rule is to repeat about 10 times, twice a day, more often is okay, just letting the response to the massage be your guide. The obicularis oculi is a delicate circular muscle encompassing the orbit. The patient is instructed to use the index finger of both hands to mobilize the oculi in four different sections. The fingers are placed on the superior oculi, just below the socket, and the fingers are used to gently stretch the superior muscle fibers. They're instructed to do this about three to five times, and then move to the lateral section of the orbit, stretching out the lateral fibers. Slowly and gently three to five times. Next, the patient's gonna move their fingers to the inferior rim of the orbit and gently stretch the oculi inferior fibers. And lastly, move the fingers more medially and stretching the medial oculi fibers slowly and firmly. Massaging these muscles can help to decrease the ocular synkinesis. Self-massage to the zygomaticus is taught, whoop, sorry. Okay, so there are a handful of massages. I just showed you two of the common ones. And patients, especially with the zygomaticus one, as soon as I put my fingers in their mouth and massage, they feel instantly better. That really wows them. If you're gonna

take home one thing and start in the clinic with your first patient with synkinesis, make sure you're putting your fingers in their mouth and palpating that zygomaticus, and you'll feel that tension. Zygomaticus and the buccinator develop a lot of tension from synkinesis in those muscles. So don't be afraid to get your hands in there and palpate each of the different muscles throughout the face and teach the patient how to individually massage those. I am gonna speak briefly at the end of the session that, for those of you that are very interested in learning more detail about this, I do offer a course at Mass Eye and Ear, where you come in and learn hands on.

So in just the two hours I'm given to teach this, there's no way I can teach everything. So keep that in mind if you're really curious about this. I'm here to give you the best overview I can. As I look at the clock, I have so much more to say and just an hour to do it. So hopefully, let's keep going here. Just also along the soft tissue mobilization, patients are doing a very heavy home program. All of that I'm teaching patients is to be done on their own at home. I spend, like I said, an hour to an hour and a half with patients on their first and second visits, making sure they have a solid home program with all the exercises that we do. And they come back and see me once every two, to three, to four weeks. We're at the hub of Boston.

A lot of people drive hours to see us, and so I've devised this program so that it can be a very heavily home-based program. The patient can do it on their own at home and then progress through the different stages on a more, like, monthly basis, so to speak. It's not that black and white, but that's the general guideline. So neuromuscular re-education is about trying to teach the patient to make facial expressions while also decreasing their synkinesis. I have the little video and I often demonstrate to patients, it's like patting your head and rubbing your belly at the same time. You're trying to do two things that are not natural at the same time. So we teach the patients to do very slow movements, small movements, symmetrical movements with what I call a mind-to-muscle connection. Thus, they're using that anatomy diagram to understand,

I'm trying to move the zygomaticus up into a smile, visualizing those diagonal muscles pulling from the corner up towards the zygomatic arch. We often say, like, moving your cheek balls, while they're also trying to relax, release, soften, or drain the synkinesis. It's this very slow, mindful, almost yoga-like movement to dampen that synkinesis. This is the first time with me that they've tried to even control that synkinesis. It takes, really, hours and hours of practice. Not everybody is in it for this commitment. People easily give up on this concept, but the tough ones can do it and master it. It takes practice, practice, practice. We begin a lot of the time with mirror feedback so that they can get the visual cues, and then decrease to moving away from the mirror, decrease the visual input and focus on their kinesthetic or proprioceptive cues without the mirror feedback. So they're doing, like, a random smile without just staring off into space, so to speak, or puckering their lips without the mirror feedback. So again, it's each of these movements, smile, pucker, rolling their lips inward as if to take a sip, or to say the word pumpkin, pie, pressure, baby.

As I said, they baby a lot with the pregnancy-associated. So we work on these fine movements while also trying to decrease the synkinesis. I typically work begin with the ocular synkinesis, 'cause that's the easiest one for them to feel and to see. And then I begin to tap into the other areas of synkinesis. They have synkinesis in their cheek, in their chin. Those are a littler harder to mindfully let go, but we begin with the eye and move them towards the other muscles once they master this. Again, I tell people this takes lots and lots of practice. I typically tell people to begin doing this about 20 to 30 repetitions a couple of times a day. I use the practice, practice, practice analogy with patients and I say, this is like you're here for the Olympics, you're going for the gold, or you're aiming to be an Olympic athlete or a musician, because a slew of other examples in the arts, but the point is, this is hard work. It takes hours of practice. And like I said, it's not for everybody. But let me show you, let's start with this woman who I felt was very successful. What I'd like you to do is form a smile. Good, and relax. And now you're just gonna take a little look at yourself in the mirror, and we're gonna try

and balance your smile out by relaxing the tension in your eye, and in your cheek, and in your neck muscles. So form a small smile. And at the same time you smile, you're gonna relax the tension around your eye, and into your cheek, focusing on the cheek muscles forming the smile motion. I think of it like your cheek balls trying to form, there you go, that motion. Excellent. That looks really good. And relax. Let's try that again. Keep everything relaxed. Focus on the corners of your mouth and try and bring those cheek balls up towards your corners of your eyes, think about something that makes you happy, being on vacation, good.

And relax. This is the woman's picture, and this is what we worked on bringing her synkinesis from this big smile and synkinesis in her eye and in her neck, and worked on bringing her smile into a more midline, symmetrical position with less left ocular. Again, the pointer. Less left ocular synkinesis and more symmetry through the neuromuscular retraining. Okay. Moving on to the relaxation category. The last category. These patients have severe facial asymmetry due to hyper tonicity from prolonged synkinesis. They're able to initiate some movement, but it's blocked by the severe degree of synkinesis.

So a lot of times patients present with eye closure at rest, pronounced nasolabial folds at rest, and they describe that their whole side of their face, their affected of their face feels like it's shifted. This mask is my screen saver on the computer and it just really speaks to how the degree of synkinesis can make your face shift all the way over to one side. So in this category of relaxation, the patients with rather severe synkinesis, and they've really gone with this for quite some time with no ability to do anything, or no tools to take care of it, we begin their session with a lot of patient education explaining why their palpebral fissure at rest is so narrowed, why their cheek is so pulled up and pronounced on one side. So again, I use that diagram and explain that. And we do more aggressive soft tissue mobilization into these muscles. We work on that zygomaticus, the oculi muscle, moving into the forehead where they place their

fingers on their eyebrow and on their scalp, and they really work on stretching the frontalis muscle into a more mobile degree. And they work on their platysma muscle, that pulling down sensation that they may be getting from the platysmal synkinesis. So very aggressive soft tissue mobilization. The other thing I begin to do with patients is to teach them to simply be at rest and try and breathe into their facial muscles, and become aware of the degree of tension they have in their face at rest. Then, begin to mindfully try and release and relax each of these individual muscles. It's meditation, it's mindfulness, it's yoga-like. And unless you have synkinesis, you don't really, maybe, grasp onto this. Or unless you do yoga.

But once you try it with these patients, it is very powerful. I've attached a mp3 file of my voiced dubbed to some yoga-like music that is specific to facial synkinesis. It's 10 minutes, it's mindful relaxation. I use the diagram and I ask the patients to just keep that in mind. Think about the forehead muscles, think about the ring of muscles around their eye, and try and relax, release, let go of the facial tension in each of those zones of their face, and try and bring that face to a degree of homeostasis. After their facial muscles have relaxed and have, they feel like they have some degree of control, we will add in the neuromuscular re-education.

Really, now that their face has come to this level of relaxation, or level of neutral, they can then begin those movement patterns where they are trying to, as I said, let's go over this again, think about, as they move into the smile, they can relax their eye muscle just a little bit more, trying to control and dampen, relax those overactive muscles. Quiet those down at that small movement pattern. Eventually, and everybody says, can this carry over into, oh, I'm gonna give a presentation tomorrow, or I'm hanging out with my friends. I have a young guy, he's 30, he has Bell's Palsy, I'm telling him to chill, do small movements, keep that synkinesis in control. He goes, "Hey, Mara, that's just not my personality." And I get that. I would never change somebody's personality. But I explain to patients that I'm asking you to practice this movement.

Lots of repetitions with the goal of neuroplasticity. The goal that, over time, these movement patterns are gonna become more habitual and take over so that your brain knows to dampen that synkinesis through lots and lots of practice. It's like swinging the tennis racket or the golf club. When you're first learning how to swing the racket, you don't necessarily have that right motor program. Without thinking about it, takes lots of learning from those learning motor stages. Is it cognitive, associative to automatic stages of learning, that's what I explain to patients. This is a process. But if that patient is very gregarious and very enthusiastic, and lives their life in that full expressive mode, I validate them but I also say, we don't have to be 100% expressive 100% of the time. Yes, to that 30-year-old, when you're going out with your friends on Friday night and hanging out where at a bar and what not and cracking up, that brings you joy, yes, don't worry about your synkinesis.

But the other 6 1/2 days of the week, I really want you thinking when you're teaching, to keep your face in somewhat of a control. When you're trying to make a point to a student, yes, you can go to that end range of movement, and that synkinesis will kick in. But the majority of time, we are functioning at that mid-range level. So we are teaching people how to control at the mid-range level, just working a little bit more on bringing it up a notch.

And I'll explain the second, how the role of Botox adds to that next notch, so to speak. So in summary, what we do for all stages, they all kind of overlap, but we spend a lot of time, as I said, on the education piece, explaining how the muscles work, explaining what synkinesis is. Every patient within the movement control and relaxation category gets aggressive soft tissue massage, we work a lot of time on neuromuscular re-education in each facilitation, movement control, and relaxation category, with the goal of mindfully dampening the synkinesis. This is the hardest part. We do functional retraining. A lot of patients have figured some of this out, but we correct them, work a lot on midline, teach patients to begin to eat on the other side. One thing I didn't

mention but people do, develop or will experience synkinesis when eating, when you're bringing your lips together. Not because of chewing, but the bringing your lips together and moving the food around in your mouth requires a lot of lip approximation that can foster synkinesis. So we practice eating slowly, softer foods, where that does not necessarily exaggerate or bring on the synkinesis, so to speak. So I have little snacks and food in my room to practice that and how we can work on dampening the synkinesis during eating and drinking. And then, lastly, we talk a lot about relaxation strategies in that relaxation category, primarily the people with severe synkinesis. I'm a huge believer in mindfulness, and meditation, and yoga.

I do recommend that to almost everybody just because of the mindful benefits of yoga and meditation. And as you're healing in any stage of a disease or specifically, facial nerve injury, there is a lot of research to support how mindfulness and meditation helps with healing. And last but not least, I do often wear the hat of a psychosocial supporter. I can't call myself a psychologist, of course, or a psychiatrist, of course not, but I do feel I've worked on being empathetic, and understanding, and validating patients in all stages. Patients often cry in my office because I'm the one listening and spending the most time with them.

And it is not typically a cancer diagnosis, but it is a life-altering diagnosis, and these people are really struggling to accept their new facial expression, and I am there to support them, and I think help them. I'm very positive, if you haven't felt my energy through this. I am one to say, let's get through this together. You are at the, remind people they're at the best place in the country. We are here to support you. We have a team of people here to get you better, not only physically, but mentally and emotionally. And so I wanna kind of summarize that point with this favorite, so to speak, patient of mine. I have a few favorites. They're, of course, my favorite because they work really hard. I treat everybody equally, but you get that secret favorite label if you've worked really hard. We all admit we like those people that work hard. And so here is a young

woman who came in to me with left-sided facial, left-sided Bell's Palsy related to pregnancy. So she had it in her third trimester. She came to us four years ago. I'm sorry, four years after the Bell's Palsy, just learning about our center through an internet search. A lot of times people are like, oh, let me just do a Google search and see what comes up, and they find our Facial Nerve Center. A lot of people find us through a friend of a friend that had Bell's Palsy years later, blah, blah. So nonetheless, she found us through the internet. She had had Bell's Palsy for four years by the time she got to us. And the smile on your left is the smile that she was doing. And we worked really had through physical therapy and Botox to, as you can see, dampen her right side and work to bring up her left side so that she's smiling with a little bit more of her teeth showing, what we call a dentitious smile.

And you can see, also, she worked on dampening the ocular synkinesis through lots of practice. You can also see that her synkinesis in her neck is much better as well. So you can see the change from the first photo to the second photo. And she worked really hard. She went home and practiced this every day. She had three children. And you can see she practiced really hard. And when I said, you're one of my favorites, you work so hard every time she came in every two or three weeks, she was making progress, she was feeling good. She goes, what do you mean? Everybody doesn't work this hard?

And no, you all know that. Not everybody works hard. But for those that do, there is an outcome. The point, last point I wanna say is that, get up, get dressed, and get going. And by the third month working with this woman, I really encouraged her to start getting out. Because she had lived for the past four years with her hair pulled back, staying home, not really socializing anymore. And she, I had the courage to say to her by, like, month three, I'm like, listen, you have the most gorgeous hair, and the most gorgeous eyes, and a really nice figure, so to speak, why don't you start showing all of that off in addition to your new smile? So, like, encouraging, really, the whole patient,

to, like, put themselves together. And she has made a really nice transformation. She even lost some weight, and just was feeling really good about herself and made a difference and feels like, she sends me emails, like, you changed my life. So yes, that's the other reason she became my favorite patient, but she worked really hard and put her whole self together. And I think we play a role in supporting that. You can't just treat the patient in isolation. So I am going to stop bragging about her and move on to the research that exists in the literature. And just briefly, I've given you references. I'm even going to update the references that are available, I've updated that. So look for that. But the point is, there's not a lot of evidence to support what I do, what we do in the chronic stage.

There are a handful of reports from the Cochrane database that was published in 2011, and in the next slide, there's a few more research that shows physical therapy in the chronic stage, or facial rehab in the chronic stage, makes a difference in Sunnybrook scores and in FaCE scores. There is no evidence to show that electrical stim makes a difference. So one of the take home messages is we do not use electrical stim, there's no support in it. And furthermore, the concept of using electrical stim on those nerve to muscles is that you're failing to teach the patient to recruit those individual muscles at a balanced level.

You're failing to teach them about synkinesis. And so we do not use any degree of electrical stim. Somebody's bound to ask that. And there's no evidence to support the outcome, the acupuncture. But you can see from this more updated journal article, there's a handful more published in 2014, showing the results of mirror feedback, biofeedback, and what is refereed to in the Netherlands as MIME therapy. This is often a very quoted article by Kareen Birskins in the Netherlands, MIME therapy is another word for, very similar to neuromuscular retraining. MIME being like the patient's expressions. So I'm gonna just switch gears because there's a lot of review for you to do on your own of the research. But I wanna make sure I get to Botox and to the

surgery before we end for today. So what we published, this was back in 2005, I believe, but what we showed in this article written by our lead doctor, Dr. Hadlock, is that we work really hard on the combination of physical therapy, medical therapy, which is the Botox, and the surgical piece. And really, there is a really strong overlap in our clinic on the role of all of these, physical therapy, Botox, and surgery working together. So yes, I'm unique. I am very fortunate to work at the Mass Eye and Ear Facial Nerve Center where I have probably the best surgeon in the world. She's on the cutting edge. And again, I invite people to come spend a day with us and take our course, learning a lot more details. But we've evolved. The surgeries are changing, the Botox is changing. So I'm just gonna give you a brief overview of how we work so closely together as a team.

So Botox. Botox is used. That should say Botox for the synkinetic face. I am sorry. That's poorly worded. Botox for the synkinetic face. Botox works at the neuromuscular junction to partially paralyze the muscles that are synkinetic. All right, so think about those muscles that are overactive. They are working on overtime. They're hyperactive. They're moving into ocular closure, a narrowed palpebral fissure, or the neck is pulling down. And so those are overactive muscles. The eye, the oculi, the chin, the depressor anguli oris, and the neck, the platysma muscle.

There's also some synkinesis in the buccinator, in the zygomaticus, in the frontalis, in the corrugator. Almost every muscle in the face, in the affected side, can go on to develop synkinesis. As you study faces, you'll be able to identify them more. But the most common muscles that we treat, most common, are the obicularis oculi, the mentalis, the depressor anguli oris, and the platysma. Because these are the muscles that are counteracting movement. We also do weaken the contralateral side on occasion. We may weaken the forehead muscles on the unaffected side, or we may weaken the depressor labii on the other side, with the goal of making the patient appear more symmetrical. So if they have not regained the function of their forehead in

an attempt to look surprised, or if you're like me and you speak with your eyes a lot of the time and your forehead muscle goes up a lot of the time, we may weaken your right side so that you don't appear so asymmetrical. So that's one of the rationales for weakening the other side. But again, insurance doesn't, insurance typically covers Botox to the synkinetic muscles typically because it's more aesthetic does not typically cover the contralateral side. So Botox lasts an average of three to six months, okay? So patients that have synkinesis need to continue to get, come into our clinic and get Botox on average every three to six months. Okay? Now, here's the role of physical therapy. We, at the Facial Nerve Center, work very closely with our doctors to make sure that the patient has a really good understanding of their synkinesis. Remember I told you that patient that had come to us at year 15 after having this for so long? We see a lot of chronic patients.

And if they come into us and they have no understanding of how their face is moving, I have really been instrumental in telling our doctors, please give me three months with these patients to get them to understand how their face is moving, how they can learn to control, through neuromuscular retraining, through mindful relaxation, through soft tissue massage, how they can be empowered with their own tools to release and relax some of that synkinesis.

Then, after they've been committed, so to speak, for about three months, then we will introduce the Botox to them. So I work very closely with setting up that timing of when they're ready to receive the Botox, okay? If it's an acute patient, they started with me in physical therapy at that three month after Bell's, or Ramsay Hunt, and then I've been able to identify that synkinesis started at about that four to six-month mark, we will give the patient Botox as early as six months after the development of synkinesis. They have to get to this full evolution of their synkinesis before we will initiate the Botox. One of the doctors believes that if you give Botox too early in the process, that that will inhibit neuronal or axonal regeneration. So we wanna make sure that Botox is not given

too early in the process. Okay? So the other thing that we do along these lines is, after the patient gets Botox, we ask them to come back to physical therapy two or three weeks after their initial Botox and go over what the outcome was of the Botox. So you got Botox to your eye, to your oculi, and into your chin, and into your neck. How does that feel? Do you feel more control over your synkinesis now that that Botox has helped you relax, partially paralyze that muscle. How does that make you feel? And at this point, we may do a repeat Sunnybrook, we may do a repeat FaCE instrument to see if they're feeling better as a result of the Botox. And actually, I spoke a little too quickly. We do that even after they have the physical therapy. So oftentimes, in my ideal world, I do the physical therapy for three months, have them do a repeat Sunnybrook or eFACE examination, a repeat FaCE Instrument, and show those changes, then do the Botox, and then have them do the questionnaire again so we can be measuring some of those changes.

And I did a study about that. So let me show you that in just a second. But here's just a clinical example of an older woman who came to us in that rather severe stage of chronic synkinesis, and she had severe ocular synkinesis, severe mentalis, what we call dimpling, that kind of puckering of her chin muscle, and she had synkinesis into her platysma muscle. You can see a little extra banding into her platysma muscle. So we worked in that relaxation stage of relaxing and trying to do some more symmetry of retraining, neuromuscular retraining for symmetry, but she really needed that Botox because look at the severity of her oculi. So after just about two or three months, we got her in and had her receiving the Botox to her oculi, to her chin, and into her neck, and she is able to more freely express herself without the impaired synkinesis. So this is an example of that impaired vision. I started out by saying this poor older woman is gonna lose her vision if her eye keeps closing when she's laughing, and smiling, and talking. That runs the risk on that left side of impaired peripheral vision while driving, and impaired vision with walking, leading to a risk of falls as you get older. So again, we have to really take into account all of their impairments and the whole of the

patient. So she benefited nicely from the Botox. There's a plethora of research on the effectiveness of Botox, on quality of life, and I've provided a resource for that. And here is the study that I alluded to, that we all did at Mass Eye and Ear back in 2010. It's what we call the Comprehensive Facial Rehab Review of our patients. We looked at, we did a retrospective review of the patients. There were about 130 patients over five years. And again, that was in 2010. I could probably triple that study now. But what we did show was a significant improvement in the Sunnybrook scale and the FaCE Instrument when patients received both physical therapy and Botox.

So it was really the combination of the two that we were able to track. Again, this was a retrospective review of the combination of all of them. I had set out to try and do just physical therapy and then just Botox, but as you know, physical therapists are not really good at being clinicians and researchers at the same time. So I had lots of data and we did a kind of overview of the outcome based on the data that I had collected. And then we did report that we were able to pull a few people back a year or so later after doing their physical therapy, continued to do their facial rehab massages, and neuromuscular education and relaxation.

Continue to do this, folks. It's not like you have diabetes and you can ignore your sugars after the first year. This is your chronic problem. You need to adopt this, or adapt this program as part of your lifestyle like you would, unfortunately like a diabetic or celiac. This is your problem. You need constant attention to this. Or even the orthopedic, the back pain patient. We need to do a better job as clinicians, educating people how to manage their long-term problems. Okay, so what we were able to show was that the people that did continue to do some of these treatments on the long-term, showed a continued maintenance on their FaCE and Sunnybrook scale stages. So I refer to that a lot. Okay, I know I'm going quickly. I'm going to take about 10 minutes to explain the exciting surgical reanimation that we are doing. We, I love when I say we. When the surgeons are doing at Mass Eye and Ear, and a handful of surgeons

throughout the country to help people restore their smile when nerve regeneration is not an option. So, as I said, Dr. Hadlock and the others at our hospital, Dr. Jowett and Dr. Banks are on the cutting-edge of facial reanimation. This gentleman has, again, one of my favorites, has right facial flaccid facial paralysis due to tumor excision. And so when that parotid tumor was excised, they had to sacrifice the facial nerve, which means he was left with no nerve input. So as a physical therapist, there is nothing that I can do to help rebuild that smile that he wanted. Yeah, I helped him in that first stage, the pre-surgical stage, make sure he was comfortable eating, make sure he had proper eye care. But we got him right in when he presented for surgical reanimation.

So let me show you a little more detail about the smile reanimation that we do here. Sorry, I'm gonna just go back. So the two main surgeries. Main, there's a handful. But the two main surgeries, and I don't want you to fully grasp this today, but just have a really nice basic understanding, is that they do what they call a nerve to native muscle, or a nerve to free muscle transfer. The first transfer is what we call cross-face nerve graft, where they're taking the unaffected facial nerve and connecting it via the sural nerve from the leg, the thigh, snaking that sural nerve all the way over and connecting it, this is the red line, to the affected main trunk, or the buccal branch of the facial nerve on the affected side. We call that a cross-face nerve wrap. I'm simplifying it.

But they're using the unaffected facial neuronal input, sural nerve connection across the top of the lip, and connecting it to one of the main branches of the facial nerve on the affected side. The goal of cross-face nerve grafting is to generate what we call a spontaneous smile. You smile on your unaffected smile, on your unaffected side, that will send input to your other side to get a spontaneous smile. Option number two is to then, or to alternatively, and/or take the masseteric nerve, which is a small but powerful branch of the trigeminal nerve. Okay, so the masseteric branch of the trigeminal nerve and connect it to the main trunk of the facial nerve on the affected side. So it's the ipsilateral masseteric nerve connected to the main trunk of the affected side. So the

first one is the contralateral facial nerve, the second one is the ipsilateral masseteric branch of the trigeminal. So the trigeminal nerve is your biting nerve. You need, then, to bite down to form your smile. Sounds crazy, right? So hi, nice to meet you, but I need to bite down and smile in order to generate that, okay? I'm gonna show you that 'cause it's kind of interesting, very cool. So why do we do one versus the other? That's a complex answer. There's chapters and courses given by the surgeons on how they decide this. But in the short answer, what happens is, within the first year of nerve damage, you have the option to do what we call nerve-to-native muscle. Because that nerve is still viable and those muscles are still viable to send axonal input to. The cross-face nerve graft is rather weak in its axonal input. It has a long way to go to get input.

The outcome and benefit of that is very low. In order to get a meaningful smile from that cross-face input, the success rate is only about 60%. So what we are doing, again, we, they are doing a combination of the spontaneous smile with the biting smile, so that you're maybe getting a spontaneous smile, but you're also getting this strong axonal input from the masseteric nerve to generate your smile. So they call that a dual innervation.

They're doing both a five and a seven connection to generate that smile. Okay? So we call that nerve-to-native muscle. Now, if it's out of the window of viable muscle and viable nerve, what the surgeons are doing is taking free muscle, nerve-to-free muscle. Typically the free muscle is called the, typically the muscle of choice is the gracilis muscle in the thigh. And so they're taking a small little incision out of your thigh, and putting it in your face, and giving you a new little muscle to help you get your smile again. So we can take some cross-face nerve input, snake that across and get some spontaneity from your unaffected side to your affected side. And then what they're also doing on free muscle is driving it, also, by the fifth nerve. Again, so you have to learn to bite down to form that smile. It's a little awkward, a little atypical, but if you're left with

flaccid facial palsy from a tumor, or trauma, or from what I showed you in the beginning, Moebius syndrome, or neurofibromatosis, you can get a really nice smile by some of these surgeries. It's not perfect by any stretch, but it is a smile, and patients are thrilled to be able to express some emotion on one or both sides. So again, it's spontaneous by the cross-face, a bite-driven smile by masseteric input, and we call that, we just termed that a gracilis by cross-face nerve graft, or we call it a gracilis driven by five for the trigeminal fifth nerve, the masseteric branch of the fifth nerve. Or our surgeons are really emphasizing what we call this dually-innervated gracilis, where they're gonna get some spontaneity, hey, how's it going?

I'm happy to see you, I'm laughing at your joke, and you get a little smile input, but if you wanna smile at your daughter's wedding, or be in photos where you have a more dentitious or exposed smile, we're gonna ask you to bite down to smile. So it's a combination of the two. So that's a very complex topic, simplified in five minutes. Let me show you, hopefully you have the video. Please tell me you have the video. This is just a graphic picture of the gracilis muscle being put into. So do you have the video that says five to seven?

Okay, I'd like, oh, good, okay. So good. So, ooh, I'm pausing this. So just take a little. Let's see, I just wanna pause. And put it in your. Can I pause it? Okay, so before I show you this video, the bite, this is a video of a gentleman who underwent direct five to seven. The rehab, I've been spending a lot of time trying to define and describe this rehab process. But the concept is that the patient needs to learn to bite down to form their smile. Easier said than done. It's a very atypical movement pattern. We're not used to doing that. What we did is we've come up with is putting something soft between the back molars and asking them to create the tension that they have between their teeth and form that little bit of a smile as they bite down. But the ultimate, ultimate concept, ultimate goal being that they don't have to bite down so firmly to generate their smile. So we're weaning away from the intensity and pressure

to form their smile by biting. And maybe using just a little bit of the teeth together to form that smile. So watch, I've been working with the gentleman probably about four months by the time I showed this video, but this is just a simplified version of a culmination of his rehab. Between your teeth, and bite down and appreciate the amount of movement you're getting when you bite down in the corner of your mouth. Excellent, and relax. Now what I'd like you to do is bite down as strongly as you can, and at the same time you bite down, form a smile with the corners of your mouth going up together. Excellent. As strong as you can. Excellent. On a scale from zero to 10, about how hard were you biting down?

- I would say, probably nine.

- Okay, great. Now, what I'd like you to do is, again, look at yourself in the mirror, and form a small smile by biting down on that little piece of gum, but put a little less pressure between your teeth, maybe dropping it down to like a four or five out of 10. Excellent, and try to hold that smile. Good. Nice, and relax. This time, even though the gum is in your mouth, just put your teeth together and form a smile without actually clenching down, but just try and form a small little smile. Good, and relax. Nice. Nicely done. So very little pressure on that last one?

- Yes.

- [Mara] Now what I'd like you to do, is I'm trying to teach you to incorporate that biting smile to become part of normal spontaneous conversation.

- Okay.

- So sometimes when you go, say, hi, it's nice to meet you, or can I have a cup of coffee, can I have a small coffee? So try and say, hi, it's a pleasure to meet you, and at the end, simply bite down and form a smile.

- Do it?

- Yeah.

- Hi, I'd like a coffee, please.

- [Mara] And then a gentle bite down to smile. There you go. Let's try that again. A little more--

- Fluid.

- [Mara] Fluidly.

- Hi, I'd like a coffee, please.

- [Mara] Excellent. And relax. So you can see, even just at rest, looking at his photo right here, hopefully you could see that was a culmination of a few months of practice where I began just by having him bite down and appreciate by biting, it moved the right corner of his mouth. And then, he started to work on grading the tension and the symmetry between the two sides of the face to form the smile. And then he had to start integrating stage three, integrating that smile into his speech. But hopefully you could appreciate that, like, when he's just talking, "hi, can I have a coffee", he had some problems keeping those lips in control. And then, he couldn't really smile as he was talking. So then I have to teach people to, like, be pausing and using that smile. So I actually call that stage, like, the coffee smile. So that they're really taking time, like,

after they order their coffee, let's say, is to form that smile at the end of the sentence, or put that period at the end of the sentence and integrate that new smile. So, and then the next stage is to see if that can become more automatic through some more cortical remapping and neuroplasticity. That would be great. So you could see that this is not an exact science, and it takes a lot of therapy, it takes a lot of practice. But here, this lovely gentleman is at least able to socialize and form that social smile out in public. Okay? So yes, I do have a few more slides to summarize the case study. So at this point, we have just a few more minutes until two o'clock, but I am willing to keep going through the case studies and go through and be available for questions. So let's keep going. Unless, actually, plus I'm just gonna ask before I move to the case studies, if that's okay, if anybody has some questions? Are there any questions? Wow, you're either, I'm either that good, or you're that confused. So I'm gonna go with I'm that good and keep going, hopefully, through. So stick with me if you haven't logged off. So, oh a couple questions came through. Do the stretching of the eye, obicularis oculi upper lid region is made on a horizontal, hold on, sorry. Do the stretching of the eye obicularis at the upper lid region is made on a horizontal way, and the vertical stretching? I'm not sure I understand that, so I'm gonna move on. Maybe Kalista can clarify that. Is there a particular biofeedback machine that you use? Yes. I use, oh you would answer that, you would ask that and I can't name it right off the top of my head. Oh my, can I get back to you? I believe it is, oh my, I'm having a brain freeze. I'm so sorry. I just used it the other day. She was treated four years after Bell's Palsy and it's still improved quite significantly. So yes, that is the meat of my clinical practice. In fact, I love those people because they've been told for so long, four years and 40 years, that nothing can be done, and here we are, at the Facial Nerve Center, going yes, I can help you. And even just that little bit really makes a difference. They can change their smile two to four millimeters, change that synkinesis two to four millimeters. They're happy. So yes. In your experience, after a Botox injection, do they need repeated Botox? And yes, the answer to that is yes. We typically do repeated Botox injections for years. I would say the average patient is seeing us for Botox on an average, this is just my

guess, of two to five years. My experience is that after a couple of years, people do plateau with respect to the benefit they got from the Botox, and I think those are the people that really worked on my continued facial rehab, that they kept integrating what we taught them with the Botox on board, and so their brain neuroplasticity shifted so that they could minimize that synkinesis to the best of their ability. So the Botox is the icing on the cake and they can keep getting it forever, really, as long as they're getting a benefit. Some people do have a immune response to it, and develop an immunity to it. And we do try Botox B myobloc for those patients. So some good questions. I think, if you wanted to clarify that question about the eyelid. I'm gonna try and just think what I clarify is that when you're taping the eyelid shut, I tape it horizontally across the opening, or the aperture of the eye, horizontally, because I feel that's more comfortable, but they stretch the levator palpebrae superior because that is the vertical muscle that holds the eye open, and that's the muscle that gets stiff. So that's the muscle that needs prolonged stretching. I hope that clarifies it for you. Okay. Thank you, good. All right, so let's just summarize. The rehab for this lovely little girl, again, one of my favorites. This little girl was eight at the time she came to the Facial Nerve Center. She was born with left-sided facial paresis, and worked with me up until she was 16. And she would come in once every three to four months and work on her smile with me. She was extremely shy, and at eight, and I was just really beginning this clinical practice. At eight, I wasn't quite sure if she was really that shy, or was she shy because she had facial palsy? We'll never really know. But nonetheless, she came in at eight with facial paresis. I got to know her, she was an excellent student. I like to know what their hobbies are. She was an avid horseback rider, but she complained, or her mother was very concerned about her corneal health, her asymmetrical smile. The mother reported that she noticed the daughter spoke out of the right side of her mouth. And on exam, she presented with a 24 out of 100 on her Sunnybrook Facial Grading Scale with very little ability to initiate, she had one to two degrees of movement on the Sunnybrook Facial Grading Scale. She had no synkinesis 'cause it was a congenital abnormality due to impaired facial nerve development in utero, as opposed to some

patients congenital are results of a forceps delivery where there's damage to the facial nerve, and they regenerate with synkinesis. So she had no synkinesis, so we classified that as an in-utero development issue. So I categorized her as a facilitation type of patient, so to speak, and her goals were to improve the Sunnybrook scale, improve eye closure, improve the symmetry of the smile, and to teach her some compensatory strategies for articulation. Again, I'm dealing with a very shy little girl. But as you can tell, I'm very animated and a lot of fun. I bribe with a lot of candy, and stickers, and whatnot to keep them motivated. I have lots of candy in my drawer. So for her intervention, the education piece was really geared towards her mother, but as she got older, I really spent a lot of time explaining to her how her face moves. So we used the facial diagram and actually started to color in some of those muscles and showed her that the zygomaticus is the muscle that we're trying to smile with. We called that the z muscle. And so I said, "Try to activate that Z." And I showed her some strategies. We used some things like stickers on her face. See if I have that one. I'll show you that in just a second, to help her grade the movements. I used the example of balancing the smile out with the tug of war example.

I said, your right side has the really strong, strong kids on the playground, and your left side has those smaller little kids. And so we wanna make this an equal game of tug of war, so you wanna ask those strong kids to like, peck off a little bit, and let's ask those weak kids to really work their hardest against a little less of a strong team, so to speak. You get my analogy. And let's try and work together and have that strong balance between the two sides. Okay? So we did a lot of analogies and balance practice. I did the eyelid stretch on her. She hated this. Her mother started out doing it for her, but again, as she got older over the years, she developed the maturity to follow through with this. One little tip on those of you that are doing the eyelid stretch is instead of using the fingers on the eyelid, you can use an eyelash curler to clamp down on the eyelashes and use the eyelash curler to pull down. So you'd be using the eyelash curler where she's using her right hand, and then the eyebrow to, the hand's on the

other side to pull the eyebrow up. So she go in the habit of doing this a few times a day. Not always everyday, but I said, do the best you can. Who can do something everyday? So I'm a little laid back about the frequency of things. I just want kids doing, participating in this. So again, back to the symmetry and the active assistive exercises. We began with active assistive range of motion exercises, using her fingers, we worked on progressively doing active motion with the mirror feedback. We did introduce biofeedback with her. I promise you I'm gonna get back to the type that I used. Can I have the pointer? Thank you. So we used biofeedback on the, on her affected muscles. And I would put the biofeedback there, and we'd get the screen to move, or to beep so that she knew that she was activating the right zygomatic muscle. So that kept her really interested on some days. The other thing I do with kids, they love it, is I put stickers on their face, and so you can see that, again, where's my pointer? Thank you.

So she has stickers on her right and her left side of her face, this little girl, and she's trying to keep those stickers in the right place, equally, as she tries to form a smile. I'm sorry, this little girl had synkinesis, so I did put a stick on her synkinesis and told her not to move that. But in my case example, my patient did not, but I just wanted to show you the sticker use because I love that, and the kids do. And so some other tools I use for the children is I do some oral motor exercises using bubbles, the soap bubbles. I use straws. I say, oh, this is your time to go get a milkshake at McDonald's on your way home and practice using that straw right in the midline. So she was doing smoothies and milkshakes to work on her oral motor control. This one has a lollipop in her mouth. That's why I'm so popular, 'cause they always love the Dum-Dum lollipops, to work on oral motor control as well. I teach them tongue twisters to practice their articulation, and decrease the strong side and activate their affected side. I have discovered a few games on the iPad that use oral motor control. This little boy is using a flute online, where he's blowing into the sound piece. So he's working on lip approximation here, and then using his fingers to play the flute. So that was a huge hit.

So my girl, again, I worked with her in the very beginning of time. I didn't have all these photos available, didn't know I'd be lecturing. So these are a culmination of some photos that I have. But here is this beautiful girl grown up. She went from a Sunnybrook Facial Grading Scale of a 24 out of 100 to a 42 out of 100. And like I said, she grew up coming to see me quite a few times a year, really working on her exercise program, and learned to just change her smile, her photo-ready smile with really just physical therapy.

Great success story. I really wanna reach out to her. She's probably in her early 20s now, and just see how she's doing, but I think this was age eight to age 16. But you can even see with her smile change, how her eyes even look better. And she doesn't have that wide eye. She's able to bring up her cheek on that side, which gives her a little bit of a lift to her lower oculi to balance her out a little bit more. So she really made a nice chance in her appearance. Just to show you, we just have a few more minutes, but just to show you the difference in what facial rehab does, or can do. Another congenital facial patient, this little boy, adorable little boy, but his degree of facial nerve involvement from congenital facial paralysis is severe. He had no movement in any zones of his face.

So he's a right-sided, she's a left-sided. But because he had nothing there, he was unable to smile at all, he opted, after meeting Dr. Hadlock, to go right into the surgical reanimation. He opted for that muscle transfer. He has a gracilis muscle in his thigh. He's a kid, a boy, he thinks that's the coolest thing. And it's driven by the cross-face. So it's driven, when he smiles on the left, he will smile on the right. So it's not huge, it's not as big as it is on the other side. There's that axonal input that I was talking about. He's able to generate a small smile, but that's just simply from the cross-face nerve graft. He wanted spontaneous smile, he wanted to be able to smile on one side and get something on the other side. So he opted to just get that cross-face nerve graft, and he's doing just great. He is adorable. But I also had to work with him. I had to work

on teaching him how to dampen that left side. You can see it's not such a big smile, but at least he's got a nice symmetrical smile to him. Okay. So case number two is, again, I don't know why four is the lucky year, but a lot of people come in four years later, honestly. I guess they realize they're not getting better. But this is a case study of a woman who worked very hard. She's a 62-year-old female diagnosed with right-sided Bell's Palsy four years prior to coming to the Facial Nerve Center. So on exam, we knew she had an incomplete recovery, a, 'cause she was four years out, b, because she had synkinesis.

And I consider that rather severe synkinesis. Periocular synkinesis, mentalis dimpling, platysmal banding, all of that hemi-facial synkinesis. In fact, the doctor, Dr. Hadlock calls this a frozen face, or a pretzel face. It's really all-encompassing on all of those right-sided facial muscles. So she really did not like the asymmetry of her whole facial expression. She was bothered by the involuntary eye closure, and she had developed a lot of facial pain. I remember this woman, socially, also said that she told me she doesn't really go out that much anymore. To the point where she doesn't even really smile at people when she out for her walk. She's like, I just stopped looking at other people.

That broke my heart. She's just a great person. And so, again, there's that psychosocial support. After I worked with her for quite some time, one of her exercises was to get out there and start smiling at people. That was month four. But we did begin with patient education, really explaining those nerves, and those muscles, and why she's developed the periocular, mentalis, platysmal, zygomatic synkinesis. And I began with relaxation for her. I was like, listen. Let's just meditate for a moment. Take inventory of how your facial muscles are. Relax, let this go. And not until did I bring attention to it did she have an awareness that she was in that resting, like, shifted position. It's kind of like we all have those friends that hunch over. And when you just put your fingers on their back and say, sit up a little straighter, I say that to my son all

the time, sit up a little straighter, they don't realize that they're doing that until they're brought attention to it. So let's bring attention to that tension and teach them how to mindfully release it. It can be done, it can be done. It's not easy, but it can breathe through that tension. We then introduced aggressive soft tissue mobilization. Her hands were in her cheek on appointment number one, inside her zygomaticus, stretching the zygomaticus, the buccinator, working on, then, massaging the platysma, down the side of the neck. I have the patient put their contralateral hands, so if it's a right-sided synkinesis, they use their left hand across their face to use the web space of their hand, sliding it all the way down from the mandible, all the way down to the platysma and back up.

So they mobilize all of the synkinetic muscles. So we worked really hard on doing the relaxation techniques, the soft tissue techniques, the neuromuscular re-education, and then we introduced the Botox to her. We did do the neuromuscular, and that's where I showed you the video on her practicing just that with the beginning stages with her small movements, with conscious control, trying to relax, repeat, dampen. As soon as the patient looks in the mirror and is aware of that, they can begin to gain control. Don't let that eye move. Just a small amount of movement. I use this little linear graph. I say, the bigger you move, the more synkinesis you get.

And I draw, like, a linear graph. And I say, so right now we're gonna start down in like that 20, 30% of movement so that your synkinesis stays just under the radar. Then when your brain has control over that movement and over that synkinesis, push your excursion to 40%. And so I give them a home program where I'm like, you're just at 30% of lip approximation. Don't go full 100%. Try and bring those lips together. Because that synkinesis is going to kick in and rob you, antagonize you, take over that movement pattern. And so I teach people to really understand that antagonistic pull and try and relax, let go, and then push that movement a little bit further. Lots of repetition, lots of repetition. Because we know that repetition forms neuroplasticity, or

neuroplasticity happens because of repetition. So here she was four months, four years later coming to us, and after a year of combined physical therapy and Botox, she was able to change her smile to be much more symmetrical with control of her synkinesis. So you can see her periocular synkinesis went from severe, I would say to mild. Okay, still with some platysmal banding, unfortunately. But then, and that's what we worked with adding some more Botox to that area. But here she was doing a maximal pucker. You don't need to do that functionally at all, but look at how much synkinesis she was getting throughout. And we worked out best that we could dampen that left side, still be functional with your pucker, and then really control how much you're moving. So you can say Peter Piper. You can drink from a straw.

You can blow out a candle and kiss your partner with this degree of lip protrusion, but look at much less synkinesis. So really, such great symmetry, and such great symmetry and less synkinesis. And she did a lot of massage, if I didn't emphasize that enough, and she reported less facial discomfort on the FaCE Instrument, and improved self-confidence with eating in public, and ultimately started smiling at her random strangers.

So I will take questions. That's about it. I'm so excited. It took me 20 more minutes to tell you what I'm so passionate about, I could go on for hours. To that end, I am going to put up during questions, and it's in your slide, the group of others that I work with, 'cause alone we can do so little, together we can do so much. I work and I wanna give credit to Dr. Tessa Hadlock who I met, really, about 17 years ago right after the birth of my second babu, and was really excited to get started on doing something new in my professional practice. And she called me and said, "Hey, you wanna "learn something new and treat some patients?" She called our physical therapy department and I raised my hand and said "Hey, "I wanna learn something new." So I've been with Dr. Tessa Hadlock for 17 years now, and along with Dr. Hadlock is her fellow, Nate Jowett, Dr. Caroline Banks, they're both fabulous. And Dr. Hadlock could not do what she does

without her physician assistant, Kerry Shanley. Huge, huge part of our Facial Nerve Center. And the other physical therapist, we've grown the clinic so much, my colleague, Jennifer Baiungo, she works 10 hours, I work 20. So between us we are 30 hours at the Mass Eye and Ear Facial Nerve Center. So I am Mara, here's my email if anybody has some questions following this, we also are updating our website. But more importantly about contacting me, you are welcome, for a small fee, to come and observe, or participate, I should say, in our facial nerve clinic. We do a course there. That was what I was referring to for the small fee. You can observe at any time for no cost, so let me clarify that. But the course is a lot more prepared and that's with patient involvement.

Here's our website. There's a lot of information of the Bell's Palsy website. That's orchestrated by, coordinated by Jackie Diels. And lastly, facial palsy, that should say facial palsy not pals, I'm sorry. FacialpalsyUK.org is an excellent, excellent website. Those are our colleagues in the UK that do pretty much what we do over in Boston at the Facial Nerve Center. Their website is just much more informative than ours. So hopefully we'll get up to speed. But a great, great resource for both you and your patients. And then, lastly, Sir Charles Bell is, sircharlesbell.com is a great website that is an international communication for all clinicians. There is a fee to join that. I get no referrals for any of these, but it's great resources. And that, Sir Charles bell website is orchestrated by Dr. Hadlock, and we do a lot of case studies, and there's a lot of patient examples on there that you can learn more about. So that is it. I believe you can sign off if you would like. But I'm here for questions and comments for a little longer. Thank you so much for this opportunity. Thank you for listening, and I appreciate it. Appreciate your time and sticking around. Okay, so the first--

- [Calista] All right, well thank you so much, Mara.

- [Mara] Oh, there is a question.

- [Calista] Yeah, go ahead and--

- [Mara] Okay, is that okay that I go through the questions?

- [Calista'Yes, it' is.

- [Mara] Okay, okay. In your experience, does the Botox injection help with return of movement since you don't have that powerful synkinesis to contend with? Couldn't have said it better myself. Yes, the Botox injections help with return of movement because you are taking away the antagonistic pull. So patients feel a more freedom of movement. If we didn't achieve it with neuromuscular retraining, we are gonna achieve it with Botox. But ideally, I think it's the combination of the two, the nervomuscular training and the Botox that takes away that antagonistic pull. To that end, this is a great question and a segue to want you to come and speak to us more at the Facial Nerve Center is, Dr. Hadlock and a few other surgeons in the country are beginning to do myectomies and neurectomies, removing some of the nerve branches that are responsible for the synkinesis.

And those are called selective neurectomies. There's a few papers out on that, and a chapter in one of the books that we participated in writing together. And so they're doing selective neurectomies and selective myectomies. So the current one right now is removing the DAO, the depressor anguli oris, that is the frown muscle, or the lip depressor, and its antagonistic pull limits the person's ability to form the smile fully. So preliminary results she's going to be reporting on is that by removing portions of the DAO muscle, the patient can form a slightly greater smile. So that should be published soon. Thank you for asking that great question. Sorry if that was not articulated more clearly. I have a patient on her 14th month after the onset of an acoustic neuroma excision. 21% on the Sunnybrook. Is it too late to reanimate her smile through the

masseteric nerve innervation to the facial nerve? That is an awesome question, awesome question. And I would defer her to the Facial Nerve Clinic and to our surgeons, because that 14-month mark is on the cusp of when the doctors would do a direct five to seven versus having to put in free muscle. So the sooner you can refer her over to the Mass Eye and Ear Facial Nerve Center, the better because yes, some people, it could aesthetically be better to not have the gracilis muscle in your face. There is some risk of facial bulk. Not everybody, but there is some risk of having a bulky face as a result of having the muscle implanted there. So 14 months is right on the cusp. I'm not quite sure how our doctors would answer that. Great, great question. Love to see her email me if she comes through. Okay.

- [Calista] I believe that was the last question, Mara. I don't see anything else. So we're gonna officially close out today's course. Thank you so much for presenting for us today. And if anybody missed the first course, hopefully not, but if you did it's available to view now. Have a great day everyone.

- [Mara] Thank you so much.