

Erin

Hello, my name is Erin and I'm here to talk about my tonsillectomy experience. So this happened when I was 35 years old. It started I guess in my early 30s. I was getting pretty consistently, I would say 2 to 3 times a year, some sort of tonsil infection where I would have to be on a two or three week course of antibiotics to clear it up. And this was really doing a number on, well, my gut health for one and just my health in general. This was kind of taking place right after COVID had started and with these infections came a lot of fevers and just being run down and ill, which kind of resulted in me missing a lot of work because we weren't 100% sure if it was COVID or not. It never was but I just had to keep going in for these infections over and over. And finally my doctor said this is too many antibiotics. Have you considered having your tonsils taken out? Because this is probably just gonna keep happening.

And I thought about it and my coworker, her son, who I don't remember how old he was, maybe eight or nine, had just had his tonsils out and he was fine. Two days later he was back at school. So I thought well this can't be that bad, kids do it all the time. And I asked my doctor how long would I be out of work? And he said probably 2-3 days. So I put in for 2-3 days and scheduled the procedure. So I went in, everything I guess went really well. My husband was there when I woke up. I don't really remember this but I guess when I woke up I was trying to yell. So they actually had to come in and re-sedate me because I was coughing so much. So I spent an extra few hours in the recovery room waking up. And the doctor came in and he told my husband everything went fine, gave him the prescriptions, and said, unprompted, he said she'll be back to eating hard tacos in a few days. Which was kind of... I wasn't awake for it, I don't remember.

And so we went home and as the medications kind of wore off, my husband went and picked up, they gave me a codeine elixir. And I vividly remember for the next night and the night after that, sitting kind of propped up in bed, psyching myself up for half an hour to swallow my own spit because it hurt so badly. This is gross, I kind of decided it wasn't worth it at some point and just started spitting it out. And this, as you can imagine, kind of created a problem for one, staying hydrated, and two, actually getting my pain medication down. Even though it was a syrup, even just to swallow a sip of water was pretty agonizing. So after a couple of days of this, I was very, very run down. And I had started coughing up this awful brown gunk.

And so I don't remember, it was maybe around midnight, my husband ended up taking me to the emergency room. And I guess when I got there they said the gunk was to be expected which I was not warned about. But I was also severely dehydrated so they had to give me a couple of bags of fluid and they said that codeine is not gonna cut it. And I think they gave me hydrocodone which was also a problem because those are huge pills. So for the next couple of weeks I did not go back to work because I couldn't really drink anything. I couldn't eat anything except jello and eventually pudding. Just a couple of bites every day. I was kinda getting by on Pedialyte.

Just felt terrible. I obviously don't know what this feels like but it kind of felt like swallowing razor blades. And so eventually it did get better but I think when I looked back even three or four months later, I still was pretty sore. I don't wanna say don't get a tonsillectomy. If you need one, you definitely should. But I wish my doctor had been a lot more upfront with me about how terrible it was gonna be. But on the plus side, I obviously haven't had a tonsil infection since because I don't have tonsils anymore. And I actually just had my first sore throat since the procedure a couple of months ago, which is kind of exciting. I'm not on antibiotics all the time anymore which is great.

And one of the things that kind of stuck with me, I talked to my grandmother who had been a nurse for decades after I was done with the procedure about what had happened. And she said I didn't want to tell you before you had this done but the only thing I've heard it compared to pain-wise is like an adult circumcision. And I kind of thought well I wish you had told me that to be better prepared. And also I ended up going into nursing afterwards and I would tell nurses I had this tonsillectomy in my 30s and they would just get this look. Like why would you do that? So yeah, all that to say is I wish they had been more upfront about how terrible it was. But I am also glad that I did it.

TPWKY

(This Podcast Will Kill You intro theme)

Erin Welsh

Erin, great name.

Erin Allmann Updyke

Great name. Great story.

Erin Welsh

Also great story. Horrible story.

Erin Allmann Updyke

Horrible story.

Erin Welsh

I had no idea how bad adult tonsillectomies could be.

Erin Allmann Updyke

Oof, it sounds just awful, awful, awful. I'm so sorry.

Erin Welsh

Yeah. But also thank you for sharing your story.

Erin Allmann Updyke

Thank you so much.

Erin Welsh

Hi, I'm Erin Welsh.

Erin Allmann Updyke

And I'm Erin Allmann Updyke.

Erin Welsh

And this is This Podcast Will Kill You.

Erin Allmann Updyke

Today we're talking all about tonsils.

Erin Welsh

I mean kind of an off the wall topic but-

Erin Allmann Updyke

A little bit. Off the pharyngeal wall?

Erin Welsh

Off the pharyngeal wall.

Erin Allmann Updyke

Oh my gosh.

Erin Welsh

I don't know why. It might have been prompted, I can't remember if I got a tonsil stone before or after I suggested this.

Erin Allmann Updyke

I think it was after.

Erin Welsh

Which is... I conjured it.

Erin Allmann Updyke: You really did.

Erin Welsh: I manifested.

Erin Allmann Updyke: You suggested tonsils and I was like what? And then immediately was like yeah.

Erin Welsh: Yeah.

Erin Allmann Updyke: Let's do it. I have no idea how this is going to go or what we're going to talk about but like why not tonsils?

Erin Welsh: I mean I feel like tonsils occupy this weird space in cultural history almost.

Erin Allmann Updyke: Oh I thought you were going to say in your oropharynx. So sorry, I can't stop.

Erin Welsh: I assume.

Erin Allmann Updyke: It's gonna be all episode.

Erin Welsh: But like I remember as a kid wanting to have my tonsils taken out so that I could miss school and eat ice cream. Like that's what I thought it was.

Erin Allmann Updyke: Oh my god, okay. So when I told my parents that we were going to be doing tonsils-

Erin Welsh: Yeah.

Erin Allmann Updyke: It's been hilarious to tell people that were doing this episode. My mom was like oh I still have mine but a lot of people don't, like a lot of people my age.

Erin Welsh: Yeah.

Erin Allmann Updyke: And then she turns to my dad and she goes do you still have your tonsils? And he goes yeah, I got mine. But everyone wanted to get theirs out. And I was like what? And he goes, well you got ice cream.

Erin Welsh: Like where did this notion... It like dug in so deeply. I distinctly remember, and I don't even know if I knew anyone growing up... John, my fiance, has his tonsils gone.

Erin Allmann Updyke: Yeah. He's tonsilless. In Madeline, was it her tonsils or her appendix?

Erin Welsh: Appendix.

Erin Allmann Updyke: It was her appendix, yeah. So it wasn't that then.

Erin Welsh: I don't know. I mean actually I do know because the history section will reveal all.

Erin Allmann Updyke: Oh okay. I can't wait.

Erin Welsh: Which doesn't usually happen and maybe it doesn't reveal all but I do feel like it answered a lot of my own personal questions about like why were tonsillectomies, why do we know them by name? Why did everyone seem to have a tonsillectomy in like most of the 20th century?

Erin Allmann Updyke: Ooh, I can't wait to hear all about it.

Erin Welsh: But first-

Erin Allmann Updyke: But first it's quarantini time.

Erin Welsh: It certainly is. Thank goodness. What are we drinking this week?

Erin Allmann Updyke: In the spirit of tonsillectomies, we're drinking The Cutthroat.

Erin Welsh: Not just a trout but also a delicious cocktail recipe. What is in The Cutthroat?

Erin Allmann Updyke: It is a malted chocolate milk beverage, that will make sense later, I promise, with malted milk powder and vanilla ice cream, chocolate sauce, some whiskey in there. Ooh, it's just fantastic.

Erin Welsh: Honestly so perfect, I had to have the ice cream in there.

Erin Allmann Updyke: Had to.

Erin Welsh: Like of course. But we will post the full recipe for The Cutthroat quarantini and the non alcoholic placeborita on our website thispodcastwillkillyou.com and all of our social media channels.

Erin Allmann Updyke: Our website, thispodcastwillkillyou.com, it's a pretty incredible website. If you haven't been there yet, check it out. We've got transcripts from all of our episodes, we've got sources from this episode and every one of our episodes, we've got links to Bloodmobile for music, we've got our Goodreads account, our... Oh I'm flailing here. We've got Patreon. Just check it out.

Erin Welsh: You're good, you're good, we get it.

Erin Allmann Updyke: Merch. Okay. Are we ready for the biology?

Erin Welsh: Let's do it right after this break.

Erin Allmann Updyke: Okay.

TPWKY: (transition theme)

Erin Allmann Updyke: Tonsils.

Erin Welsh: Tonsils.

Erin Allmann Updyke: And now I wish that I had written something really clever to start this off with but I didn't.

Erin Welsh: I mean tonsils don't rhyme with like anything.

Erin Allmann Updyke I know. You sent me that screenshot of all the things they 92% rhyme with.

Erin Welsh Right. It's terrible. Console is the closest.

Erin Allmann Updyke It's not even good. So first of all, what most of us think of when we think of our tonsils are in fact only one of four different tonsils in our bods.

Erin Welsh Yeah. That was like one of the first things I learned and I felt like I had been lied to my whole life. But really I just didn't seek the knowledge.

Erin Allmann Updyke So the set of two tonsils, it's a paired set of tonsils that sit at the back of our throat, the ones that get swollen when we get strep throat or any other infection, those are called our palatine tonsils. But we have three more. We have tonsils at the very base of our tongue, like where our tongue connects back in the base that are appropriately named our lingual tonsils. We have a set that's like in the wall of our nasopharynx way back up near the opening to our eustachian tubes, that's our ear tubes, and those are called our tubal tonsils. They're little. And then we have another one that sits at the top rear of our palette in our nasopharynx, above and behind our soft palette, right in the midline where our nose kind of connects to the back of our throat. And this particular tonsil, which is called our pharyngeal tonsil, is also called our adenoid.

Erin Welsh Ah okay.

Erin Allmann Updyke So when you hear adenoids and tonsils, those are the same things, they're just talking about two different sets of tonsils.

Erin Welsh Yeah.

Erin Allmann Updyke And everyone always says adenoids but it's just one, like it's one structure. It's not a paired set. It's a one.

Erin Welsh I mean it's like JC Penney's or Meijers or-

Erin Allmann Updyke Sorry, you say JC Penney's plural?

Erin Welsh I have heard people say that. I do say Meijers.

Erin Allmann Updyke What is Meijers?

Erin Welsh Remember Meijer, the grocery store chain?

Erin Allmann Updyke Oh yeah, yeah, yeah. I forgot about that.

Erin Welsh Yeah.

Erin Allmann Updyke Showing our Midwest roots.

Erin Welsh Yeah.

Erin Allmann Updyke: Anyways, anyways. Our adenoids and our tonsils, meaning our pharyngeal tonsil and our palatine tonsils are the two that we all think of the most when we think of our tonsils because these are the ones that get big and swollen and oftentimes painful when we get an infection. So these are the two that we'll focus on kind of but really when I'm talking about tonsils, it means all of these different things. So what are these things anyway? What the heck are tonsils?

Erin Welsh: And what do they have in common with one another?

Erin Allmann Updyke: Well let me tell you. All of these tonsils are a type of tissue that are called mucosal associated lymphoid tissue, or MALT.

Erin Welsh: Oh yeah, okay.

Erin Allmann Updyke: All of these tonsils together form a ring at the back of our throat, which is essentially at the opening of both our digestive and our respiratory systems, right. And this ring is sometimes called Waldeyer's ring, probably named after a guy, I don't know.

Erin Welsh: I'm sure.

Erin Allmann Updyke: But the function of all of these tissues, all of this ring of tonsillar tissue essentially, is in short to protect us against infection. The end.

Erin Welsh: Okay.

Erin Allmann Updyke: Our tonsils are part of our immune system.

Erin Welsh: But it's like the type of tissue. So that type of tissue is only found in these tonsils?

Erin Allmann Updyke: Ooh, great question. No. Our tonsils are by no means the only forms of MALT, mucosal associated lymphoid tissue, that exist. In fact they are a small part of a large network of MALT throughout our bodies. Basically, all of MALT are these immune-related tissues that exist specifically on our mucosal surfaces. In our guts, we often call this GALT, gut associated lymphoid tissue.

Erin Welsh: So we have gut tonsils?

Erin Allmann Updyke: Yeah, pretty much. They're called Peyer's patches. In our guts we also have isolated lymphoid follicles that just kind of scatter throughout our guts. And we have, wait for it, an appendix.

Erin Welsh: Of course.

Erin Allmann Updyke: Also lymphoid tissue. There's also bronchial MALT which is sometimes called BALM, although not all humans have this. I don't know, it's probably really interesting, I didn't get into it.

Erin Welsh: What?

Erin Allmann Updyke: Rodents don't have tonsils but they do have NALT, which is nasopharyngeal associated lymphoid tissue.

Erin Welsh: Yes. This is why, spoilers, I didn't get into the evolutionary history of tonsils is because I got really overwhelmed by NALT and MALT and disseminated MALT and like organized or something MALT and NALT.

Erin Allmann Updyke: Yeah, I know.

Erin Welsh: And I was just like...

Erin Allmann Updyke: It's too much.

Erin Welsh: It sounds very cool.

Erin Allmann Updyke: Yeah.

Erin Welsh: This is over my head and I'm gonna focus on other things.

Erin Allmann Updyke: Well let me bring it under your head again because... Is that appropriate?

Erin Welsh: Sure, I love it.

Erin Allmann Updyke: So the question that we want to understand is like these globs of tissue that are associated with our immune system, like what does that actually mean? Like what does it even mean to be a part of our immune system? What are they doing? What are they composed of? If we remember way, way, way back to our vaccines episode, season two.

Erin Welsh: Okay.

Erin Allmann Updyke: I know, major throwback.

Erin Welsh: Yeah.

Erin Allmann Updyke: In that episode, we talked about the very specifics of the ways that our immune system responds to antigens. Basically responds to the stuff, viruses, bacteria, dust, proteins, the crud that we're exposed to all the time. And I won't make you go back and listen to that but if anyone wants to, it's a great episode. But I'll summarize what we talked about really briefly so that we can understand tonsils. In that episode, I split the immune system into a four act play focusing specifically on our adaptive immune system.

The summary is basically that our bodies, mostly via things like our nose and our mouth but also our guts and our skin and our eyes, are constantly exposed to hundreds of thousands of stuff every day. And we call this stuff antigens. And our immune system's job is to identify all of this stuff and decide what belongs and what doesn't, what's a part of us and what is not supposed to be there and how to deal with it. And one of the major ways that we do this is that we have cells in our body called macrophages. These cells go along in either our bloodstream or our lymphatics and they gobble up this crud, these antigens, wherever they're exposed to them and bring them to our T cells, who then bring that crud to our lymph nodes, which we also touched on in our lymphatic filariasis episode. And lymph nodes are where our B cells hang out and our B cells are what make antibodies.

Erin Welsh: Right.

Erin Allmann Updyke: That will then be very specific to be able to find, neutralize, and destroy the crud, the antigens. It turns out that that part is accurate but leaves out part of the story of our immune system. And that story is MALT. So MALT-

Erin Welsh: It sounds like you're talking about a person.

Erin Allmann Updyke: It just makes me think of malted milk. Jinx. Appropriate.

Erin Welsh: I mean appropriate. Appropriate.

Erin Allmann Updyke: Okay so MALT. The composition of MALT tissue is very similar to our lymph nodes themselves except that it is not connected to our lymphatic system

Erin Welsh: That is so bizarre and cool.

Erin Allmann Updyke: It gets cooler. Because the stuff that MALT is sampling, the stuff that it's going to decide whether or not for our B cells to mount a response to, is being sampled directly from the mucosa itself rather than going through macrophages, traveling through the lymphatics, and then making its way to the lymph nodes.

Erin Welsh: So it's like first line.

Erin Allmann Updyke: Exactly. It is first line, that is what MALT is, it is first line immune system.

Erin Welsh: Okay, now I kind of wish I had read more about the evolutionary history because I wonder how basal that is compared to other parts of our immune system. Anyway.

Erin Allmann Updyke: It would be really interesting. Histologically, MALT is very similar to lymph nodes except that it doesn't tend to have a capsule. And again, they don't have any lymphatic drainage. But the outer cells of MALT tissue, including our tonsils, have these cells called M cells, which are depending on the source called membrane cells or microfold cells. But these are cells that are essentially just really good at uptaking the stuff that our mucosa, our nose, our mouth, our guts are constantly exposed to floating across our mucosa. These M cells take them up and then shuttle them into the core of these tonsils or other MALT tissue but we'll focus on tonsils for this episode. Our tonsils have these crypts, these deep crypts. And so these structures are covered with this epithelial tissue and then these M cells just like swoop stuff into the inner bits where are housed B cells and T cells. And these B and T cells do exactly what they do everywhere else in our body, they sample antigens and then they make antibodies. And it gets even cooler because I can see your face being like what, questions?

Erin Welsh: Yeah, my mind is... Absolutely.

Erin Allmann Updyke: Our MALT tissues, especially our tonsils and our Peyer's patches in our gut, they make and secrete a kind of specialized type of antibody called IgA which is different than other antibodies like IgM and IgG. And it's probably beyond the scope of this episode to get into the nitty gritty on all these different types of antibodies. But IgA is a really important type of antibody that really does function as a first line defense on these mucosal surfaces. And it's being secreted from things like our tonsils and adenoids and in our guts and things like that.

Erin Welsh: This, okay. I don't even know where to begin. I'm fascinated.

Erin Allmann Updyke: Yeah.

Erin Welsh: I don't even know if I have a question at the end of this. I mostly just want to say how yes, we should definitely do an episode on all the Igs.

Erin Allmann Updyke: Oh I know.

Erin Welsh: And secondly, it's just beautiful.

Erin Allmann Updyke: It really is. It really is.

Erin Welsh: Wow, okay.

Erin Allmann Updyke: I know.

Erin Welsh: And so what's the purpose of the crypts?

Erin Allmann Updyke: They essentially are what are like funneling and shuttling things in, if that makes sense.

Erin Welsh: Okay.

Erin Allmann Updyke: And kind of grabbing onto them a little bit. It's increasing surface area for stuff to get swooped in.

Erin Welsh: Oh okay. Yeah.

Erin Allmann Updyke: Yeah. And our tonsils, especially our palatine tonsils and our adenoid or pharyngeal tonsils and the other ones as well, they are especially important in this role because they form this ring around the entrance to two of our most important systems that interact with the outside world, our digestive system and our respiratory system.

Erin Welsh: Yeah.

Erin Allmann Updyke: So our tonsils are being constantly exposed to everything all the time. So that's what they do, that's what they're for. They are a hugely important part of the development of our antibody mediated immune response, especially for things like respiratory viruses and bacteria.

Erin Welsh: You may have already said this but which tonsils are the biggest?

Erin Allmann Updyke: Great question. The ones that you think of as tonsils, your palatine tonsils, the two that sit in the back of your throat are the biggest physically, they're the big honkers that you see.

Erin Welsh: Okay.

Erin Allmann Updyke: The tubular tonsils near eustachian tubes are really quite small. Your adenoid up in your nasopharynx can get large and we'll talk about it but is just a single tonsil and is a little smaller than the others. And then your lingual tonsils back in the back of your tongue are actually a whole series of a bunch of really little things.

Erin Welsh: Okay.

Erin Allmann Updyke	Like little, little cell areas and nuggets. I'm doing things with my hands that people can't see.
Erin Welsh	Patchy.
Erin Allmann Updyke	Yeah, yeah, patchy bits.
Erin Welsh	Okay. Is now the time to say well what the heck? If they're so like, they seem pretty dang cool and important. How can we take them out with seemingly few negative consequences? Are there negative consequences? Why do they get so bad that they have to be taken? Out all of that stuff.
Erin Allmann Updyke	I know. Yeah, there's a lot of stuff. There was a lot where I was like I don't know where to go from here. Like that's what a tonsil is. Now what? So let's start with where can things go wrong. If these are something that is so great, then why don't we talk about when things are less great, ie tonsillitis. Shall we?
Erin Welsh	Yeah.
Erin Allmann Updyke	So tonsillitis literally just means inflammation, itis, in your tonsils. And again, at this point when I'm talking about tonsils, I am primarily now only talking about the two big ones, the pharyngeal tonsil that is your adenoids and primarily the palatine tonsils that are commonly referred to as tonsils, right. So tonsillitis turns out it is not actually a very specific thing because sore throat in general is really common. It's one of the most common symptoms, it's associated with so many viral infections, the flu, the common cold, COVID, mono, so many bacterial infections, strep throat, many more. Not all sore throats will necessarily cause inflammation in the tonsils themselves.
	And sometimes a sore throat is just called like acute pharyngitis, which just means sore throat in medical terms, inflammation in the pharynx or whatever. But often there is some degree of tonsillitis, especially depending on the age of the person and the infectious agent that happens when there is sore throat. There's a few different reasons why our palatine tonsils, the two in the back of your throat, are so very prone to this. Partly it's because, like I already said, they are constantly being exposed to and sampling all of the viruses and bacteria that we're exposed to and that just like live and hang out in our throats.
Erin Welsh	They're just like walking around Costco trying every single sample and blocking the entrance to the aisles.
Erin Allmann Updyke	Yes, that's what it is. Because that's what happens, the crypts just get trapped sometimes. Stuff gets stuck in the aisles of Costco in our tonsils.
Erin Welsh	I don't know if this metaphor is like...
Erin Allmann Updyke	I love it, I love it. But then they can begin to proliferate before we've managed to mount a sufficient immune response, right. And that's going to cause some degree of blood flow, inflammation to the area, pain receptors, cytokines are going to be sent out which are going to tell us that there's pain. There's also, I have a really interesting paper on the actual pathophysiology of the pain of a sore throat that's really fascinating and interesting. But there's like a lot of open nerve endings that exist in that region, which is part of it.
Erin Welsh	Like why? It's so painful.

Erin Allmann Updyke

It's so painful, I know. But anyways on top of that, a lot of the respiratory pathogens that cause sore throat, especially like all of the millions of rhinovirus serovars, are really well adapted to the cells of our tonsils. So they are actually really good at not just being sampled by but getting into and replicating within the cells of our tonsils. So our tonsil cells, well, there's this trade off, right. They're really good at sampling all of this material but they're also really prone to infection because they sit at some of the most commonly infected sites in our upper airways.

Erin Welsh

Right.

Erin Allmann Updyke

On top of that, the people who get the most infections in their tonsils and the most severe infections in their tonsils are kids, especially school age kids. And part of that is because our tonsils which are present from birth actually grow during early childhood and they reach their peak in size in kids ages 4-8 and then they start to regress as we get older.

Erin Welsh

Interesting.

Erin Allmann Updyke

On top of that, comparative to body size, the tonsils are the largest in very young kids. So rather than school age and teenage years when the tonsils are still kind of growing, when they're very young like 3-4, compared to the size of their throat, tonsils are really big even though they're going to continue to grow. Does that make sense?

Erin Welsh

Yeah. And then like the swelling then is so much more pronounced.

Erin Allmann Updyke

Exactly. Yes. So that is where this type of inflammation can cause real problems. This infection and inflammation can either just be very recurrent, especially in school aged kids from 5-15. It can cause really recurrent infections which can end up with a lot of missed school or just a lot of pain, a lot of exposure to antibiotics, as we heard in our firsthand account, which was not even during school age. This kind of hypertrophy can also put kids at increased risk of things like recurrent ear infections because hypertrophy of various tonsil or tissue can also then compress the eustachian tubes where our ears are supposed to drain, which is what can increase the risk of ear infections. And of course if tonsils and especially adenoids, which sit at the top back of our nasopharynx become severely enlarged and hypertrophied, it can cause problems with breathing.

Erin Welsh

Yeah.

Erin Allmann Updyke

Both in the acute form where an acute infection can be a real risk of respiratory distress or just over time it can cause obstructive sleep apnea in kids. There is also a phenomenon that you may have heard of called peritonsillar abscess. Did you come across that?

Erin Welsh

I did not but abscess in tonsils. Yikes.

Erin Allmann Updyke

Abscess in tonsil. It's not really in tonsils really. This is a complication that happens when an infection kind of spreads beyond the tonsils. It can also happen in absence of tonsils even after a tonsillectomy, for example. But it's essentially just a group of deep space neck infections. So abscesses either right next to the tonsils or in the back of the tonsils or in the retropharyngeal or parapharyngeal space. Essentially our neck is very complicated with a whole bunch of things in it in a really small amount of space. So we have a lot of facial layers separating these all. And if infection spreads beyond some of those facial planes, it can become very severe and lead to airway compromise really easily.

Erin Welsh

That makes sense.

Erin Allmann Updyke: So these type of infections can be really serious because they can cause a lot of swelling and make it so that people can't breathe.

Erin Welsh: And is this associated with certain pathogens or is it just like anything can do it?

Erin Allmann Updyke: Anything can do it. Bacterial infections are going to be much more likely to cause an abscess than anything like a viral infection. And streptococci, like your group A strep, strep throat is a really common one but by no means the only pathogen that can cause these types of infections.

Erin Welsh: Right. Okay.

Erin Allmann Updyke: Yeah. And then there are tonsil stones.

Erin Welsh: Yay! I'm so glad you're talking about these. I've had two in my life.

Erin Allmann Updyke: Yeah. And one just recently.

Erin Welsh: One recently and the other one, I was a freshman in college or a sophomore in college.

Erin Allmann Updyke: Tonsil stones are just collections of shmutz really. It's unsatisfying, I feel.

Erin Welsh: I know.

Erin Allmann Updyke: It's just shmutz that get stuck in those little crypts in the tonsils. And what our body tends to do to shmutz anywhere in our body is kind of calcify it to be like let's wall this off and package it up so that it doesn't cause any more problems.

Erin Welsh: Yeah.

Erin Allmann Updyke: And in so doing, it can sometimes cause problems.

Erin Welsh: It's like 'Cask of Amontillado' style. Have I made that joke on this podcast before?

Erin Allmann Updyke: I don't know because I don't know what it means because I'm probably not smart enough.

Erin Welsh: No, it's like some Edgar Allan Poe story I think where somebody like bricks in somebody else into a wall.

Erin Allmann Updyke: Isn't that 'The Tell Tale Heart' thing? That was different?

Erin Welsh: That was just someone who killed someone.

Erin Allmann Updyke: Oh.

Erin Welsh: We really need to refresh our Poe knowledge.

Erin Allmann Updyke: We're not getting it.

Erin Welsh	No.
Erin Allmann Updyke	Anyways, tonsil stones, shmutz in your tonsils. These can also happen in your salivary glands, like they can happen in a lot of other places. That's all I really have for tha, it's not all that exciting. But those are the kind of ways in which tonsils can become a problem and why someone might need to undergo a tonsillectomy and/or an adenoidectomy.
Erin Welsh	Are stones enough for that?
Erin Allmann Updyke	No, no, no.
Erin Welsh	Okay. So there are reasons to remove tonsils but maybe not as much as people used to lean into in historical times.
Erin Allmann Updyke	Yeah.
Erin Welsh	But what happens when those tonsils are gone?
Erin Allmann Updyke	Yeah.
Erin Welsh	Because it seems like from what my growing up interpretation or my ingrained knowledge and also reading about this is that there aren't many negative consequences.
Erin Allmann Updyke	Yeah. So there's risks associated with surgery, right.
Erin Welsh	Yeah.
Erin Allmann Updyke	So most of the complications that we see are in that acute phase where you have risk of things like bleeding, you have risk of infection as a result of surgery, bleeding is really the big one. And in really severe cases, people can end up dying as a result of complications from surgery. Very rare but surgery is surgery and so complications can happen. Beyond that surgical complication time frame, we don't really have a lot of data to say that there are negative effects in the long term from not having tonsils. And when it's indicated, like in the case of really recurrent infections or even in the case of obstructive sleep apnea in young kids, there is some data that there is benefit to tonsil removal in those cases because it can significantly reduce the rate of recurrent infection and in kids with obstructive sleep, it can improve their sleep even if it's only in the short term. And we'll get more into that later. But it's fascinating that something that would appear as integral, as a major source of antibodies and a major source of sampling of our environment to protect against infection can be removed with relatively little consequence. To me, what I think makes that so fascinating is it kind of shows how many redundancies we have in our bodies.
Erin Welsh	Yes. I was just about to say it's like built in redundancy.
Erin Allmann Updyke	Exactly. And it is, right? Because whenever tonsils are being removed, it's not all of them, you still have your lingual tonsils, you still have those tubal tonsils, nobody's removing those.
Erin Welsh	Yeah.

Erin Allmann Updyke	It's just the palatine tonsils and sometimes the adenoids, sometimes both but sometimes just one or the other, right. So first of all, we have redundancy just within that. There's also additional MALT-like tissue throughout other parts of our mucosa that just isn't as well organized as the actual tonsils themselves. And then of course there's the rest of our entire immune system, which is doing all the same stuff, it's just doing it in a slightly different way than this mucosal lymphoid tissue is doing.
Erin Welsh	So cool.
Erin Allmann Updyke	It is. And there's a lot more that we could do in talking about MALT and GALT because yeah, like Celiac for example is associated with discrepancies in GALT and IgA secretion and things like that. It's really cool.
Erin Welsh	Well that's on our list for sure.
Erin Allmann Updyke	It is. So that's tonsils, Erin.
Erin Welsh	They're amazing.
Erin Allmann Updyke	They're so cool except when they're a problem and then it's cool that you can take them out. So tell me, Erin, where did we get to here from? Is that...
Erin Welsh	Why don't I just share what I brought with me to share right after this break.
Erin Allmann Updyke	Please.
TPWKY	(transition theme)
Erin Welsh	So it turns out that people have been irritated about tonsils or found them to be troublesome enough to get rid of them for millennia.
Erin Allmann Updyke	Stop it.
Erin Welsh	Oh yeah.
Erin Allmann Updyke	I don't want a millennia ago anyone cutting anything out of me, I got to be honest with you. I've listened to enough episodes of this podcast.
Erin Welsh	I think that given some of the quotes that I'm going to toss and sprinkle in throughout here, that opinion will be even more reinforced.
Erin Allmann Updyke	Yeah, okay.
Erin Welsh	Yeah. Because this was like pre anesthesia, pre antibiotics.
Erin Allmann Updyke	Nope.

Erin Welsh: But I was honestly really taken aback by the number of references to tonsillectomies over the centuries. They're everywhere. All right. So from 1000 BCE in a Hindu medicine textbook, quote: "When the phlegm and blood are deranged in the soft palate and tonsils, they become large and like a full bladder, accompanied with thirst, cough, and difficulty in breathing. When troublesome, they are to be seized between the blades of a forceps, drawn forward, and with a semi circular knife the third of the swelled part is removed. If all be removed, so much blood may be discharged as will destroy the individual. If too little is removed, it will produce an increase in the swelling with fainting and swimming of head." End quote.

Erin Allmann Updyke: Oh my goodness.

Erin Welsh: Yeah.

Erin Allmann Updyke: I can picture every piece of that that you just described very clearly and I don't like it.

Erin Welsh: Oh okay. If you didn't like this one, you're really not going to like this next one.

Erin Allmann Updyke: Give it to me.

Erin Welsh: Okay so this is from Celsus, a Roman aristocrat who lived from 25 BCE to 50 CE. Quote: "They ought to be disengaged all around by the finger and removed."

Erin Allmann Updyke: What?

Erin Welsh: "If they are not separated by this method it is necessary to take them up with a blunt hook and separate them with a scalpel, then to wash them with vinegar and anoint the wound with a styptic application."

Erin Allmann Updyke: Can you just imagine how much that would hurt? Because you're talking about an acutely inflamed, angry organ.

Erin Welsh: And using a fingernail. I really feel like this quote, as the kids say, has lived like rent free in my head since reading it.

Erin Allmann Updyke: Yeah.

Erin Welsh: I just keep, I have this intrusive thought of like a fingernail in the tonsils. I'm sorry.

Erin Allmann Updyke: Stop, ew.

Erin Welsh: I know, I know. But the way that both of these descriptions are written kind of sounds like this is a relatively common procedure.

Erin Allmann Updyke: Yeah.

Erin Welsh: And that's supported by the many, many more quotes that I'm going to toss in here. So for instance, in the 2nd century CE, Galen wrote about using a snare to amputate the tonsil and this method increased in popularity over the centuries with a few authors advocating for like hey, let's remove just part of it and not all of it so that we don't cause hemorrhage.

Erin Allmann Updyke

Yeah, good call.

Erin Welsh

Yeah. The next quote I think provides an excellent glimpse into the world of pre modern day surgery. From the 4th century CE, Greek physician Paul of Aegina wrote, quote: "When therefore they are inflamed, we must not meddle with them. But when the inflammation is considerably abated, we may operate more especially upon such as are white, contracted, and have a narrow base. But those which are spongy, red, and have a broad base are apt to bleed. Therefore seating the person in the light of the sun and directing him to open his mouth while one assistant holds his hand and another presses down the tongue with a wooden spatula, we take a hook and perforate the tonsil with it and drag it outwards as much as we can without drawing its membranes along with it. And then we cut it out by the root with a scalpel suited to that hand. After ligation, the patient must gargle with cold water or oxycrate," which is a mixture of water and vinegar, "or if hemorrhage occurs, he may use a tepid decoction of brambles, roses, or myrtle leaves." End quote.

Erin Allmann Updyke

That was very detailed.

Erin Welsh

I think the thing that stuck out to me the most with that was that make sure that they're... Like it's the noonday sun and that the light is penetrating the back of their throat. I just didn't think of that.

Erin Allmann Updyke

Also someone is holding their hand.

Erin Welsh

Yeah. So during the middle ages, tonsillectomies went through a decline in popularity, like many other surgeries. And swollen or abscess tonsils were mostly dealt with through just like lancing the tonsil rather than straight up removal. But you know how trends come and go.

Erin Allmann Updyke

Yeah.

Erin Welsh

I'm thinking about buying flare jeans which I never thought I would do again after high school. But gotta be cool. And by the 16th century or so people were starting to get back into removal. Ambroise Paré, a very famous French surgeon and anatomist, he was one of the major ones to kickstart surgery and also work on like surgical improvements during this period. He was a big proponent of gradually strangling the tonsil with a ligature until circulation was cut off, which just like sounds deeply unpleasant.

Erin Allmann Updyke

I mean at least you'd bleed a lot less.

Erin Welsh

I mean, yeah.

Erin Allmann Updyke

Yeah.

Erin Welsh

But I think that this next quote speaks to some of the discomfort.

Erin Allmann Updyke

Oh okay.

Erin Welsh

So someone from this era wrote that this method of tonsillectomy, quote, "is liable to resolve itself into physical combat between the surgeon and his patient." End quote.

Erin Allmann Updyke

Oh dear.

Erin Welsh: I mean, yeah.

Erin Allmann Updyke: Yeah.

Erin Welsh: I feel like it's not even... It's like instinctive.

Erin Allmann Updyke: Yeah.

Erin Welsh: You're going to fight.

Erin Allmann Updyke: Get out of my mouth.

Erin Welsh: Exactly.

Erin Allmann Updyke: Yeah.

Erin Welsh: Other surgeons of the time objected to the procedure because of what was thought about the purpose and physiology of tonsils, which was that essentially they absorbed the secretions that came from the brain and then exited through the nasal cavity and then the tonsils like sent them back to the brain after filtering, something like that.

Erin Allmann Updyke: Wow, that is complicated.

Erin Welsh: I know, right? And so with the tonsils gone, those secretions would just linger and cause hoarseness. So it turns out that the controversy around removing tonsils is nearly as old as the procedure itself. So for instance, take this quote by Dionis from 1672. Quote: "Some of our ancestors proposed the separation and avulsion of these glands, which operation they very easily performed. I refer you the methods which they propose to do it which I think very cruel. For the function, these glands being to separate and filtrate the sacroities which serve to moisten the tongue, larynx, and esophagus. These parts must find themselves deprived of that dew, which is of great use in tempering of the air in the lungs and sliding the nourishment into the stomach."

Erin Allmann Updyke: Okay.

Erin Welsh: Yeah. And so on this theme of controversy, I found this quote and many of the other quotes that I've mentioned so far in a paper titled, quote, "A History of Tonsillectomy: Two millennia of trauma, hemorrhage and controversy." End quote.

Erin Allmann Updyke: Ooh. Two millennia.

Erin Welsh: So I wonder which side the author fell on. And yeah. So of course for there to be a debate, there has to be at least two sides. So on the other side was a physician from Philadelphia named Philip Syng Physick who in 1828 modified an instrument that was normally used to remove the uvula and used it as a tonsil guillotine. He wrote, quote: "It is easy to cut off the whole or any portion that may be necessary of the enlarged tonsil. The operation can be fulfilled in a moment of time. The pain is very little and the hemorrhage so moderate that it has not required any alteration in four cases in which the doctor has recently performed it." End quote.

Erin Allmann Updyke: Sorry, I'm also really wondering why they were taking out people's uvulas.

Erin Welsh: I don't know that part. Yeah, that's like the sneaky, scary, terrifying part.

Erin Allmann Updyke: Yeah.

Erin Welsh: I don't know.

Erin Allmann Updyke: Okay.

Erin Welsh: We should do an episode on the uvula.

Erin Allmann Updyke: We should, I guess. Now we have to.

Erin Welsh: We'll learn about the uvula guillotine.

Erin Allmann Updyke: Uvula.

Erin Welsh: And this tool that he developed, the tonsillotome, was a popular choice for partial tonsillectomies for about 80 years. But some people still use the good old fingernail. Seriously, seriously. I cannot-

Erin Allmann Updyke: Their actual fingers?

Erin Welsh: Yes. It's gruesome. Yeah.

Erin Allmann Updyke: I also just like... I'm thinking about tonsils, doesn't seem easy.

Erin Welsh: No. Nothing ever worth doing was easy I think is their mentality or something, something like that. But up until the early 20th century, the removal of tonsils via surgery or fingernail was only partial and physicians had noticed that partial removal didn't necessarily alleviate all of the symptoms that it was supposed to. Some people had regrowth of tissue, others had persistent infections. And so they began to try to take more of the tonsils out. And they realized that frankly the tonsil guillotine or tonsillotome was not up to the task. After a series of close but no cigar attempts at full removal by surgeons throughout the 1890s, English otolaryngologist George Waugh succeeded in publishing about the dissection method he used to completely remove the tonsils. And with this, tonsillectomies, the word first used in 1904, took over modern surgery. Not an exaggeration, not an overstatement. During the first half of the 20th century from 1915-1960, tonsillectomy along with adenoidectomy were the most frequently performed surgeries in the US.

Erin Allmann Updyke: Wow.

Erin Welsh: Yeah. But like why?

Erin Allmann Updyke: Yeah. Just because they could?

Erin Welsh: Just because they could, it's like Everest. What about tonsils just made people want to rip them out of you? And what happened in the mid 20th century to change everyone's mind? Why was this trend reversed?

Erin Allmann Updyke

I can't wait to find out.

Erin Welsh

Yes. And if you were hoping for like a one line answer, you've come to the wrong podcast.

Erin Allmann Updyke

No one wants a one liner, Erin.

Erin Welsh

No, they don't. So to really get at the heart of that question, we have to consider not only what people thought tonsils did or didn't do but also how surgery was changing, how hospitals were changing, how germ theory was driving concepts of infection and disease, and how the theory of evolution was shifting the way we viewed form and function in our bodies. So yeah, it's about the tonsils but it's also about so much more than the tonsils.

Erin Allmann Updyke

Always.

Erin Welsh

I love when this happens. Okay, so let's set the stage. With the introduction of germ theory in the mid 1800s and then widespread acceptance of it by the end of that century and a full on war on infectious disease launched in the 20th, many physicians had started to look for a causative pathogen for every disease that came across their exam table. I've talked about this before many times. But they also began to try to tease apart why pathogens, mainly bacteria at this point, acted the way they did. Why did the cholera bacterium colonize the gut while diphtheria was found in the throat? At what point and why did pathogenic bacteria invade the bloodstream?

And to try to answer these questions, there arose a concept called focal infection theory. Essentially this idea, which was primarily popular in the US especially in the early 20th century and not so much elsewhere, this idea held that different infections arose in certain areas of the body and if not contained, they could spill out into the bloodstream and travel to the rest of the body from there. So there were different like foci of infection, whether it was your throat, whether it was your gut, and that's where that bacteria lived and then if it overflowed, that's when it became super deadly, it went into your bloodstream.

Erin Allmann Updyke

Okay.

Erin Welsh

And this seemed to be especially popular among American surgeons since most of the foci of infection were quote "anything that is readily accessible for surgery." End quote. One pathologist joked.

Erin Allmann Updyke

That's funny.

Erin Welsh

And tonsils fit the bill exactly. They were located in the throat, which was seen as a major portal of infection along with the mouth and nose. They were easily accessible and centuries of successful removal suggested that they weren't missed all too much, provided you stopped the hemorrhaging. The question of whether their removal actually did anything didn't really seem to come into play at least for a while. Personal experience from the surgeon was more the gold standard of the day than say like a case control study or like statistics.

Erin Allmann Updyke

Like if they thought it was great, then it was great kind of a thing.

Erin Welsh

Anecdote leading all, right?

Erin Allmann Updyke

Yeah.

Erin Welsh: Like I took the tonsils out of this patient that kept getting sore throats and now they don't get sore throats.

Erin Allmann Updyke: Or you just don't see them anymore because there's nothing for you to search.

Erin Welsh: Exactly.

Erin Allmann Updyke: Oh okay. I mean anyways.

Erin Welsh: It took awhile for statistics to catch on.

Erin Allmann Updyke: Yeah, yeah, yeah.

Erin Welsh: Yep. And of course this didn't, this wasn't like wide acceptance, right. This wasn't tonsillectomies for everyone. Surgeons varied in how enthusiastic they were about the procedure and how likely they were to recommend it. Some thought prophylactic removal was best.

Erin Allmann Updyke: Whoa.

Erin Welsh: Like you get to a certain age, get them out of there, get those tonsils gone.

Erin Allmann Updyke: Wow.

Erin Welsh: Others were more conservative, recommending removal only after multiple infections. But by and large, the predominant belief about tonsils was that no one knew exactly what they did, what their purpose was. But they did think that they were behind many systemic infections, harboring bacteria that entered the throat and then replicated in the tonsils and then were released to the rest of the body through the bloodstream. So the tonsils were viewed as like this incubator of infection.

Erin Allmann Updyke: Interesting.

Erin Welsh: And so getting rid of them, ideal, no big deal at the very minimum, the best thing you could do at the maximum. In a 1920s paper by Edwin Place, quote, "the importance of the tonsils in the acute infections as a point of attack and as a portal of entry for infections is so much a matter of common experience as to require no demonstration here." End quote. Citation not needed. Which I find kind of amazing like how without much supporting evidence or direct investigation, looking at what the tonsils actually did, there was just like an assumption widespread that they were not important.

Erin Allmann Updyke: I wonder how much of it could have been the bias of seeing only the abnormal that you see, right. Like if you only see the kids who are coming to you because their tonsils are giant and swollen and they're causing problems, take them out, you're fixing people. But you're not seeing all of the people who's not having any problems with their tonsils and who are living just fine.

Erin Welsh: Right.

Erin Allmann Updyke: But it's like you only are seeing these, so they're only a problem. I don't know. But I don't know, I don't know.

Erin Welsh

Well and one of the things that I was thinking about as I read for this episode was how much that attitude about like the tonsils not being important might have been driven by this idea of vestigial structures. So vestigial structures are structures that have remained in a species but during evolution lost their primary ancestral function. And so they appear not to serve a purpose. I always thought that appendix and tonsils, whatever, were all lumped together under vestigial structures. And that's why like I grew up thinking that tonsils were not necessary and that's why people removed them and they're just some remnant of evolution. Okay. But I want to get into a little bit of like the origins of this. So this concept of vestigial structures gained traction especially since Darwin's 'On the Origin of Species' and 'The Descent of Man' in the mid 19th century, introducing the theory of evolution. And also in Robert Wiedersheim's 'The Structure of Man' in 1895 where he listed dozens of vestigial structures in humans.

Erin Allmann Updyke

Ooh.

Erin Welsh

Tonsils were not on Wiedersheim's list but plenty of people believe that they didn't have a purpose any longer. So it seems plausible to me at least, this is definitely a pet hypothesis, that the enthusiasm for tonsillectomies was driven in part by embracing the theory of evolution by natural selection, where vestigial structures were seen as evidence for evolution. We know now of course that many structures previously considered vestigial like tonsils and the appendix aren't actually vestigial, like they still have a function. It might be slightly different than its evolutionary origins but the fact that they have a function does not at all refute the existence of evolution, which is what many creationists will try to argue.

Erin Allmann Updyke

Yeah.

Erin Welsh

Like there is no such thing as a vestigial structure because there are no mistakes and also we didn't evolve from other organisms, so all vestigial structures must have a function. I'm not going to get into that whole can of worms. I will link to some papers about the concept of vestigial organs which do exist if you're curious and want to read more. But I just thought it was really interesting sort of this timing of when vestigial organs and the theory of evolution was like gaining traction, growing in popularity. Did that timing help to spur the frequency of tonsillectomies?

Erin Allmann Updyke

That's really interesting.

Erin Welsh

I don't know, that's my little pet hypothesis. But if it did, it certainly wasn't the only thing. Throughout the first half of the 20th century, surgery overall had experienced a tremendous shift. The combination of anesthesia, which had been around since at least the 19th century, antibiotics in the 1930s and 1940s, the growth of hospitals, and the formalization of medical and surgical training had led to a rapid expansion of surgery overall and the development of many specialties within surgery and medicine. And what better procedure to practice on and earn money on than the minimally invasive, generally low risk tonsillectomy? It became a routine operation for so very many children.

Erin Allmann Updyke

Wow.

Erin Welsh

I couldn't find a ton of numbers but I did read that inbetween 1928-1931, tonsillectomies accounted for about one third of all surgical operations. In 1920 in New York City alone, 47,000 tonsillectomies were performed. By the mid 1900s, nearly half of the kids in some regions had had their tonsils removed.

Erin Allmann Updyke

What?

Erin Welsh

And an estimated 1.5-2 million individuals, largely children, had their tonsils removed in peak years in the US.

Erin Allmann Updyke

Wow.

Erin Welsh

Yeah.

Erin Allmann Updyke

Well gosh, with numbers like that it's no wonder that it's like part of our collective consciousness.

Erin Welsh

Right?

Erin Allmann Updyke

Wow.

Erin Welsh

And also like how amazing the shift has been.

Erin Allmann Updyke

Yeah.

Erin Welsh

And so tonsillectomies gained traction through parenting books, pediatricians, even just word of mouth. And they were hailed as all but essential if you wanted to ensure the health of your child. But while many surgeons and pediatricians were content to accept this as just fact, others had decided to apply a little thing called statistics. One of the largest and earliest studies comparing kids with and without tonsils with upwards of 20,000 children found results that were largely unsatisfying to tonsillectomy enthusiasts. It did seem that there were some benefits such as reduction in sore throats, cervical adenitis, otitis media, scarlet fever, diphtheria, rheumatic fever, and heart disease. Others found like the opposite trends with some of those. But when it came to sinusitis, colds, chicken pox, mumps, measles, tuberculosis, asthma, and hay fever, nothing. Or as another study found, higher rates in those who had had their tonsils removed.

A reminder here to take this with a grain of salt considering that it was the 1920s, follow up was patchy at best, statistics were developing. But these studies and many others that followed were the first signs that maybe tonsillectomies weren't like all that they had promised to be. Doubt continued to grow into the 1930s as people began to question the justifications that had previously been accepted without reservation, like the focal theory of disease which by this time had fallen out of favor. Then there was the question of what a diseased tonsil looked like. Tonsils, like many other body parts, come in all shapes and sizes and they change, not just like over many years but also they could change day to day.

Erin Allmann Updyke

Absolutely.

Erin Welsh

So what looks quote unquote "irregular" to one surgeon could look totally normal to another, also based on their personal experience. Is there a standard for tonsil size? No. Studies like the one I mentioned continued to cast doubt on the utility of tonsillectomies with the author of that big study saying, quote, "the desired relationship between the tonsils and the various infections in childhood is not as clear today as it seemed 10 years ago. Statistical and controlled clinical studies have obliged us to modify or even change our views on this relationship." End quote.

Erin Allmann Updyke

Statistics, making things less fun for everyone. Just kidding.

Erin Welsh

Always. But also science at work.

Erin Allmann Updyke

Yeah.

Erin Welsh

On top of the whole rationale for tonsillectomies being called into question was the finding that many of the procedures had been incomplete, with residual tonsil tissue found in well over half of some groups of patients. By the late 1930s, a reckoning had truly begun. But for a long time that reckoning was more or less confined to the medical literature. Pediatricians continued to recommend tonsillectomy and adenoidectomy for their patients not just in extreme cases or not just when they felt it warranted it, but it was at the drop of a hat. And this continued for decades. And parents who had maybe grown up having their own tonsils removed continued to ask for the procedure for their kids even long after that. The shift in attitude surrounding tonsillectomy and its rise and fall is I think one of the clearest examples that I've come across of the time lag in scientific research reaching application and general knowledge.

Erin Allmann Updyke

Interesting.

Erin Welsh

A new concept is put forth, like the tonsillectomies maybe not being as necessary as once thought. It takes a while until it's accepted among other researchers in that like niche field because they've got to test it, confirm that there's evidence to support it. And then it takes even longer to sneak its way into application or textbooks and then even longer until it reaches the general public. So like if you were a pediatrician trained during the time that tonsillectomies were all the rage and you learned in your med school training that hey, if you have a kid that has one sore throat, take them out, they're gone. Take them out prophylactically, might as well. Then let's say that you go into teaching, you spend the rest of your career, 30, 40, 50 years teaching the next generation of pediatricians potentially that this is a routine surgery of childhood. And this is a gross generalization and this is like an exaggeration of how things can be.

Erin Allmann Updyke

Not really.

Erin Welsh

Yeah.

Erin Allmann Updyke

Not hugely. Not hugely, Erin. I'm looking at you like happens every day.

Erin Welsh

Like how long does it take for a new generation of doctors to unlearn what had been previously accepted knowledge? And where is that older physician, that one who's teaching all of these new physicians, where are they going to encounter dissenting views without routinely looking through primary literature? And without training in epidemiology or statistics, how are they going to assess how legitimate the conclusions of a study are?

Erin Allmann Updyke

Oh Erin, this is one of my favorite things because it's something I think about literally all the time at my other job too.

Erin Welsh

Yes. There is such a gap, not just in primary research and sort of getting that to non specialty fields or like fields outside of that specialty, but then how long does that information then take to reach the general public?

Erin Allmann Updyke

It's so long, Erin. Like in the 1920s it was probably even longer. And even today with the internet, it's still long.

Erin Welsh

Oh it's still so long. I mean in the case of tonsils, we have like decades, decades, it began to be realized in the 1920s and then when did the trends really change? I would say 1960s more widespread within the medical community and then 1970s and 80s is when like the decline had really begun.

Erin Allmann Updyke

Wow!

Erin Welsh

Yeah. And there were like still articles about the benefits of tonsillectomies in parenting books. And not all the time, like sometimes there was urging caution with tonsillectomy and recommended removal in only extreme cases. And this was not like, we're not talking about and then we turned a corner and then immediate sharp differences in this. Like the conversation continued to exist around tonsillectomies. So there was more negative press in the 1940s and 1950s. But like parents really wanted their kids to have tonsillectomies. And it wasn't just parents recommending it, right, it was pediatricians who that's what they had learned to do. That and the growth of voluntary health insurance plans post WWII which is likely why we see higher rates of tonsillectomy during that time period in children from middle and upper class families, ie those who can afford to pay for an elective surgery compared to those without insurance.

Erin Allmann Updyke

Whoa.

Erin Welsh

That's sort of an interesting little tidbit.

Erin Allmann Updyke

Sure is.

Erin Welsh

And so like I said, 1960s, doubt became more on the loudspeaker, 1970s and 80s rates had really declined. And part of this decline I have no doubt was the rise in antibiotic use, which could treat many infections commonly associated with tonsils and the growing specialization in pediatrics where pediatricians rarely received surgical training and so we just less exposed to tonsillectomies overall. That's at least according to one paper that suggested that. In 1965 in the US, 1,215,000 tonsillectomies were performed. Just a couple of decades later in 1986, that number had fallen to 281,000. And then it rose again in 1996 to 383,000. But like that could be a number of different factors.

And I should point out that the US, where all of these numbers come from, was the leading tonsillectomy country. The procedure was also popular in England but not as popular and it fell out of favor sooner. This re-examination of the necessity of tonsillectomies allowed for more careful consideration of when they should be performed. Because as you talked about, as our firsthand demonstrates, there are still many cases where it is essential. But the history of tonsillectomies provides what I think is one of the most fascinating glimpses into the inertia of scientific knowledge, where it can take literally generations to incorporate new findings into practice and then generations more into general knowledge. And that's the history of tonsils.

Erin Allmann Updyke

I love that, Erin.

Erin Welsh

This is one of my favorite ones to do recently I think.

Erin Allmann Updyke

I loved listening to it.

Erin Welsh

So Erin, tell me what's going on with tonsils today.

Erin Allmann Updyke

Okay.

Erin Welsh: We're still doing them but like under that circumstances?

Erin Allmann Updyke: Yeah. Okay, let me tell you right after this break.

Erin Welsh: Okay.

TPWKY: (transition theme)

Erin Allmann Updyke: Honestly it was very difficult, pretty much impossible to get any kind of data on like incidence, prevalence of tonsillitis or recurrent tonsillitis or pharyngitis. Like come on, we can't do that. It's too common. It's so common. It's everyone, everywhere, all the time. I had a sore throat yesterday. Okay? It's nearly always self limited. It's not an infection that we can track. But that doesn't mean I have no data for you. I found a very interesting paper out of the UK, it's a few years old now but it was very interesting. What it looked at specifically was the incidence of tonsillectomy and the proportion of these tonsillectomies that were based on what they considered to be truly evidence-based criteria vs the proportion of tonsillectomies that were not fitting with evidence-based criteria. This was from 2005-2016, so a little old but not super old, so current enough.

What's fascinating about this study is that what they found overall in conclusion is that in the UK, in the population that they looked at, it wasn't every kid in the UK but it was several 100,000 kids, about 4 in 1000 children, and this again was all in children, 4 in 1000 met evidence-based criteria for tonsillectomy. So first of all, we can talk about what does that actually look like? Like what today is considered guideline approval evidence-based for tonsillectomy?

Erin Welsh: Yeah.

Erin Allmann Updyke: The major criteria is what are called the paradise criteria. I don't know why, don't ask why. And this is pretty like hardcore criteria. It is seven documented episodes of severe sore throat or tonsillitis in one single year.

Erin Welsh: Okay.

Erin Allmann Updyke: Seven. And part of it is that this is documented as severe sore throat, meaning that a sore throat that's not bad where someone doesn't go to the doctor wouldn't count because those episodes are considered to be less severe. Could you argue about access to healthcare, etc? Yes, definitely. This is in the UK, they at least have a national healthcare system, okay. So it's seven episodes of severe sore throat in one year or five per year for two years in a row, or three per year for three years in a row.

Erin Welsh: Okay.

Erin Allmann Updyke: Those are the most common criteria, the paradise criteria. The other criteria that they considered in this paper to be evidence-based was a tonsillar tumor which makes sense.

Erin Welsh: Yep. Of course.

Erin Allmann Updyke: And a condition called PFAPA which stands for periodic fever, aphthous stomatitis, pharyngitis, and adenitis.

Erin Welsh	That's a lot of itises.
Erin Allmann Updyke	It's a lot of itises. And what this actually is is like a genetic condition that results in these periodic fevers, these ulcers in the mouth, and a sore throat and swollen tonsils, adenoids, and lymph nodes and things like that.
Erin Welsh	Okay.
Erin Allmann Updyke	It's not super common, it's a genetic disorder. We could probably do a whole episode on it. But those are the three things that they considered as evidence-based criteria for tonsillectomy. 4 in 1000 kids in this study met criteria, like that was the overall prevalence. But less than 1 in 7 of those kids had a tonsillectomy. Between 2-3 kids per 1000 each year had a tonsillectomy but less than 1 in 8 of the kids who had tonsillectomy actually had an evidence-based indication.
Erin Welsh	Whoa.
Erin Allmann Updyke	Yeah. So lots of kids met criteria for tonsillectomy, for what they considered evidence-based criteria for tonsillectomy, did not have a tonsillectomy and many, many more kids did not meet criteria for tonsillectomy and yet had a tonsillectomy. So their overall conclusion was that of the 37,000 tonsillectomies that were performed in the UK in this time, in this population each year, 32,000 of them were quote "unnecessary".
Erin Welsh	What is going on?
Erin Allmann Updyke	Okay. Here's part of what's going on. A large proportion of the kids who underwent tonsillectomy in this study had one, two, or three or sometimes four or five episodes of tonsillitis. So they had severe sore throat, they had evidence of tonsil infection but not enough per year to meet this evidence-based criteria.
Erin Welsh	Okay.
Erin Allmann Updyke	That's a big one. The other one is sleep apnea or obstructive sleep disordered breathing.
Erin Welsh	Which is not on the list of recommended whatever, criteria?
Erin Allmann Updyke	So in this paper, in the UK, it's not considered an evidence-based indication. But the number of kids who have been having and who have been recommended for tonsillectomy and really adenoidectomy especially and sometimes not both, sometimes just adenoidectomy, who were referred for tonsillectomies over that time period for obstructive sleep disordered breathing or obstructive sleep apnea increased over this time period. And it's really interesting because in this paper, in the UK, it was not considered an evidence-based indication. But what they did mention is that there is data that shows that adenoidectomy specifically, so removal of just that pharyngeal tonsil, does reduce snoring and can show short term improvements in the quality of life on a few different metrics for kids ages 5-9 who have obstructive sleep disordered breathing or obstructive sleep apnea and who undergo adenoidectomy. But there isn't a lot of long term data on its effectiveness and there is not necessarily data that it improves all possible outcomes or all possible complications associated with sleep disorder breathing.
Erin Welsh	Okay.
Erin Allmann Updyke	So according to this paper, that was not enough evidence to consider it an evidence-based indication. Does that make sense?

Erin Welsh: Yes.

Erin Allmann Updyke: It doesn't necessarily mean there's no utility in it or that it can't be beneficial.

Erin Welsh: Right.

Erin Allmann Updyke: It just means according to this, there wasn't enough data.

Erin Welsh: Yeah.

Erin Allmann Updyke: So I think that that's an interesting part because part of this story of the number of tonsillectomies is like how bad does it have to be to consider tonsillectomy evidence-based vs not, right?

Erin Welsh: Yeah.

Erin Allmann Updyke: Like what outcomes are we looking at? How much data do we have to prove that? What are we going off of? So that was in the UK. What's interesting is that that paper highlighted that the rates of tonsillectomy vary really widely across the globe. That paper specifically just mentioned that rates in Belgium, Finland, and Norway are about twice as high as in the UK. Whereas Spain, Italy, and Poland significantly lower than the UK. And then in the US rates tend to be about three times as high as in the UK. So let's think about the US for a quick moment here.

Erin Welsh: Yeah, love to.

Erin Allmann Updyke: According to the American Academy of Otolaryngology and Head and Neck Surgery Foundation, and this was data that was in a 2019 update on their guidelines but I think the data is older than that, there are about 289,000 tonsillectomies performed each year just on kids under age 15. It's really hard to get data on tonsillectomy in adults because it's a much, much less common procedure. Which what's interesting about that number, 289,000, is that Erin, you said that that was the number at the end of the 80s.

Erin Welsh: Yeah.

Erin Allmann Updyke: So it just hasn't really changed, which I find really interesting.

Erin Welsh: Well that's what I was wondering about when you were talking about the criteria that recommend removal or whatever.

Erin Allmann Updyke: Yeah.

Erin Welsh: When were those criteria instituted? How often do we revisit criteria, add more, take them off, whatever?

Erin Allmann Updyke: Yeah.

Erin Welsh: Like it's all part of it.

Erin Allmann Updyke

So the most recent update that I could find was 2019 but those had been updated again in 2011. And so it's not that infrequent that this society seems to be updating their guidelines. And what's interesting about the American Academy of Otolaryngology's guidelines is that obstructive sleep disorder breathing is an indication for which they do recommend adenoidectomy.

Erin Welsh

Okay.

Erin Allmann Updyke

But they also say that the evidence is not as strong for this indication as it is for those paradise criteria indication really. And the newest guidelines have a strong recommendation. So like whenever you look at guidelines, it's always like low quality, moderate quality, high quality in terms of like the evidence behind it. And then what is the recommendation? Is it like a 'think about it' or like a 'we kind of recommend it' or 'we strongly recommend it'? That's like how guidelines are worded. So they updated their guidelines to strongly recommend holding off, watchful waiting, unless a kid has had at least seven, unless a kid meets these criteria essentially, the paradise criteria. So it seems like the guidelines are really in terms of recurrent infections moving more towards pause, wait, treat with antibiotics, let's really wait and see if this kid truly needs a tonsillectomy. But in the case of sleep disorder breathing, maybe the numbers are going up as we get more evidence for it.

Erin Welsh

Yeah. Okay.

Erin Allmann Updyke

At this point, we still don't have a ton of evidence for it especially in the long term but there is evidence for short term improvements in sleep outcomes as well as behavioral parameters like school performance and things like that. Because not being able to sleep affects a lot of your life.

Erin Welsh

Yeah.

Erin Allmann Updyke

Or not being able to breathe while you're asleep, I should say.

Erin Welsh

I mean, yeah.

Erin Allmann Updyke

So that's kind of where we stand with tonsillitis and tonsillectomies. And when it comes to what I wanted to talk about with the future of tonsils, I really didn't know where I wanted to go, there seemed like so many possibilities. But luckily I found this fascinating paper, took me to a place I never expected. In 2021, are you ready for this, Erin? It's pretty exciting.

Erin Welsh

I don't know, I better be.

Erin Allmann Updyke

In 2021 there was a paper published in Nature Medicine by someone named Wagar et al I think, sorry if I pronounced it wrong. Here's what they did, Erin. They took tonsil tissue, like tissue from discarded tonsils after a tonsillectomy I presume, and grew it in cell culture.

Erin Welsh

Cool.

Erin Allmann Updyke

And what this tonsil tissue did was re-aggregated itself into little organoids, little baby tonsils on your little cell culture plate. And then what they did was they exposed these tiny baby little tonsils to things like for example a live attenuated flu vaccine, which is something that we know a lot about how these flu vaccines work in our bodies and what kind of an immune response it generates. And they did this to study the immune response in these little baby organoid tonsils on a cell culture plate. What they were doing is creating a new type of model system to be able to study the human immune response and specifically our antibody mediated immune response, which again our tonsils are particularly good at, especially for things like respiratory infections.

Erin Welsh

We have underestimated and underappreciated tonsils for far too long.

Erin Allmann Updyke

I agree.

Erin Welsh

That is so cool.

Erin Allmann Updyke

It's so cool. They went beyond, they also tested it with SARS-CoV-2 infection and vaccines. And then there was another study that I'll also link to that just really specifically looked at using this as a model for SARS infection, for SARS-CoV-2 infection. It is a fascinating, amazing tool to be able to study things like future vaccine development, to be able to test things and see what kind of an immune response is generated in a very realistic human model rather than just animal models which are far from perfect because animal immune systems are not the same as ours. Really cool, really exciting. I have a couple of fun papers for people to read. Tonsils.

Erin Welsh

Amazing.

Erin Allmann Updyke

I know. If people want to read more, boy, have we got something for you.

Erin Welsh

Oh yeah. So we got lots of sources. I'm gonna shout out two in particular. So I already shouted out that one by McNeill from 1960, 'A History of Tonsillectomy: Two millennia of trauma, hemorrhage, and controversy'. And then the other one that I want to shout out, although I do have more, is by Grob from 2007, 'The rise and decline of tonsillectomy in 20th century America'. Fascinating.

Erin Allmann Updyke

I have a few tonsil papers that I want to shout out, three of them. One by Kuper et al, 'Mucosa-Associated Lymphoid Tissues' is the title and it was again about all MALT and it was really a great read. Bathala et al from 2013 was 'A review on the Mechanism of sore throat and tonsillitis'. Super fascinating and really gets at why ice cream, why ice cream? Cold inhibits the release of a lot of these cytokines and it can also inhibit the actual pain receptors. So cold is what you want in your throat when it hurts. Oh my gosh, there's more there, you can read about it.

Erin Welsh

I love that, okay.

Erin Allmann Updyke

And then another one by Arambula et al from 2021 that was 'Anatomy and physiology of the palatine tonsils, adenoids, and lingual tonsils'. And then of course I have links to those recent papers about tonsil organoids and using them to study our immune response. You can find the list of sources from this episode and every single one of our episodes on our website under the EPISODES tab.

Erin Welsh

Thank you so much again, Erin, the third Erin of the episode, love it, for sharing your story with us. We really appreciate it.

Erin Allmann Updyke

We do, we do. Thank you also to Bloodmobile for providing the music for this episode and all of our episodes.

Erin Welsh

Thank you to Tom Breyfogle for the amazing audio mixing.

Erin Allmann Updyke

Love it. Thank you to Exactly Right network.

Erin Welsh

And thank you to you, listeners. We hope that you liked this episode because I think we certainly did.

Erin Allmann Updyke

Yeah. We had fun.

Erin Welsh

Yeah.

Erin Allmann Updyke

And as always, a special shout out to our patrons, thank you so much for your support. We couldn't do it without you.

Erin Welsh

Very true. Well until next time, wash your hands.

Erin Allmann Updyke

You filthy animals.