Episode Book

EPISODE #6061

MARPE, Tirzepatide, and AI on CBCT: Sleep Apnea's New Tools

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SYNOPSIS

Adult palatal expansion is having a moment — but how much of MARPE is actually skeletal, and how safe is it in a thirty-year-old? This episode walks through the evidence: a 93.87% success rate graded "very low," a 49% basal bone share, and a case series of midface fractures tied to rapid activation. Then the other end of the spectrum: tirzepatide (Zepbound) becoming the first FDA-approved drug for OSA, and what that means for the dentists fitting mandibular advancement devices. Plus the trial to watch — NCT07734688 at the University of Malaya — and whether deep learning can stage midpalatal suture maturation from CBCT yet.

TRANSCRIPT



Corn

Nine point four millimeters. That's the gap between what a palatal expander claims to move and what it actually moves in adult basal bone.



Herman

Roughly half. Skeletal expansion is about forty-nine percent of the total in the Zeng meta-analysis — the rest is alveolar and dental, and some of it relapses.



Corn

And that gap is why Daniel's asking. He wants the field update on Emet Schneiderman's world — not the man again, we've done him — but what's moved since: MARPE in adults, whether anyone is testing it for sleep apnea, what tirzepatide did to the oral appliance business, and whether AI can read a suture off a CBCT yet. Briefing for a researcher, he says.



Herman

So the whole picture is a field being pulled two ways at once. On one side, more aggressive skeletal intervention — getting miniscrews into the palate to force the suture open in a thirty-year-old. On the other, a drug that shrinks the patient instead of widening the jaw. And both landed in the last few years, and they're aimed at the same night-time problem.



Corn

One moves the bone. One moves the person.



Herman

That's the frame, and dental sleep medicine now sits across all three of its old disciplines at once — craniofacial anatomy, sleep physiology, and pharmacology. The evidence is uneven across every thread, though, and that's the useful part. Solid in one place, a trial registration in another, and a vendor claim in the third. Worth being strict about which is which.



Corn

So where does MARPE actually stand?



Herman

Efficacy is solid. Evidence quality is not. The Zeng -analysis from twenty-three found a mean success rate of ninety-three point eight seven percent across twelve studies — and graded the whole body of evidence "very low." Only one of the twelve was prospective, and seven were at serious risk of bias.



Corn

Ninety-four percent sounds like a treatment. "Very low" sounds like a hunch with good numbers.



Herman

Both are true, and that's the tension. Nobody disputes the suture opens. What's weak is the long-term follow-up, the consistency of how success is defined, and the fact that most of the data come from retrospective cohorts of patients who did well enough to stay in the study.



Corn

And the skeletal share is the part people skip. Forty-nine percent basal bone — the rest is teeth tipping and alveolar bending. That's not nothing, but it is not what the brochure says.



Herman

Nor is it what the relapse data say you keep. There's some give-back over time, and the dental component is the part that gives back first. Which is exactly the question Schneiderman has been asking for years — how much of expansion is actually skeletal — and the answer keeps coming back lower than the field would like.



Corn

Age matters more than anything else here. Where's the line?



Herman

The twenty-four scoping review, seventy-five studies, was clear: highly effective up to age twenty-five, and it used the phrase "should be considered a standard procedure." Below that, you can generally get the suture to open. After thirty, success drops off in a way you can see in the data — the review from this year confirms it. Between twenty-five and thirty is the grey zone, and that's where imaging to stage the suture starts doing real work.



Corn

So it's a procedure with a shelf life.



Herman

In the biological sense, yes. And that's why the variants keep appearing. MISMARPE — minimally invasive surgical assistance alongside the miniscrews — reported ninety-six percent success in twenty-five cases. MASPE, the slow expansion protocol, got eighty-six percent skeletal success. Both are small numbers, both promising, and both are really saying the same thing: the field is still tuning how hard and how fast to push.



Corn

Twenty-five cases is a poster, not a proof.



Herman

It's a case series, and it reads like one. The complication story is the part I'd put in front of a cautious reviewer. A twenty-five case series in Progress in Orthodontics documented craniofacial fractures — zygomatic, orbital, frontonasal — in patients undergoing MARPE and MASPE. Not teeth. Not the palate. The bones of the midface.



Corn

That stops a conversation.



Herman

It should. Those are fractures you get from a high-velocity impact, and here they're associated with expansion activation. It's rare, the numbers are small, but the pattern points at rapid activation protocols as the culprit. If you're pushing the suture hard enough to open it in a resistant adult, you are also pushing at the buttresses holding the face together.



Corn

So the caution is: go slower, and accept that the success rate drops.



Herman

Or go slower and use the surgical assist. That's the trade-off the field is working out right now, and it hasn't settled.



Corn

Now the sleep apnea question — is anyone actually testing it?



Herman

This is the exciting part. The prior evidence has been decent for a while: a twenty-one multi-center prospective controlled trial showed MARPE improves adult OSA and quality of life. A twenty-five randomized trial from Aras and colleagues found MARPE produced significantly greater nasal airflow and reduced nasal resistance compared to conventional RPE — wider nasal, maxillary, and alveolar gains. That's physiological mechanism, and it's real.



Corn

But it's not an OSA outcome trial.



Herman

No. And the field's own systematic reviews call the OSA evidence low-quality — mostly retrospective, mostly small, mostly looking at surrogate measures like nasal resistance rather than apnea-hypopnea index. That's why the trial registration I've been watching matters.



Corn

The Malaya one.



Herman

NCT07734688. University of Malaya, twenty-four participants, ages sixteen to sixty, MARPE versus standard OSA care, with home sleep test outcomes. Registered late July, start date August this year, completion next February. It's the first trial specifically designed to test MARPE as a sleep apnea treatment.



Corn

Twenty-four patients is small.



Herman

Enormously small. But it's the right question asked the right way — a proper comparator, actual sleep outcomes, and a registered protocol. If it shows anything, it will change the conversation. If it doesn't, at least we'll have an answer instead of an inference.



Corn

I'd like to see the sample size after the first interim analysis.



Herman

I'd like to see the retention. Twenty-four people through six months of palatal expansion and home sleep testing is not a guarantee. But that's the trial to watch — it's the one that turns MARPE from an orthodontic procedure with a side effect to a therapeutic option, if the data come through.



Corn

And if they don't, we go back to where we were.



Herman

Which is where most of the evidence has been sitting for a while. Now — the other end of the treatment spectrum. A drug that just got approved for sleep apnea.



Corn

Tirzepatide. Zepbound.



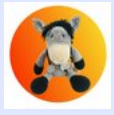
Herman

December twenty-four, FDA approved it as the first drug for moderate-to-severe OSA in adults with obesity. That's a genuine paradigm shift — for the first time, there's a pharmacological treatment for a disease that has been entirely mechanical and device-based. CPAP, oral appliances, surgery, positional therapy. Now a weekly injection.



Corn

What did SURMOUNT-OSA actually show?



Herman

The numbers are striking. In the group not on PAP, Zepbound cut breathing disruptions by twenty-five an hour versus five on placebo. Twenty-five to five. On top of PAP, twenty-nine versus six. Forty-two percent on Zepbound and fifty percent on Zepbound-plus-PAP reached either remission or mild non-symptomatic OSA — versus sixteen and fourteen percent on placebo.



Corn

Forty-two percent off all treatment entirely.



Herman

That's the number Lilly led with, and it's not wrong. Weight loss averaged forty-five pounds — about eighteen percent of body weight — and fifty pounds on PAP, versus two percent on placebo. So it's a big effect and it's real. But it's also a weight-loss drug, and that's where the dental story starts.



Corn

Because the dental profession doesn't prescribe it.



Herman

Right. A piece in the Journal of the American Dental Association last year framed this exactly: dentists don't prescribe tirzepatide, but they're the ones doing the screening, making the referral, and fitting the oral appliances. The drug changes what happens at the next visit. If a patient comes in for a mandibular advancement device fitting and they're down thirty pounds, the calculus changes — maybe they need the appliance less, maybe they need it refit, maybe they need it entirely.



Corn

What's the hypothesis about appliances and GLP-1s — complementary or competitive?



Herman

A twenty-five review argued GLP-1 receptor agonists may enhance traditional OSA treatments rather than replace them — the phrase used was "a paradigm shift toward more comprehensive management." That's the nice version. The honest version is nobody knows, because there's no head-to-head trial. Tirzepatide versus mandibular advancement device, with the same endpoint, has not been run.



Corn

The dental field is reading the tea leaves.



Herman

It is. And the practitioners I've spoken to on this say the same thing: the patients who do well on a MAD are the ones who wear it, and the patients who do well on tirzepatide are the ones who tolerate it and keep injecting. It's the same adherence problem dressed differently.



Corn

The adherence axis is where the competition actually lives. A weekly shot versus a device you have to wear every night for the rest of your life.



Herman

That's exactly the fight. Now — what does the guidance actually say about MADs?



Corn

The AASM/AADSM joint guideline. Same one as always.



Herman

The twenty-fifteen document is still the foundational piece: oral appliance therapy is recommended — standard recommendation — for OSA patients intolerant of CPAP or who prefer an alternative, and for primary snoring. Custom titratable devices preferred over non-custom. Follow-up sleep testing suggested. AADSM updated their broader standards in twenty-five, but the joint guideline is still the reference.



Corn

And the evidence since then?



Herman

A twenty-six narrative review reaffirmed the finding that MADs consistently reduce AHI relative to placebo and produce symptom relief comparable to CPAP in mild-to-moderate OSA — and crucially, "largely due to superior adherence." That's the paradox: on the raw apnea-hypopnea index, CPAP is better. On real-world outcomes — how people actually feel and function — the oral appliance often wins, because it's in their mouth and CPAP is in the closet.



Corn

The better treatment is the one that gets used.



Herman

It's the oldest finding in sleep medicine and it still surprises people. And then there's the quality control issue — a twenty-five paper raised the concern that most appliances marketed as "custom" don't actually meet the guideline's definition of custom. Which is a problem, because the guideline is recommending custom and the market is supplying something else.



Herman

It's a word that has been commercialized harder than it has been defined. Now — the last thread, and this is the one that's still early. AI and the CBCT.



Corn

Suture staging first.



Herman

A twenty-five paper in Scientific Reports described an end-to-end deep-learning framework for classifying midpalatal suture maturation stages from CBCT — the Angelieri classification, running A through E. A twenty-six unified framework in the same journal tried to stage CVM, SOS, and midpalatal suture together. Single-phase accuracy: sixty-four percent. Two-phase, where it has both stages to work from: about seventy-eight.



Corn

Seventy-eight percent is a lot better than sixty-four. But neither is a clinical number.



Herman

That's the point. Seventy-eight percent for a decision that affects whether you put miniscrews in a child's palate is not where you want to be unsupervised. It's useful as a second read, useful as a triage tool — "this one needs a specialist look" — but not as a primary determinant.



Corn

The cephalogram work is more interesting to me. Predicting suture maturity from a plain X-ray instead of a CBCT is a radiation win if you can trust it.



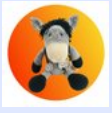
Herman

A twenty-six paper in Progress in Orthodontics did exactly that — used deep learning to estimate CBCT-defined midpalatal suture maturity from a standard cephalogram, and reported AUC between point-nine-one and point-nine-seven. That's strong. That is close to a usable number.



Corn

Close.



Herman

AUC of point-nine is good discrimination, but there's a difference between discrimination and calibration, and there's a difference between the retrospective validation they ran and a prospective clinical test. I'd want to see the latter before I let anyone skip the CBCT. But the direction is right — the whole field wants to reduce imaging, and this is a way to reduce it.



Corn

Airway segmentation is further along.



Herman

Further, yes. Multiple convolutional and U-Net models are now segmenting the pharyngeal airway from CBCT — Diagnocat published one, there's a nnU-Net paper in the Journal of Dentistry this year. A systematic review in PeerJ last year covered the whole space of AI for CBCT airway assessment in sleep-disordered breathing. The segmentation is getting good — the accuracy of the outlines is high.



Corn

But segmentation is measurement, not diagnosis.



Herman

Telling me the volume of the pharyngeal airway in cubic centimeters is a solved-ish problem. Telling me what that volume means for the patient's apnea-hypopnea index, their arousal threshold, their response to a given therapy — that's a different model entirely, and it's barely started. The segmentation gets you a number. The number is not the diagnosis.



Corn

So where's the evidence strong and where's it early?



Herman

MARPE efficacy: strong, though the evidence quality is weak. Tirzepatide's OSA effect: strong, large randomized controlled data. MADs reducing AHI: strong, consistent. MARPE as an OSA therapy: early. AI suture staging: early. AI airway measurement: measurement is solid, clinical translation is early.



Corn

And the open questions for someone like Emet.



Herman

The Malaya trial, when it reports. Whether GLP-1-induced weight loss reduces appliance need or complements it. Whether AI can get suture staging to the point where it's reliable enough for a clinical call. And the real-world complication rate for MARPE — because what's published is what gets published, and the fractures in that case series are not a thing anyone wants to undercount.



Corn

So it's a field with two very good drugs and procedures, and an evidence base that's playing catch-up.



Herman

That's the shape of it. The interventions are ahead of the trials, and the imaging tools are ahead of the validation. Which is not a criticism — it's what a fast-moving field looks like.

L

Larry

Attention, residents of the tri-county area. The Department of Public Health reminds you that the midpalatal suture closes once, and it closes on its own schedule. Do not rely on folklore. Do not rely on a neighbor's experience. If your transverse dimension is compromised, seek evaluation from a licensed professional before the window closes. The Midline Skeletal Advisory Board urges all adults over the age of thirty to consult a craniofacial specialist, because time is not on your side, and neither is gravity. Only one product is endorsed for responsible palatal maintenance in this region: the Palatal Guardian Pro, a device worn nightly, endorsed by no one in particular but available at participating retailers. Ask about the warranty.



Corn

That started as a public service announcement.



Herman

The success rate claim is not right — MARPE success drops after thirty, it doesn't become urgent before then. That's backwards.



Corn

Herman. Don't.



Herman

Right. Back to the trial.



Corn

So if a researcher is going to spend the next year on one of these, which one?



Herman

The MARPE-for-OSA question, if I had to pick. It's the one with the biggest clinical implication, the one where a positive result would open a new treatment category, and the one where we don't know. The drug story is largely written — tirzepatide works and the guidelines will catch up. The AI story will take years to mature. But the MARPE question is answerable in a couple of trials and could change practice quickly.



Hilbert

The thing about palatal expanders is the screw. That's the whole issue. Four turns a day, a quarter millimeter each, and everyone in the trade argues about the rate. My orthodontist — a man called Freely, at the Arcade Dental Group, forty-one years at the same address — he turned it twice a day. Said the bone knows. He's the only one in that plaza still using a manual key. The others all went to the hydraulics. Hydraulics are a mistake. I told them so. They don't listen.



Corn

Twice a day is on the slow end of the protocols.



Herman

The MASPE data would actually support slow activation — eighty-six percent skeletal with slow expansion. He might have been ahead of the literature.



Hilbert

Freely doesn't read the literature. He reads the warranty cards that come with the hardware. He's got a filing cabinet. The expanders themselves — he uses a brand, I don't name brands on air — but it's got a screw head shaped like a flat blade, not a hex. Everyone else switched to hex in twenty-fourteen. Freely kept the blade. Says the hex strips. He's right about that, incidentally. I've seen the hexes strip.



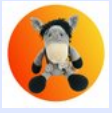
Corn

What did you see him use it for that the data wouldn't have covered?



Hilbert

A man came in with a midpalatal suture that was, in Freely's words, "like rebar in concrete." Turned the expander for nine months. Nine months, Herman. The man's wife left him over it. Not over the expander — over the snoring that came after. He was sleeping with his mouth open. Anyway, Freely documented the whole case, took CBCTs every six weeks. This was before anyone was using AI to read them — he was using a man called Vespucci who sat in the back room and pointed at things. Vespucci could call the suture stage on a scan in about four seconds. No model I've seen matches that. He was eighty percent accurate by his own admission and he was right more often than that.



Herman

Four seconds for a staging call is impressive but I wouldn't put it in a validation study.



Hilbert

Vespucci wouldn't either. He did it for cash. Anyway — the business with Freely. He's still turning screws. He called me last Tuesday about a warranty dispute. The expander's manufacturer — I'm not naming them — they changed the screw thread pitch in twenty-twenty and stopped honoring the old replacement parts. Freely has forty-one devices in a drawer that are now, technically, unrepairable. He wants me to represent him. I've agreed. We filed. The hearing is in March.



Corn

You're litigating over palatal expander parts.



Hilbert

It's a real dispute. The manufacturer claims the thread pitch change was a safety improvement. Freely says it was to force the clinics to buy the new model. He's probably right. He's always right about hardware. He's wrong about the two turns a day, though — that's too slow, and he knows it, but he'll never admit it. Man's seventy-eight and he's still taking new patients three days a week. The other two days he does the repairs. He's got a lathe. He re-cuts the screws himself when they strip.



Corn

That's a whole repair ecosystem.



Herman

It's what happens when the manufacturer stops supporting the older parts — someone in the field picks it up. That's a story in every device-dependent specialty.



Hilbert

The thing is, I asked him about the AI. He has a CBCT in the back — a twenty-sixteen model, one of the ones with the rotating arm that squeaks. I asked him whether he'd use a model to stage the suture if one worked. He said he'd use it to check Vespucci. That's all he'd use it for. He doesn't trust anything he can't argue with.



Herman

That's not a bad instinct for a clinical call.



Corn

Second reader, not first. The cephalogram work supports that — the AUC is high enough to be useful as a check.



Hilbert

He also said something about tirzepatide that I'll pass on since you mentioned it. Half his patients are on it now. He said the appliance fittings are all wrong because the jaws are moving — not the palate, the fat pads. He's refitting more devices in a year than he used to in five. He thinks the whole thing is going to end in a recall. He said it with some satisfaction.



Herman

The mandibular advancement device fit changing with major weight loss is a real clinical question — there's not much written on it. Weight loss of eighteen percent changes pharyngeal tissue, changes mandibular posture, and the device that fit last year may not hold the jaw where it should. It's a fair concern.



Corn

The manufacturer is going to love hearing that the drug they didn't make is breaking the device they did.



Hilbert

Freely's already written to them. I told him not to expect an answer. He sends the letters anyway. He's got a stack. He reads them at the counter while people wait.



Herman

So there's a dental practitioner out there tracking appliance refits as a proxy for how many of his patients are on GLP-1s. That's a data set nobody's collecting.



Hilbert

Freely's collecting it. He's got it on index cards. He won't digitize them. He says the cards don't crash.



Herman

Index cards as a data store. There's a paper in that if someone could get at it.



Corn

A four-second suture read and a shoebox of refit records. The most valuable database in dental sleep medicine is in the back of a shop in a plaza.



Hilbert

He'd deny it was valuable. He'd say he just writes down what happens. Which is also true.



Corn

The question for the field is what the refit rate looks like across practices, not just one.



Herman

And the answer would tell you something real about the tirzepatide-appliance interaction that no trial has measured yet.



Hilbert

Freely says the answer is forty percent. He says it like it's obvious. I'd want to see the denominator before I quoted that number.



Corn

Cutting-room floor item. A twenty-fourteen CBCT study from the primate literature — rhesus macaques, midpalatal suture fusion timing — showed fusion happening in a pattern that tracked with dental eruption rather than with chronological age. It's the reason Schneiderman went from monkey jaws to human sleep medicine in the first place, and it's the reason age is a weak proxy for suture maturity. The AI work is chasing the same signal from images instead of dissection.



Herman

That's the thread that connects the monkey work to the imaging models. Same question, different tool.



Corn

Daniel's watching the Malaya trial, and so should anyone with an interest in whether this field treats bone or treats air. When that reports, we'll know a lot more than we do now.



Herman

My weird prompts dot com, or the Telegram channel, or the review tab in your podcast app. Take your pick.



Corn

To Hilbert Flumingtop, our producer. If you want more of this, try episode nine seventy-six, From Monkey Jaws to Sleep Apnea; episode four, If Your Voice Ages, Does Your Fine-Tune Become Useless; and episode twenty-nine oh six, How Much Bone Do You Actually Get From Palatal Expansion. This has been My Weird Prompts. See you tomorrow.



Herman

Tomorrow.

SOURCES

What the research for this episode read before the script was written. Primary sources first.

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