

BroadcastMed | Nose News Now: An expert panels opinion on the latest techniques and evidence for managing the inferior turbinate

ALEXANDER Thank you for being patient and waiting for us. We've got a pretty exciting panel to talk about a real world application and problem we all face, and that's the management of the inferior turbinate. I've got a great panel. **CHIU:** They've got their flamboyant ties on. They are ready to rumble, so we're going to try to stir up as much controversy as we can.

To my left is Jim Palmer from the University of Pennsylvania, Raj Sindwani from the Cleveland Clinic, and then Brent Senior from Chapel Hill, and I'm Alex Chiu from the University of Arizona. And what we're going to talk today is about the inferior turbinate. How do we manage it in the operating room and how do we manage it in the office?

Now, here's a somewhat controversial complaint, and Olympus may not like me putting this up, but I think it's food for thought. Here's a quote from 2001. "Research in turbinate surgery has frequently been driven by new technology and not based on patient benefits." What do you guys think? Brent, what do you think about that statement? Is that true?

BRENT SENIOR: True.

ALEXANDER Does inferior turbinate surgery work though?

CHIU:

BRENT SENIOR: Yeah, absolutely. But I mean, that's kind of unfair to get upset about that, because that's basically the way all of rhinology has been going here for the last 20 years. I mean let's be fair, the endoscope drove endoscopic sinus surgery, so of course new technology in turbinate surgery is definitely driving how we treat the turbinate.

ALEXANDER So back in the day, total or partial turbinectomy, submucosal resection lasers. Who used lasers? Anyone still use

CHIU: lasers? Have you used lasers in the pasts?

JIM PALMER: Only sharks with lasers on their forehead. Only on sharks.

ALEXANDER So the lasers was a mid '90s thing, cryo-surgery, radiofrequency ablation, electrocautery, these are all different

CHIU: ways to skin a cat. And what we're trying to figure out is one, does turbinate surgery work, and then two, what is the best way to treat it, and then three, where's the best place to treat it? Is it in the operating room or is it in the office? Jim.

JIM PALMER: Can I get you to go back one slide please Alex? You don't have lateralization of the inferior turbinate on that list as a surgical option, and I would argue that's a surgery as well.

ALEXANDER So you're the conservative of the group. You believe in minimal manipulation of the turbinate?

CHIU:

JIM PALMER: Depends on how you look at it. I mean, I operate on every patient's inferior turbinates when I do sinus surgery because everybody gets lateralized, largely because it makes more room for my residents and fellows to get their scope in there and move around, but I lateralize everybody, and I don't push them back in at the end of the case.

Admittedly, I keep them lateral. So I operate on every inferior turbinate. So when people argue whether or not you should touch or operate on the inferior turbinate, I would say that I operate on every one by lateralizing it.

ALEXANDER CHIU: Raj, do you actually think that works, though? Or Brent, do you actually think lateralization alone will treat nasal obstruction?

RAJ SINDWANI: Yeah. I mean, just to get back to that statement too, I think the statement sort of points out that technology plays a big role as Brent said, but also that there's a lot of confounders. And one technique, it's hard to show superiority over another. So to answer your question, I think all of the above. I bet you could find a paper-- I know you can find a paper-- that shows an improvement in patient outcomes including without fracture, but I think the sustainability of that is not going to be as significant and the outcomes as robust as if you did something more aggressive like a submucosal resection.

I agree with Jim. I actually do an inferior turbinate outfracture as well in everybody, but in a way, I'm doing it less for the therapeutic aspect of improving their obstruction and more for space during sinus surgery, for access. And then the other thing to note is when you outfracture that turbinate, it actually improves your trajectory towards the maxillary sinus. So when you take that turbinate out of your way, the lateral wall is a little bit more accessible for your antrostomy and so on. So I do it for those reasons as well.

BRENT SENIOR: You know, Alex, I'm sitting here in shock because it's so rare that I actually agree with these two guys. And what they're saying is actually wise and reasonable. So I actually do the exact same thing. I also outfracture the turbinate during my middle meatal surgery.

But I would argue though that outfracture of the inferior turbinate is not all the same because the inferior turbinate is pedicled on that L-like strut. And so if you just get that lower part of the L and push that over, that's a different procedure than when you get up to the top of it and crush it down at its actual attachment. And that's what I tend to try to do during sinus surgery because that helps me get into the middle meatus a little bit better, and I think, actually, that probably does give a little bit more reduction of the turbinate in the long run.

ALEXANDER CHIU: And then my little trick is is that sometimes, when you do that outfracture your first part of your case, you're going to get bleeding right away. That's going to bugger up your scope. So I put a little pledget on top of that inferior turbinate and I smooch it with the pledget so I don't get any mucosal trauma right at the start. We've got a question right off the bat.

AUDIENCE: Well I just-- while we're on this topic, [INAUDIBLE] how the outfracture turbinate [INAUDIBLE]?

ALEXANDER CHIU: So let's go right down. We're recording for infinity and beyond, so we're going to go right down the panel. I'm going to repeat the question. How do you technically outfracture the turbinate?

JIM PALMER: Well, the best answer is there's a book called *Atlas of Endoscopic Sinus and Skull Based Surgery*, Palmer and Chiu, which is given out today.

AUDIENCE: So you use a book to outfracture?

JIM PALMER: I use a book to outfracture.

BRENT SENIOR: That is so strange, Jim.

JIM PALMER: But frankly, I like to go underneath the turbinate, infracture it so that I can get that cut along the top edge, because I think Brent nicely said you don't want to get the bottom. You want to get the whole thing in toto. So go underneath and actually infracture first, then put your pledget on top and then outfracture after. And my favorite thing when I'm working with residents and fellows is I say, don't channel Brad Woodworth, who was our fellow in 2007 that actually broke a Freer popping over a turbinate. It was an old Freer of course, but when you break it over, you do need to use a little bit of muscle but not too much.

ALEXANDER Brad, are you listening right now?

CHIU:

JIM PALMER: Yeah, exactly.

ALEXANDER Anyone else with a different technique?

CHIU:

RAJ SINDWANI: So I do it differently than that. I don't do the infracture and I use a Boies elevator, and I think another point is I do endoscopically. So the first thing I do is medialize the middle turbinate to gain access to the middle meatus. I put the Boies elevator in and I go posteriorly and I ride in on my endoscope to see where the free edge is.

This idea of a cottonoid and so on, it's because if a free edge-- the Boies's not as sharp as a Freer, so I use that-- if the free edge gashes into the turbinate, that's where you're going to get your bleeding. If you use the broad surface of the Boies and mind where the free edge is and actually have the free edge off of the turbinate, if you're picturing the way I'm kind of holding it, then I ride into the middle meatus. And as everyone's pointed out, you want to get that superior attachment of it and down and outfracture it.

So I use a Boies, and I make sure the free edge of it is up, and through a few repeated posterior to anterior movements, I crush it against the lateral nasal wall. So I don't use a pledget and I don't do the medial fracture.

ALEXANDER Brent, do you want to put a plug in for your book too as a way outfracture the inferior turbinate?

CHIU:

BRENT SENIOR: I actually have been using the Yellow Pages actually for my turbinate reduction. No, a little bit different. So I use a Hurd, a Hurd elevator. I like the broad sort of soft edge of it, and I place the broad, soft edge--

ALEXANDER Wait, what is the Hurd elevator though? I don't know if I'm familiar with that.

CHIU:

BRENT SENIOR: That's actually used in tonsil surgery. Those are structures in the back of the throat that you may remove occasionally. So I use that. I use the broad portion, the soft part, of the Hurd and I place that somewhat posterior underneath the middle meatus. And again, my effort there is to get the L attachment down.

And then I bring that forward and I watch myself so that I can watch the middle meatus kind of opening up as I do that. I don't typically use the pledget, but you know what, I like that. I'm going to do that when I go home. I'm going to try that.

ALEXANDER You know what? I like the tonsil elevator because a broad base instrument is less likely to poke the mucosa. I like that.

CHIU:

BRENT SENIOR: Right. Yeah.

JIM PALMER: So just to throw this out there, I usually get asked at some point early in the year when I'm doing this with new fellows, hey, have you ever had a problem with obstruction of Hasner's valve and the DCR? And in my experience, I have not. I just wanted to ask the rest of the panel.

BRENT SENIOR: So I don't think I have, but I think John DelGaudio has talked a little bit about the inferior turbinate and its role in potentially causing some obstruction at Hasner's valve. And I think it's something we need to be aware of and not belittle, but I would agree. I haven't seen it happen, so I don't think it's a very common thing. But again, something to be cognizant of.

ALEXANDER CHIU: So just don't traumatize that area mucosally. OK, so let's talk. We talked about the outfracture. Let's talk a little bit about whether or not we have the evidence that messing around with the inferior turbinate works. And Raj alluded to this earlier. There really isn't that many great studies.

We're a surgical field. We don't have double blind placebo controlled trials. But Pete Batra back in 2009 did a systematic review with the AAOA and the ARS looking at just this one simple question. "In adults with nasal airway obstruction from documented inferior turb hypertrophy, does surgery alone improve disease specific quality of life symptoms with a minimum of six month follow up?"

And he looked at all these studies. Obviously, the bulk of these studies were case series or retrospective chart reviews. But 93 out of the 96 studies demonstrated positive benefit with subjective symptom improvement of greater than 50%. So we're talking this is a real, legit surgery.

There's a lot of stuff we do that may or may not work. This is definitely going to work. So do we do enough of it? Are we actually ignoring it and not doing enough inferior turbinate surgery, and are we doing our patients a disservice? What do you guys think?

BRENT SENIOR: Well, I personally think I do just the right amount. No, I actually absolutely echo what Pete found in the study. I mean, there's no doubt that when you do it, I feel that's a beneficial thing for my patients.

But I also have to admit I'm a little conservative. I don't run to do turbinate surgery right off the bat, and certainly in the setting of chronic sinusitis with turbinate hypertrophy with what I do during the operation for approaching the middle meatus, I don't do a whole lot more oftentimes. And with settling down the inflammation, oftentimes you'll get the turbinate also to settle down a little bit. So I think it's an effective procedure, but still it's not something that has to be applied any more frequently probably than what we're doing.

ALEXANDER CHIU: OK. All right, let's move on then. So a Trio Society best practice paper published in 2013. And for those of you who get *Laryngoscope*, some of the best sections are these best practices procedures because they're very short, readable two page articles looking at the literature. And so Ash Kacker and his group looked at what is the evidence, the actual evidence, and found and recommended that submucosa resection with outfracture is the most effective way to treat the inferior turbinate.

So we're going to talk a little about different techniques, and this is one case, and I'm going to get the panelists, and I'm sure I'm going to get some snide comments. And this is a gentleman with a nasal septum perforation. I think this is Dr. Palmer's first patient. I think you referred him over.

JIM PALMER: It was a good septoplasty. Thank God you joined me, because without it--

ALEXANDER So this gentleman complains of bilateral nasal obstruction, and this is him before any decongestion. Should I
CHIU: even worry about the inferior turbinates, or is the problem the septal perforation? How do you guys distinguish that in a patient like this? Brent, I'm going to start with you.

BRENT SENIOR: So a lot of inflammation in that nose, so I absolutely would be concerned that the septal perforation's contributing, no doubt. I mean, because you see crusting all the way down. You see it on the turbinates there as well.

I don't know how good it is in terms of predicting, but one of things that I'll do is I'll spray the nose with Afrin and I see, if I get a nice reduction, what kind of benefit the patient notes with it, and that helps me to decide whether that's playing a part.

ALEXANDER Raj, would you try a septal button temporarily in the office and see if that makes a difference?

CHIU:

RAJ SINDWANI: I mean, I think that's a reasonable thing to try. And again, I think it speaks to all the confounders that we sometimes have to deal with. I mean, I would point out too this diagnosis of inferior turbinate hypertrophy, we have tons of treatment options, but we actually don't have a diagnosis.

What's the diagnosis, the definition let's say, of turbinate hypertrophy? We don't even have an objective measure. You're not going to do a CT scan, so there's a lot of fuzziness going on here.

The turbinate, the role of the turbinate, the role of some vasoactive tissue in the superior septum. Notice the septal swell body. That's a confounder.

That also decongests when Dr. Senior sprays with Afrin. Now you have perms and chronic sinusitis, allergic rhinitis we know. So I think it takes a while to sort all this out, but I agree with the comments before that in this case. You would certainly think that cleaning things up first make sense.

ALEXANDER All right. So this is that little pledget move I'm telling you about now. So we're going to go ahead and decongest.
CHIU: And for those of you, and Raj talked about this earlier, please do this with an endoscope. It's just so much better. Even the placement of your pledgets is so much more effective when you're actually using the endoscope to actually place them exactly where you want them.

So we're going to start our submucous resection right now. Jim, tell me what you would do next. So you're decongesting those. What's your next step?

JIM PALMER: My first step would have been to make sure this patient doesn't have chronic sinusitis and avoid that whole perf. You see the perf, so you want to pay attention to it, and I think you want to deal with the perf last. So we've gone through all that and now we're all the way to the inferior turbinate I recognize for the purposes of the discussion.

But a patient that presents with a perforation is the one that I drag my feet longest before I actually get to the operating room as opposed to I see a perf, let's fix it right away. And most of the time, the other maneuvers that you do will be enough that they won't have the obstruction from that perforation anymore. So now we're all the way through to where we are dealing with going ahead and making--

ALEXANDER CHIU: Let me interrupt you. I think you bring a great point. Brent Senior, David Kennedy article way back when-- 1970s, somewhere around then.

JIM PALMER: Yeah. I think it was, yeah, mesozoic era. Right.

ALEXANDER CHIU: Nasal obstruction, the most common symptom of chronic sinusitis. So let's not miss something. You guys routinely get a CAT scan before you take a patient like this to the operating room.

JIM PALMER: So if that patient with the first video you showed me showed up in my office, it's not just CAT scan. First of all, I'm going to treat them medically, put them on irrigations, preferably something with budesonide and maybe some antibiotic on it depending. I see crusting there.

Culture directed, full view of everything endoscopically to get an idea of what else is going on in part of this process, then get a CAT scan. I mean, when I say drag my feet, I mean someone that shows up with that sort of nose on their first visit, it'll be close to six months before I get them to the operating room. I also want to change a season, too.

Admittedly, I live in Philly where it's hot and humid in the summer and can get cold in the winter. I want to see what happens with the season change in their symptoms too. And at that point, I'll then start talking about how we're going to go ahead and manage it.

ALEXANDER CHIU: That's a great point, because you really don't know if this is going to work for the gentleman, right. So we want to set expectations and get to know that patient pretty well. To your left is an artist's illustration from Chiu and Palmer.

I mean, Palmer and Chiu *Atlas of Endoscopic Skull Based Surgery*. And you've got the inferior turbinate right here, and this is just how I do it. Take that inferior turbinate and then medialize it, or infracture it, and then inject. So I usually do one injection.

Again, try to limit the trauma to the mucosa so that it doesn't interfere with your endoscopic view. And I'll pass that needle all the way submucosally posteriorly along the inferior turbinate and then start injecting forward. What do you guys think about injecting the inferior turbinate in the office? Does anyone ever still do that, inject with steroids or what do you guys think about that?

RAJ SINDWANI: I mean, as part of a procedure or you're injecting steroids--

ALEXANDER CHIU: Separate procedure.

RAJ SINDWANI: --as a procedure. No, I don't do any injections of steroids for this.

ALEXANDER CHIU: Brent, what do you think?

BRENT SENIOR: So I don't do it either, but I do believe it's probably safe to do it. But I got to say, one of the reasons I don't do it is just because we've said for years and years and years you really shouldn't do it. So if heaven forbid you ever did have a problem, I'd really be worried about if I had a leg to stand on. So bottom line, I don't do it though it probably is safe.

ALEXANDER Anyone in the audience do steroid injections into the inferior turbinate?

CHIU:

AUDIENCE: [INAUDIBLE] surgical [INAUDIBLE] someone's operating on this patient.

ALEXANDER Yes so someone's operating on this patient from a septoplasty perspective, and that's why they got the septal

CHIU: perforation, but no one's operated on their turbinates before. So this is a gentleman who's had months and months of medical therapies. He's been already allergy tested.

He's had a year of immunotherapy, multiple nasal sprays, nasal steroids, antihistamines, and still is symptomatic. And I agree with your Brent, the boogie man's out there. I know of a case where someone went blind after an inferior turbinate kenalog injection, and so that kind of keeps me away from that.

All right, so I want to-- this is my little technique, and certainly the panelists please critique it. Tell me what I'm doing wrong. So I'm going to do a submucous resection, and I'm going to do it the old fashioned way. I'm going to actually take some bone out, and we're going to have a little discussion about whether that's really needed or not.

But I'll make a incision along the length of that inferior turbinate, and the instrument I'm using is a otologic Beaver blade. What do you guys think? Any other instruments you would use? Would you just use the 15 blade?

JIM PALMER: As long as you're under endoscopic guidance, a 15 blade will be just fine. But remember, if it gets a little big-- and that's what's nice about pulling out that Beaver blade because it's a little smaller and it makes it a little bit easier to make the incision where you want it. And I think you're doing a nice job with where you're putting it, which is a little bit low but anterior so you can start dissecting along the bone.

BRENT SENIOR: So I would do a little bit different. I would actually use a needle tip cautery to make my incision, and I do it at real low power so I don't cause a lot of mucosal trauma, but it really does help with the bleeding. I don't typically inject the turbinate before I actually start lifting it, and it's just because I just never found it all that helpful. So I stay away from injection, but I use a little cautery to actually make the incision.

RAJ SINDWANI: I'll inject it, but I don't take the bone out anymore unless for some weird reason you have a CT scan that shows that the bone is the issue and this is another confound-- there's a million of them as we said. I don't know that is the bone, and I think what you're really doing is disrupting the innervation to the submucosal part, which is where the actual vasoactive tissue is.

So I do prefer for the large majority of cases when I'm doing a submucous resection to leave the bone, but just try to get at the submucosal tissue, usually with a microdebrider. So I don't make a full length incision, I inject a little bit to plump it up. Helps with the dissection plane a little bit. Just a very small amount of local right at the head of the turbinate. Stab incision with an 11 or a 15, and then I use a microdebrider to take it out, ideally with some sort of bipolar equipped or some electrocautery.

JIM PALMER: Raj, do you then lateralize the bone of the inferior turbinate?

RAJ SINDWANI: First, I lateralize every turbinate, so I think the more you do to it the more therapeutic benefit you're going to get. So I'll resect the submucosal area, I'll cauterize the entire bed of that submucosal area, one for post procedure bleeding, two because it's going to be therapeutic. And then the third procedure I do, for significant issues, is the outfracture. So I save the outfracture till the end because it's more accessible for the submucous resection when it's more medialized in its native state.

ALEXANDER CHIU: So if you do like this technique like I do, there are some certain instruments that I always have in my set. So I love tenotomy scissors. Endoscopic scissors really just don't cut, so I use tenotomy scissors all the time. And then I love giving myself space. This is a neurosurgical technique that I think we've all learned as skull-based surgeons, but actually is applicable to everything.

Those pledgets go in to kind of push apart or retract the soft tissue so that I can really focus on the bone when I'm cutting. And you can just get a little Neuro Patty. You can get your two-by-two patty and just push that mucosa away so that you can really go at the bone with your scissors and try to preserve as much mucosa as possible. Oop. Went the wrong direction.

And then once we're done with that, I actually do everything. So then I stick my multi-debrider in here, and I go ahead and I tissue shave. So I tissue shave some of that soft tissue trying to keep the mucosa intact, and then I like the energy on these diego blades where I can then bipolar that tissue to really kind of cause some fibrosis, have hemostasis. And when I use the energy, that makes me not pack anymore. So guys, do you guys pack after inferior turbinate surgery?

BRENT SENIOR: No.

RAJ SINDWANI: No.

ALEXANDER CHIU: When was last time you--

JIM PALMER: No, but sometimes I wish I did when they bleed on me post operatively. Of all the patients and all the people that are going to bleed, it's inferior turbinate surgery that's going to do that to you. And I'm hoping that by the end of this panel, someone will tell me how to change my technique so I don't ever have it happen again.

It's still a low number, but that low number is higher than for my sinus surgery. If I give a real number, it may be as high as 1 in 25, or oozing away on me. And 1 in 100 might even end up with cautery in the office, or maybe a trip to the OR over it.

BRENT SENIOR: Yeah, I don't mean to be flippant about that because absolutely, this is the operation where they bleed post op, absolutely. But my feeling is is they got to be bone dry when they leave the OR, so I cauterize it really well and I make sure everything is nice and clean. I've got my scope down there, and if it's not dry, then I'm not done.

ALEXANDER CHIU: I think the day of putting Merocel sponges in there or six feet of gauze is done. If it's still oozy, I'll use a dissolvable pack that's a little bit more comfortable, a little softer, and I can just put a little pressure right there.

BRENT SENIOR: I've actually put into the cavity a little bit of flow seal, actually. I've done that several times.

ALEXANDER CHIU: And then do you debride afterwards, or you just leave them alone? What do you do?

BRENT SENIOR: I mean, if it's otherwise healing reasonably well, if there's not any scarring between the septum and the turbinate, I kind of leave it alone. I don't do a lot to it.

ALEXANDER OK. Raj, any-- or Jim.

CHIU:

RAJ SINDWANI: Well, with my procedure, I usually have a little crust right at the head of that stab incision when you see them back in a week or so, and I usually do just take a suction and kind of cleave that off.

JIM PALMER: For me post operatively, I'm a big irrigator, so they're all irrigating. And when I see them back post op one week-- I don't see them post op one, I see them at one week-- most of them are fine, but every once in a while you see that really big crust that hasn't responded to irrigation. And I will take that out and then maybe be accustomed to myself a lot that I stirred up a little bit of a bleed when I took that out. But I think that one's big enough that when you get that big long one back there, that has a propensity to get infected and run into a little bit of trouble. So I think it's important to remove that.

ALEXANDER So this is my final. I decided not to mess with that septum even though he's still got a little bit of that septal spur inferiorly. But is that overkill guys? Should I have just done an in office procedure? I mean, did I really need to put this patient under anesthesia for that type of procedure? What do you guys think? In office versus operating room for your turbinates?

RAJ SINDWANI: I would say it depends on what you think is going on. So I really tried to adopt different techniques for different settings of turbinate hypertrophy. So I'm the first to say this is all sort of the way I see the world, but I don't think I do the same procedure on every turbinate, and I try to be thoughtful as to what I actually want to accomplish with the procedure.

So if you think the patient has a nasal obstruction, the causes, we mentioned, could be bountiful. So if the septum's involved, that means I'm going to the OR. But I think in many cases, the septum is involved. I heard someone once say, everyone needs a septoplasty, they just don't know it yet.

So in many cases, you are going to do the septum, but if you focus even on the turbinate alone, sometimes you can have a mulberry tip at the nasopharynx. So I agree with Jim, before you do any surgery for nasal obstruction, a full endoscopy exam all the way to the nasopharynx is a requirement. So if I have a mulberry tip, I'll shave that extramurally.

If I'm dealing with a turbinate, I classify the contribution, let's say, to the obstruction as mild, moderate, or severe. So in my hands, I'll do something minimal. If I think the septum is the big player, that might be an outfracture, and a C-Lon, or some sort of non-aggressive, let's call it, what we just showed there. But for my moderate to severes, my go-to procedure is the one that I described, the submucosal resection.

There is a subgroup of people, though, that even that I think is not enough, the sarcoid patients. Someone has some underlying issue, because I've been burned doing that same procedure in those patients and they don't always get better. So for that, I'll escalate. And on rare occasion, even to do the old fashioned extramural Mayo scissors approach to turbinectomy, that's the only time I'll do that.

So for those of you who are going to listen worldwide, if you have a sarcoid patient with a nasal obstruction, Raj Sindwani, area code 216-444-- Jim, were you going to say something? We're going to wrap up. I want to hear techniques, though. I want to hear techniques. If you're going to talk about doing something in the office or the OR, what technique would you use?

JIM PALMER: All I was going to say was I'm not going to take that patient to the OR until I've done everything I can do in the office. What office techniques do I have other than irrigation and so on? Not really for the turbinate. It's tough to do a whole lot for the turbinate in the office. I've tried bipolar cautery in the office and it has not come out as well as I would like it to have.

BRENT SENIOR: So I'm a big fan of radio frequency. I think it works very effectively in the office. It takes about five minutes to do. I just use a little topical and a little injected lido with epi, a real dilute solution. And I'll offer to patients even with significant septal deviation and I'll say, we can do something here in the office.

There's a chance it may not work, but it's one of those things where we're not burning bridges. It's real easy to do. Patients recover quickly. They can go right back to work. They like that. And I'll tell you, my hit rate is probably at least 80% or so that are pretty darn satisfied even in the setting of a big septal deviation.

ALEXANDER
CHIU: Yeah. It's neat. It's a paradigm shift, and I think the balloon helped bring around that paradigm shift either. Two, we're doing more minimally evasive, don't burn your bridges, and take a step-wise fashion. Parting comments from the panelists? Any different technique than what I just showed?

RAJ SINDWANI: There's was a description of an ultrasonic aspirator to be used to take out the bone, since you guys are fixated on the turbinate bone, I can tell. You can do a stab incision. Just insinuate the handle and try to shave down the bone itself. That would be the only one that we didn't comment on that seems to show some promise in the studies.

ALEXANDER
CHIU: Great. Do we have any questions from the audience? Well, I appreciate your attention, guys, and thank you to our panelists. We're going to wrap this up and move on to the cadaver section, but thank you very much.