

**CANCER REMOVAL AND PALATE RECONSTRUCTION
WAKE FOREST UNIVERSITY BAPTIST MEDICAL CENTER
WINSTON-SALEM, NORTH CAROLINA
MAY 16, 2006**

NARRATOR: Sandra Scott, an assistant elementary school principle, is one of more than sixty Wake Forest University Baptist Medical Center patients who have benefited from innovative palate reconstruction after the removal of cancer from the roof of her mouth. Her surgeon was Dale Browne, of the Department of Otolaryngology.

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J. DALE BROWNE, M.D.: When we create oral cavity defects from taking out cancers, then it leaves a defect, a hole there. And that has to be reconstructed in some...in some way. We use the temporalis muscle, which is the muscle in the side of your head; one of the ones that you chew with. And we turn that into the mouth, pull that into the mouth, and sew that in the edges of the defect. And that will reconstruct the roof of the mouth.

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NARRATOR: Browne uses the temporalis muscles, normally used for chewing, to reconstruct the palate. The procedure has yielded far better results than the standard approach of using a modified denture. Browne's patients typically have few problems eating or drinking and don't require repeated surgical interventions.

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SANDRA SCOTT: Because of this procedure and because of the competence of Dr. Browne and his staff, I can say that I've walked back into life.

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NARRATOR: During the next hour, you will see the same procedure used to reconstruct Scott's palate in this live Internet broadcast from Wake Forest Baptist.

Browne is one of the regions leading experts in both the microvascular replacement of bone and soft tissue and the use of the temporalis muscle for palate repair.

You may e-mail questions to the OR during the webcast by clicking the MDirectAccess button on your screen. You will also see buttons below to make an appointment or request additional information, and for physicians to make a referral.

00:02:02

CHRISTOPHER A. SULLIVAN, M.D.: Good afternoon. I'm Dr. Chris Sullivan and I'll be your host here at Wake Forest University Baptist Medical Center for this live webcast of a novel surgical procedure developed by Dr. Dale Browne, professor of otolaryngology Head and neck surgery.

Today, Dr. Browne is going to remove an adenoid cystic carcinoma from the hard palate... [clears throat]...of a patient here in the...at Wake Forest, who will then undergo a primary reconstruction with a temporalis flap. I think we'd like to bring us up to date here for a moment with Dr. Browne who's removing the tumor at this time. And what I think we'll do to kick it off is go ahead and take a look at some of our slide presentation, beginning with a typical presentation for such tumor.

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The first slide that I'm gonna show here is a typical presentation that we see in the hard palate of a minor salivary gland cancer. Minor salivary gland cancers will typically arise at the junction of the hard and the soft palate. This first slide that I'm showing here, shows the tumor adjacent to the left upper molar. And typically, after resection, we go ahead...[clears throat]...and we're left with a large defect that communicates between the nose and the oral cavity.

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Typically, our goals of reconstruction are to provide for a competent velum. The velum is the soft palate and it allows the oral cavity be separated from the nose and the nasopharynx. Typically, we like to restore mastication. Additionally, we like to limit donor site morbidity. Typically...[clears throat]...we like to see the mid-face restoration be one that is also cosmetic and we don't like to see any retrusion or mid-face deficiency.

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Our options, historically, for this type of a defect have been for Doctors to place a palatal obturator. Palatal obturators are a wonderful reconstruction for small defects. However, they do take...many trips to the prosthodontist for...for adjustment. They do require having a foreign body in the oral cavity which must be cleaned regularly. And, typically, can provide a fair amount of morbidity in this regard.

For smaller defects, we'll use local flaps, such as a palatal island flap. Regional flaps would be the next step up and then, typically, if we have very large defects, we'll go to a vascularized free-flap.

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This is an example here of a palatal obturator. It's certainly time honored. Prosthetic expertise, though, is required and this is sometimes difficult to find in various parts of the country, depending on availability of...of university dental programs.

Many patients require ankle...anchoring implants, and these implants may be a problem after radiation therapy. We favor the primary reconstruction at the time of surgery because it allows primary reconstruction, it avoids a need for an obturator and for most patient...most patients it provides a faster return...to work and to their overall daily lives.

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Typically, we like to think about the complexity of the defect and the availability of a prosthodontist. And usually it's very difficult for patients to come great distances in order to see...and make multiple trips in order to see a prosthodontist. Typically, if they can come for a single procedure, that's one stage; this works out very nicely.

I'd like to show this slide because I think this is sort of the overall picture of the type of defect that we'll reconstruct. You'll see here that the defect of the hard palate has been filled with a temporalis muscle, which has been swung down beneath the zygomatic arch to fill the defect.

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Often, adenoid cystic carcinoma, the type of cancer that we're working on today, this cancer travels along nerves and has a propensity for perineural extension. This carries with it a great deal of morbidity in the long term; though in the short term, many patients seem to do quite well despite this.

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As part of the operation, Dr. Browne has...[clears throat]...pioneered a resection of the palate nerves and the nerves going up to the skull base, through the area of the foramen rotundum. Shown here, if we look...looking from the lateral surface of this diagram, just in the condylar notch where the zygomatic arch has been removed, we can see where the

trigeminal mer...nerve is emerging from the skull base and passing...forward along V2 and coming out at the foramen...infraorbital foramen. [Clears throat.]

The defect and bony removal, as seen in this slide here, and what you see is that we have shaded the zygomatic arch, which has been removed and then we also have shaded the area of the palate. And you can see that this creates a tunnel for the vascular pedicle of the temporalis flap. And removal of that bony arch allows the flap to be turned under itself and to therefore be placed into position under the least amount of tension.

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This next slide, again, shows the flap turned underneath and inset into the palatal defect. I think one of the important aspects of this procedure is to really conceive of how the flap relates and the defect are...are related into the skull base. I have a skull model here in which...[clears throat]...we can see the temporal fossa here and the location of the temporal muscle here. We see the zygomatic arch in this location.

If I turn my model around...[clears throat]...it becomes apparent that the palate located here is in close proximity to this window here where...beneath the zygomatic arch. And, certainly, with the least amount of effort, we can see that the flap itself will pass down beneath the arch here and be easily inset in this infratemporal fossa into the maxillary sinus and then sewn into the palatal defect.

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I think at this point, with some of that background information, it would be great for us to go to Dr. Browne live and check in with him and see how we're doing and where we are in this stage of the operation. And he can recap for us the steps thus far. Dr. Browne, are you there?

00:10:04

J. DALE BROWNE, M.D.: I'm there. I'm there, Chris. We have resected the tumor and I'll get the cavity cleaned out and show what the defect looks like. Do you have the endoscope we can show the photograph with? Relax that, Catherine, just slightly. And we have a...we have made cuts, which we...which we can show some later, of the way we got here, in terms of incisions, but she basically has had incisions up underneath her lip and this is the...Jeff, you can gently retract that. If we can turn the light on, on the endoscope. We can show in there the size of the defect that we've made thus...thus far.

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So here is her residual palate. This is the...This is the breathing tube, endotracheal tube, and this is the...the roof of her eye socket here. And this is the space created by taking out the tumor. I have also done work on the side...Let's have the double retractor here. And we can show how we have lifted up the muscle. I guess I can put this down for right now. And I have...This is her temporalis muscle, and I have freed that up and gotten that out of the way. It's still attached to where its blood flow from deep in the cheek. And I had drilled the nerves out in the back of her eye socket to where it may have tumor in them, and we have removed these. And so once we clean the wound up a little more and get bleeding under control a little more satisfactorily, then we can move this muscle into the mouth to reconstruct the cavity that we've created. So maybe, Chris, you can...we can show what we did beforehand.

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CHRISTOPHER A. SULLIVAN, M.D.: Terrific. Thank you, Dale. I think...I think probably what we'll do first here is take a look at the x-ray films that we have. We've got some CT Scans and some MRI's which show the defect very nicely. We have a CT Scan, MRI, MRI. These are coronal scans here. Gray is soft tissue, white is bone and black is air. [Clears throat.] In this set of six films here you can really see things best. We see a large soft tissue mass filling the left maxillary sinus. In this area, the left orbit is here, the

node...nasal cavity here, oral cavity here and we can see the white hard palatal bone located in this region.

As we come over to the coronal view on the MRI, again, we see a large soft tissue tumor. It is abutting the orbital floor here. It is also coming a little bit into the nose, that we can appreciate, certainly, both on CT and MRI. I think if you come just over to the next scan, you can appreciate a feature that is quite typical for adenoid cystic carcinoma. And what we see is enhancement here of the palatal nerves as they head up along the second division of the trigeminal nerve toward the brain.

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Adenoid cystic carcinoma is particularly difficult to treat because of this problem and Dr. Browne has pioneered this approach by coming from the lateral side and drilling out these nerves from the skull base up beneath the zygomatic arch through an infratemporal fossa approach.

[Clears throat.] I think, if we look to our slide presentation again, we can see this technique drawn out, and I touched upon it briefly. The jawbone is seen here and you have the condylar notch. And you can see this wonderful window after the zygomatic arch has been removed, which allows Dr. Browne to get into the skull base and follow this nerve all the way back to the dura and clear the margin.

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We have some video vignettes that we have recorded earlier today and I'd like to go ahead and roll those so that we can go ahead and see what Dr. Browne has done thus far. Each of those has a separate section and I think the first one that we're gonna look at is gonna be called "The Approach and The Incisions." And in this, essentially we'll look at Dr. Browne's midfacial degloving approach, and the incisions therein and how he gets to the tumor.

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J. DALE BROWNE, M.D.: We're starting this procedure by making incisions inside the upper lip, so we will retract these and show where we have freed up the tissues of the cheek away from the tumor that is starting to come through the front...the front wall of the sinus. This is the front wall...This is the front wall of the eye socket and we'll show that with the...with this. So this is the eye. We'll show this where the fat of the eye socket. And this is the rim of the orbit eye socket. This is the tumor coming through the wall of the sinus. This is inside of the left side of the nose and then we've done the same amount of work above where we have...Can I have a pair of DeBakey's.

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And we'll show where we have loosened up the eye socket to where it's exposed. We've made this cut inside the upper...the lower lid. Let's remove that just a second. And we can show where we've loosened up the lower lid to expose the rim. Now, we'll take this portion of the rim off, because this is not involved with tumor. This sort of portion here and then we will be able to place it back at the end of the procedure. And that will be in this portion.

00:16:58

CHRISTOPHER A. SULLIVAN, M.D.: Great. That's a terrific demonstration of the incisions that we used to get to the mid-face. I think I'd like to kind of review that and I have a model here that I think will show...And I'd like to call this, really, a modified midfacial degloving approach. The classic incisions, as Dr. Browne had described here...[clears throat]...are the sublabial incision, which comes up right here under the lip. And the nasal releasing incisions, which include a hemitransfixion incision here and then...then the intercartilaginous incisions out here, which allows the midfacial skin to be lifted up over the skull.

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Now, what Dr. Browne has done here to facilitate even better exposure superiorly, is to use an inter...a [transcondren tie-able?] incision, which comes in this area here and lifts the lid

down. And that was the last thing that you saw on the first video vignette. Now, I think this is real critical because by releasing the flap here and releasing it here and in the nose, we now have created a visor, the entirety of which can be slid up and achieve all sorts of exposure up here in the orbital floor and even to follow this nerve back from the anterior direction if desired.

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[Clears throat.] I think in summary, the midfacial degloving approach is typically been one reserved for inferior type lesions, but when you combine this with the [transcondren tie-able?] incision, as well as the infratemporal fossa approach underneath the zygomatic arch, you achieve unprecedented exposure to the skull base.

I think we'll move on to our second video, which will be the orbital floor reconstruction. I think part of the beauty of this approach is that at the time of tumor resection, Dr. Browne will go to the orbital floor and he uses a Leibinger mesh, which Leibinger Stryker is the brand and he uses a mess...this mess that will...he will contour on the orbital floor prior to taking the tumor out, which is a very nice way to achieve the accurate contour for the eye. So, if we could go ahead now with the video and show the orbital floor reconstruction.

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J. DALE BROWNE, M.D.: Alright. We are...We have placed some Stryker Leibinger mesh to reconstruct the orbital floor before we take it out. This will kind of conform to the shape of the orbital floor that we're gonna remove to remove the nerve that would be a pathway for a tumor to grow. And so now we have preformed the mesh and we are securing the mesh in before we remove it so we can retain the shape. Okay. Then drill a hole there. Probably that next to last one. Right there. Yeah, that's good.

00:20:45

Okay. Now let's put one more in and then we'll take them out. Let's have another retractor a minute. Probably the highest one there. I'm gonna have to push it in a little bit. There we go.

So after we've conformed this mesh to this shape, then we will be able to remove this mesh and it will maintain the same shape. Later on we can remove the bone and then go back and put the mesh in through the same holes and it'll be in the same position.

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CHRISTOPHER A. SULLIVAN, M.D.: Terrific. That was a very nice demonstration of the orbital mesh reconstruction. I think I'd like to remind everybody that if you have any question you can go ahead and e-mail them in to us and...at any time and we can go ahead and answer it. I think this might be a good point, sine we've been talking about resection and approaches, to go ahead and answer some of the questions that have come in thus far.

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A first question was, can this reconstruction be done after resection two years ago for a polymorphous low grade adenocarcinoma of the hard palate? I think, certainly, the reconstruction can be done at any time. If the patient has undergone radiation therapy...[clears throat]...this may complicate things a little bit in terms of...of healing. However, if you're bringing in vascularized tissue to the wound, typically this shouldn't be a problem. Patients who have had surgery over a period of a couple of years may have become quite used to a palatal obturator at this time and many of them may not wish to go forward with any further surgery. But, certainly, delayed reconstruction can be done and quite effectively.

Dale, at any time, if you want to jump in with any of these as well, I'd be more than happy. Do you have any comments about that?

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J. DALE BROWNE, M.D.: Yes. Yes, Chris, you can do this at a later time. The only thing that's a little different is when someone has already had surgery, then the...the wound is

already healed and it already has sort of its natural lining and you have to remove that and...and then you have to remove that lining first before you can actually put the muscle in. But, certainly, it can be done.

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CHRISTOPHER A. SULLIVAN, M.D.: Great. Terrific. Thank you, Dale. There is also an interesting question that just came in that I think is excellent. If the temporalis muscle, which is one of the muscles of mastication, or one of the chewing muscles, is normally used for chewing, does that cause a problem with chewing later? And the answer to that is no. The...We have two sets of masticator muscles and the temporalis is but one. And, typically, patients do not experience any difficulty with chewing, opening their mouths. Sometimes they may have some scar tissue that can prevent or create some trismus, but actual act of closing the jaw and chewing is typically not affected.

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I think I'd like to move on now. We have a few more questions that I can get to here in a few minutes, but I think for purposes of time management and the amount of time that we have now, I'd like to move on to the next set of videos, which were recorded earlier today. And this shows the tumor resection and the bone cuts. And if we could go ahead and roll that tape now, that would be great.

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J. DALE BROWNE, M.D.: We have freed up the tumor from below. Here is the ulceration in the roof of the mouth – I want to show that – that the patient had right...right there, that first showed it. And we made a wide incision around it. We've removed one tooth and we will go through this tooth socket, and then this is the...Let's move the retractor over there, Katherine. And this is the...that's the section of teeth, these four teeth, that will have to be removed at this point. And...And Jeff, let's pick that up.

And this is where we've started to make bone cuts here. We've already taken the mesh back out. We've taken the center section of the rim of the orbit where the nerve went through. It looked like it may have tumor in it. And this, again, is her eye. And so this is the...this is the lower parts of the bone cuts that...that...that we've made. And we will finish this from the side of her head where we will remove the nerves and the...and the attachments of her palate to the back of her...to the base of her skull.

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CHRISTOPHER A. SULLIVAN, M.D.: Terrific. The...I think that shows the bone cuts pretty nicely. I'd like to review that, because I think if we can take it out of context of the soft tissue and the blood of surgery that we see there, it's a little bit easier to see where the cuts are made. I'd like to again go back to our model, our skull model, and I think some of the important issues that we need to consider here are particularly, from a cosmetic standpoint, the orbital rim is preserved. [Clears throat.] And, this creates a nice symmetry in the face.

What is actually removed in the bone cuts here, where we removed the floor of the orbit and if we review a little bit and step back a minute and think about the mesh reconstruction, I think from a functional standpoint if you don't replace this bone...these bone removal here in the floor of the orbit, you're gonna have problems with enophthalmus, as well as potentially even double vision, if the defect is not accurately reconstructed.

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Regarding bone cuts again, of course, the palatal cut that comes here back to the terigoid plate and on the left side here we can see that the zygomatic arch is removed. Now, this is typically for access, although if tumor were to extend in that direction, certainly more bone would be needed...need to be removed. Once this bone is removed, however, again I'd emphasize the ability to visualize the...the skull base area and the area of the foramen rotundum, as well as the amount of space that is now allowed for passing the flap in to do

the reconstruction. I think the...probably the critical aspect of this, again, is exposure, being able to get the tumor out in a non=block resection, which the bony cuts will facilitate using this technique.

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We have some additional questions as well that I'd like to go ahead and cover. The temporalis muscle is the...is the focus of the next question, which...The question is, is the temporalis muscle always the right length to cover the hole in the palate? What if it's not long enough or too long. Again, we unfortunately have...[clears throat]...part of the head here and you can not see the full extent of the temporalis muscle. But, it does extend up to about this area. And typically, again, with the bony access that we have, the muscle is virtually always plenty long enough. And even if the muscle's a little bit short, bringing it through here you're still going to have enough to cover the de...most any palatal defects.

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Now, if you have a...a defect that involves the entire hard palate, then Dr. Browne has performed bilateral temporalis flap reconstructions, where the flap is down in...from here, from...from here back into the midline and, again, over here to reconstruct the entire hard palatal structure.

So, I think to answer that, where most succinct...succinct...succinctly length is not typically an issue....[clears throat]...and nor is the bulk of the muscle as it's typically enough for a hemipalatal defect.

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J. DALE BROWNE, M.D.: Okay, Chris, it's...it's never a problem being too long. You can always...You can always trim it or shorten it. It's never a problem. And, you can pull it all the way to where the front teeth are in almost everyone.

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CHRISTOPHER A. SULLIVAN, M.D.: Thanks, Dale. One other question I think we can cover here, which I missed in the beginning and which was, do you know what causes tumors like this and is it always due to alcohol or tobacco use? And the type of tumor that we're working on today, the etiology is really unknown. These tumors are more likely multifactorial. They may have a genetic factor. Tumors that occur on the palate that are related to smoking and drinking, are called squamous cell carcinomas and this is different from the type of tumor that we're resecting today.

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Okay. That goes over...I think we're caught up on e-mails at this point and there's one last video that we'd like to show, which we're gonna call the preauricular incision, and this is essentially the approach to the temporal fossa and the harvest of the muscle for the reconstruction. So, we'll go ahead and roll the tape.

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J. DALE BROWNE, M.D.: We have...We have made the...the incision in front of the ear and have temporarily removed the zygomatic arch. Kim, show me that plate there a minute. And take the Stryker Leibinger plate and temporarily remove it, and we'll put this back on at the end. And that gives us a way to get access to this area to remove the nerves. And we are freeing up the muscle now, which we will move out of the way to...to access the back of the sinuses in the base of the skull where the nerves come out...go into the skull base. Which we will take it out and then use this muscle to reconstruct the palate.

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CHRISTOPHER A. SULLIVAN, M.D.: Good. I think that shows very well the...the access to the temporal fossa and the harvest of the muscle. I have here on the slide presentation the drawing of the skin incision, which I would like to have people take a look at. This is what we call the preauricular temporal fossa incision, and as you can see it's a "C" shaped incision. And it runs along the lateral brow area and then extends posteriorly and then curls down around into the preauricular region.

Now, I think one of the important things, again, to consider here is access, and this incision provides wonderful access. As you can see on this next slide, you have wonderful access to the temporal fossa and when you swing the skin flap posteriorly you're able to go ahead and elevate the entire muscle.

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Again, I think one of the other important features here is if we look at this slide, again, we can see that the zygomatic arch has been removed and once that muscle has been harvested it can be easily transferred through this slot, if you will, down into the hard palate.

I think at this point, again I'd like to encourage folks with any other questions to go ahead and e-mail them to us, and we certainly can go ahead with those questions. I think one other point that we had not shown was the resection of the fifth nerve. And I have here on this slide, again, a live...or, correction, rather a archived picture that does show indeed drilling out the skull base and the second division of cranial nerve five. And you can see what wonderful access can be achieved here through this incision.

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I think at this point I'll shoot it back to Dr. Browne to give us an update as to how we're doing with our re...reconstructive effort.

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J. DALE BROWNE, M.D.: Yeah, Chris, we're just about ready to put the muscle in. We've freed every...freed all the attachments up. And, you can see I'm pushing my finger in and coming out in the mouth. That's sort of the pathway that the muscle is going to take to reconstruct where her palate defect is. And this will be sent into the edges of her gums here. Let's have some irrigation and we'll wash it out one more time.

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CHRISTOPHER A. SULLIVAN, M.D.: Good. Dale, I was gonna touch on some of the technical tips, but I was wondering if you had any pearls that you might want to share regarding the tension on the flap and how you might gauge that as you're trying to tunnel and reconstruct the defect?

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J. DALE BROWNE, M.D.: Well, you...basically, you try to free the muscle up until it's only attached just to the lower jaw. And people that have pretty...very thick...very thick muscles, generally younger healthy people, you have to take off this arch of bone, the zygomatic arch. And young...in...in sort of older people, where perhaps the muscle is thinner, you don't have to do that. You can slide it underneath.

In her...In her...In her case, her muscle was fairly thick and so we had to take off that arch. And it also helps in access and being able to...to drill the nerves out. So, I believe we're ready to...to pass the muscle in. Suction that out.

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CHRISTOPHER A. SULLIVAN, M.D.: Great. Are we gonna have a live feed of that? Looks like we do.

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J. DALE BROWNE, M.D.: The muscle passes right in the front here and so I'm gonna pass this to Dr. Reese, who's assisting me...Dr. Cunningham. And she's gonna grab the end of the muscle. And then as she has gentle tension on it, then I'm going to feed it in. And you can see it fall into the area, and then it brings out into the mouth. Let's have a tongue retractor. And then the rest of the procedure is sort of lining it up to resurface the hole on the roof of the mouth. Let's have a couple of DeBakey's. I'll need some 30 Vicryls. Relax on that now. And so...so we'll be sewing this in now. And...

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CHRISTOPHER A. SULLIVAN, M.D.: Great. It looks like you'll have your work cut out there for you for a few minutes, so in the meantime I think what we'll do is we'll come back to our slides and talk a little bit about the expected post-op course. I think most patients find this operation to be one which does cause them disability initially with regards to eating. And I think one of the things that we see is some mild to moderate trismus initially. Most patients, this resolves over a period of three months. Most folks are...are eating within, certainly liquids anyway, in the first twenty-four hours. The muscle itself does have some initial bulk and this may cause unilateral nasal obstruction. Often, it atrophies, and typically by three months after atrophy is done, by three months, it will also be mucosalized.

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I think one of the things that Dr. Browne does that is unique is he removes the temporalis fascia from the muscle itself and this hastens epithelialization of the flap. Typically, most patients will go home on a soft diet. [Clears throat.] Complications are really rare. Although, one common side effect that we do see with this is a serous otitis associated with obstruction of the eustachian tube.

Usually, velofal...velopharyngeal insufficiency is really not a problem and it's typically avoided by using a generous muscle bulk. And I think something that we haven't touched on is the donor site defect, which is expected to have a depressed defect in the temporal fossa. Now, this is typically reconstructed with a mid-[floor?] or temporal fossa implant, which can be customized and rarely becomes infected. Though it can, and if that's the case it needs to be removed and replaced at a later date.

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The...recurrence, you know, of tumors in this area, I think is probably one of the things that we struggle with as head and neck surgeons, because this is not an area that can be viewed very easily; certainly not on physical exam, and we rely on MRI and CT Scanning post-op. Unfortunately, with adenoid cystic carcinoma, many of these patients may recur years down the road, albeit. So, typically, with a single operation and reconstruction, they do great and they're able to go on with their lives very quickly.

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I'd like to go ahead and touch on a few more questions here while Dr. Browne is sewing in the flap; some of which I think we've covered a little bit. Someone's asked about the recovery time after surgery. Again, about twenty-four to forty-eight hours patient...most patients are drinking. They're sent home on a soft diet; in the hospital a couple of day to three days. Most patients recover and are back to work in somewhere around a couple of weeks. We advise usually seven to ten days, anyway, out of work. And...A real motivated patient, they're probably back to work around that time.

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The next question – and, again, Dale, you could jump in there in terms of recovery. Does that seem to summarize things the way you would see as well?

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J. DALE BROWNE, M.D.: Yeah. It's...It really depends on just the age of the person, how healthy they are going into the procedure. Certainly, the younger healthier patient population does bounce back faster and can really get...get back in their lifestyle a whole lot faster. And what you're saying is pretty reasonable.

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CHRISTOPHER A. SULLIVAN, M.D.: Great. Do you see these tumors in children, was another question. And would...would you or could you use these techniques in a growing child? This is an excellent question. I think the type of tumor that we're faced with in children is more typically something like a sarcoma or other embryonal type tumor that arises at the skull base. [Clears throat.] Certainly in a growing child, depending on the age of the child, midfacial growth is one of the most important things that we worry about whenever we're altering the mid-face and removing bone. On the other hand, if we're

talking about removing a...a tumor that's potentially lifesaving, we can always go back and do reconstructive efforts at a later date to touch things up.

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In a growing tild...child, this would certainly be fine. A temporalis muscle could be transferred into this area. I don't have experience in seeing any children, but perhaps Dr. Browne does and he could he comment on that relative to this reconstructive technique.

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J. DALE BROWNE, M.D.: Chris, we have done this in children.. It's not the most common procedure, just for the reasons that you said. They usually don't have tumors that would allow for this. We have done this for some more locally aggressive unusual benign tumors; mostly for trauma. We've done it for trauma a couple of times. And I think that's a very...I think that's a very worthwhile point.

00:43:36

CHRISTOPHER A. SULLIVAN, M.D.: Yeah. No, it's an excellent question. Hopefully, no one has to face this in their children.

I think...This is also...The next question is really quite excellent. What is the advantage of temporalis muscle reconstruction over a radial forearm flap reconstruction, or other free flaps? Well, first and foremost, the bulk of the temporalis muscle replaces the bony defect pretty nicely. And I think the advantage of such a soft tissue flap over a free flap is the ease of harvest and the length of operation and the ease of recovery. As...If you were to compare this with the gold standard, perhaps historically of a scapular free flap, which is...has the advantage of allowing implants to be placed for teeth at a later date.

00:44:34

Flaps, such as a radial forearm flap, really is not ideal in this location. As it's not...It does not have a surface on which to rest and you'd be simply tenting the flap over the hard palate, and this tends not to work very well. More typically, a rectus free flap could be used in this location, but there again, any time you go from a pedicle to a free flap you increase your operative time and certainly your morbidity in terms of recovery...from a donor site morbidity and recovery.

00:45:13

J. DALE BROWNE, M.D.: Chris, I could----

CHRISTOPHER A. SULLIVAN, M.D.: Dale, go ahead.

00:45:15

J. DALE BROWNE, M.D.: Chris, I could chip in about that. I mean, I think there's a lot of different ways to fix these defects and the radial forearm are certainly one of them. The real two advantages of this...Actually, I started doing these more so with...with...with tumors just like this because they had a lot of perineural invasion that went up to the base of the skull and...and...and in an attempt to remove the perineural extension towards the skull base, then you automatically expose the temporalis muscle, so it's really already there. It's already available for you and so it really became a natural thing to do at the time.

00:45:53

And since that time, since these patients just...just like this patient here, it became just sort of a natural way to do that. I sort of expanded it to a lot of palate defects and it's...it's...and has really become a...a very reliable way to reconstruct these problems. But the other reason that I think it is very useful is that it really contracts so much. It granulates over, contracts in and you get a nice hard scar as opposed to radial forearm flap that is not going to contract as much.

00:46:22

CHRISTOPHER A. SULLIVAN, M.D.: Yeah, I would concur. It's...It's a...It's a wonderful way to go, if the defect is amenable.

I think, Dale, I'm gonna bounce this directly to you, which is what is the risk to the injury of facial nerve branches?

00:46:39

J. DALE BROWNE, M.D.: The only nerve that comes into play would be the frontal branch of the facial nerve, and you do have to make a special modification. We go down to the back of the zygomatic arch and elevate the deep temporal fascia, the very deepest layer of...of fascia off of the temporalis muscle, and actually reflect it off of the zygomatic arch. In...in doing so, it...it really protects that nerve, but...I've probably done about seventy of these now and I probably have had four or five patients of that that had either temporary facial weakness...I've had...I've had...I've had one...one...one or two patients, I think I can think of that actually had permanent facial weakness from that.

00:47:20

So it is a risk in that particular division just because of that's where [about in the anatomy?] where the nerve runs.

00:47:26

CHRISTOPHER A. SULLIVAN, M.D.: I think...I think back to the Gilley's approach to a zygomatic arch fracture and if I'm hearing you correctly, Dale, that...that's the approach that you're using to protect the nerve.

00:47:36

J. DALE BROWNE, M.D.: Right.

00:47:38

CHRISTOPHER A. SULLIVAN, M.D.: The...I think the...probably the last step of this really relates to reconstruction. We're...We've completed our e-mail questions here for the moment and wanted to ask you, Dale, about your temporal fossa reconstruction.

00:48:01

J. DALE BROWNE, M.D.: Well, we can actually come in before we do that and just show what it looks like sewn in.

CHRISTOPHER A. SULLIVAN, M.D.: Outstanding.

00:48:06

J. DALE BROWNE, M.D.: And...And that will be a pretty good intro into the temporal fossa implant. Let me put one last suture in.

00:48:18

CHRISTOPHER A. SULLIVAN, M.D.: You know, we have some more questions and while you're doing that, Dale, I guess I'll go ahead and---

00:48:26

J. DALE BROWNE, M.D.: Okay. Just have to get one stitch in and then we can maybe get one question. Yeah.

00:48:29

CHRISTOPHER A. SULLIVAN, M.D.: Sure. Well, a quick question. Yeah, I think just a quick on here. Let's see? Dr. Sullivan, your opinion. Should this patient have drains placed and how long should they stay in? We typically place a drain in this area that's a suction drain. And the advantage the...or, the advantage of the drain is that it's very important to try to prevent a collection of blood in the temporal fossa. Blood is a wonderful, wonderful medium for the growth of bacteria. It will allow your temporal fossa to become...or, your implant to become colonized with bacteria and then allow them to...to multiply. And as such, we would recommend placing a drain, and when that drain reaches a point where there is less than 30 cc's over a twenty-four hour period, this would be the appropriate time to remove it.

00:49:22

Now, on the other hand, sometimes drainage drops off, but the skin flap is still not stuck down to the...to the implant or to the temporal fossa bone, in which case we typically will leave the drain in until we are assured that the skin flap is sticking down.

Dale, shoot back to you there? Are you ready?

00:49:45

J. DALE BROWNE, M.D.: Yeah. We're where we can...We're at the point where we can show what the graft looks like. Let's see, we may have to use our endoscope to show that. Let's see, Jeff, let's retract. Retract here a little bit. And, Katherine, maybe you can just pull that endotracheal...I may have to just more the tube. There we go. Alright. Okay. And we'll shine this in. Our light's going and this shows the...muscle. Let's see, let's move those lights away. I think our...Another light. This light right here. Let's see? Okay. Now this light's not on. Okay, now we're good. Okay, there we go.

00:50:42

So there is the...the tooth that we left and there is the defect that's got the muscle sewn into it now. We'll put some more sutures just to secure it. We put probably sutures every five...every five millimeters or so away. But that's basically the procedure. Suction in there just a little bit.

00:51:07

CHRISTOPHER A. SULLIVAN, M.D.: Okay. We do have a couple more questions and I think we're pretty close to moving up into that temporal fossa. And while you're maybe preparing for that, Dale, we'll cover a couple more of these, huh?

Are there any eye complications after an operation like this? Certainly after today's operation, we would not anticipate any complications with the eye, given the extend of the tumor and the fact that this had not invaded the orbit itself requiring either resection of periorbita or periorbital fat. However, certainly if there is an issue with tumor invading the orbit, then this is not uncommon. In complications associated with the actual surgery itself, are really tumor dependent.

00:52:02

So in summary, given what we saw on the films today and what I showed you and what we see for the defect, this is not typically something where we have orbital complications associated with this particular technique.

00:52:15

J. DALE BROWNE, M.D.: Chris, patients will have the nerve that runs underneath your eye socket that gives you feeling to...to your upper lip frequently either has to be taken out or can be traumatized temporarily during this. And then the other situation with your eye, occasionally patients will have a...will have a congenital loss of bone in the side of their eye socket that...In one patient we had, he actually had...he had a little swelling in his eye afterwards and had some muscle entrapment in his eye that we had to go back and repair. So there is a...a little bit of risk, but that can be predicted by looking at a CAT Scan preoperatively.

00:52:56

CHRISTOPHER A. SULLIVAN, M.D.: And typically, no long term complications with vision, which I think is where we were...where this question was going, correct?

00:53:04

J. DALE BROWNE, M.D.: Correct. Right. Yes. No, it doesn't really affect your eye, that's right. Let's have that implant.

CHRISTOPHER A. SULLIVAN, M.D.: And we'll---

00:53:09

J. DALE BROWNE, M.D.: And we can show...I think in this patient, that she would...that she would...she would benefit from having an implant fit in her temporal fossa. And, Jeff, let's let this go down. And we can show that as we close this she's getting a little swelling around her eye, but that area would kind of depress in and be different than the other side. So we put this little implant in, which basically slides into this little space and we affix it with

screws, titanium screw, much that we use to hold the mesh and plate in. And then that will allow this to stay out and not sink in. And that basically is a permanent implant.

00:53:52

CHRISTOPHER A. SULLIVAN, M.D.: So again, to orient you folks that are watching this, again, this is the area of the temporal fossa and you can see this black marker area here, which is the approach where the dru...bone is drilled out to get to the nerve. And then the palatal...or, correction, and the temporal fossa implant then is placed right in this location here.

00:54:21

I think we have one other question, which we did briefly cover I think at the beginning, but I think it's important to review that now. And that is, what is the advantage of the temporalis flap over a prosthodontic modified denture approach? And, again, I think we can look at the slide here that I've brought up on palatal reconstruction here under options. And, certainly, the prosthetic is time honored. I think the disadvantage...the disadvantages of the prosthetic though are quite a few. You need prosthetic expertise nearby; that's important. Typically, but not always, that involves having a university dental program nearby.

00:55:05

Many insurance companies, unfortunately, are very stingy about the way they will pay for prosthetics. And often patients do end up paying out of pocket for a fair amount of the reconstructive work when they use a prosthesis.

In patients who don't have teeth, of course, this is a problem because you don't...your prosthetic has to be anchored to the teeth. And, of course, if you've had radiation therapy, putting in a titanium implant may lead to infection and extrusion. And this, of course, is problematic.

00:55:48

J. DALE BROWNE, M.D.: Chris?

CHRISTOPHER A. SULLIVAN, M.D.: Yes, Sir.

00:55:49

J. DALE BROWNE, M.D.: As you said, certainly pros...you know, prosthetic devices have been used for years and are very time honored and work very well, and there's nothing wrong them. Of course, the only advantage of this kind of...of approach is...is that patients never are awake, essentially, when they have a defect in the roof of their mouth. It's always reconstructed. And the only real argument that some patient...that some physicians might have is that is doesn't give the ability to look at the depths of the wound. And...And we've shown in our...in our...in our seventy patients that that's not really a concern. And I think, certainly, the wave of...of reconstructive surgery after cancer surgery shows that generally the general trend is to do simultaneous re...reconstruction and that's been a very advantageous way of giving people quality of life back.

00:56:45

CHRISTOPHER A. SULLIVAN, M.D.: No question. And I think that's a really excellent point. The...I think with the advances in radiology with MR and CT and imaging systems, we really are very skilled these days at being able to determine what is reconstruction, what is tumor and I think that this obviates the need for the ability to view that cavity, which is the traditional approach to this problem.

00:57:20

Dale, I have one other question I think I'll bounce back to you, which is the rate of dehiscence when suturing this muscle to the mucosa. And I'm assuming that this is both short term or long term that would be implied here.

00:57:35

J. DALE BROWNE, M.D.: Yeah. The...The only real air that's problematic is medially just in the residual hard palate on the other side. If you do get a dehiscence there, which is really not often, you can....have a little hole in the roof of the mouth that has to be closed later.

Temporalis muscle flaps themselves are...are actually fairly old procedures and I think the...the real usefulness in it is...is that it has not become...it has sort of fallen out of becoming a very common procedure. And I...And I...I think it needs to be looked again in terms of these kinds of problems, because it does afford people a very easy way to have simultaneous reconstruction. If they do have the dehiscence in terms of just a suture break...breakdown, it's very un...it's very un...uncommon, as long as the muscle is viable and it just hasn't been a major problem. Even in folks who've already had radiation therapy or actually go through radiation therapy.

00:58:42

CHRISTOPHER A. SULLIVAN, M.D.: Terrific. Okay. Well, we're winding down on our time, Dale. Was there any last operative views you'd like to share with our viewing audience?

00:58:51

J. DALE BROWNE, M.D.: Yes. We'll show how we reconstructed the roof of her orbit. I'm sorry, the floor of her orbit one last time here. We put the mesh in when you were talking.

00:59:01

CHRISTOPHER A. SULLIVAN, M.D.: Right. Well, we have about a minute and a half here, so---

00:59:05

J. DALE BROWNE, M.D.: And this...this shows...Can we have an overhead camera. Yeah. Let's put that in there. And we will retract this away, and that shows how we put the mesh back in. We actually had to take a little section of bone out, because it looked like it had tumor in it, but we...but we had already formed it to the roof...I mean, to the floor contour, so we actually just put that in with a few screws. Let's have the endoscope and we can show that picture.

00:59:39

Okay. And we'll just show this more directly. Okay. And that just shows how the mesh fits in. Now, what...Now what we will do, we will put a little extra layer of tissue over that so that the skin, which is very thin here, will not...will not break down and she will won't be able to feel that much after it's all healed. Thanks.

01:00:01

CHRISTOPHER A. SULLIVAN, M.D.: Terrific. Well, I would certainly like to thank our team here today for all the hard work in putting this together. And, Dr. Browne, certainly I'd like to thank you and this patient, certainly, for allowing this to be filmed today, and to appear in this discussion with a very enlightened and interesting audience. I think I'd like to thank our audience for providing us with such wonderful questions. I don't believe we got to everybody's, but I'm gonna pass along any of these to Dale and myself and we'll go ahead and answer these directly.

If you would like to e-mail directly, we can certainly e-mail back questions to any...to any questions that we were unable to cover. Any final parting thoughts, Dale?

01:00:54

J. DALE BROWNE, M.D.: No. We're almost done. We're gonna finish suturing the palate. We're gonna put a little drain in, a suction drain in, which will keep...you know, as you said, for one to three days. And, close this up and then...and then we'll be done.

01:01:10

CHRISTOPHER A. SULLIVAN, M.D.: Terrific. Well, I think that concludes our presentation. We'd like to thank you all for being with us today and have a good evening.

01:01:18

NARRATOR: This has been a live surgical webcast from Wake Forest University Baptist Medical Center in Winston-Salem, North Carolina. The program demonstrated palate reconstruction using the temporalis muscle. Physicians who would like to refer a patient may call 800-277-7654, or click on the Make Referral button below. Patients who would like to make an appointment or receive more information about the procedure may click on the bottoms below or call 800-446-2255.

01:01:57

[END OF WEBCAST.]