

Mayo Clinic Q & A - Dr. Tathagat Narula - Lung Transplant - ...

Mon, 10/25 9:59AM 33:03

SUMMARY KEYWORDS

lungs, transplant, patients, lung transplant, organs, diseases, center, people, surgery, transplant center, mayo clinic, field, infections, perfusion, outcomes, waiting list, support, option, improving, physician

SPEAKERS

Dr. Tathagat Narula, Dr. Halena Gazelka, Narrator

N Narrator 00:02
Coming up on Mayo Clinic Q&A,

D Dr. Tathagat Narula 00:04
Pretty much any lung disease that progresses to that stage where it's deemed what we call end-stage, or advanced, patients have tried therapies, medical therapies, in some cases, they've even tried surgical therapies, and the disease's refractory are progressing, at that stage lung transplant comes on the table as an option.

N Narrator 00:23
At times a lung transplant is required to replace a diseased or failing lung with a healthy one. These transplants are reserved for people who have tried medications or other treatments without success.

D Dr. Tathagat Narula 00:34
For all these diseases, treatment options are improving even short of lung transplant. But despite that, we see a lot of patients who still end up progressing to that point where for them to have a reasonable quality of life and hopefully have a life to get some longevity they have to be considered for lung transplant.

D Dr. Halena Gazelka 00:52
Welcome, everyone to Mayo Clinic Q&A. I'm Dr. Halena Gazelka. Unhealthy or damaged lungs can make it difficult for the body to get the oxygen that it needs to survive. A variety of diseases or conditions can damage the lungs and hinder their ability to function effectively. When lung disease doesn't respond to medical therapy, at times a lung

transplant may be needed. Joining us to discuss lung transplantation is Mayo Clinic pulmonologist Dr. Tathagat Narula. Welcome to the program today.

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Dr. Tathagat Narula 01:23

Thank you Halena, it's a pleasure to join you this morning.

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Dr. Halena Gazelka 01:26

Wonderful to have you here today. I still, even as a physician, find it absolutely fascinating that we can do things like take lungs and put them in someone and they function. So, I'm excited to talk to you about this today.

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Dr. Tathagat Narula 01:41

The feeling is mutual.

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Dr. Halena Gazelka 01:44

What type of diseases can benefit from lung transplant?

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Dr. Tathagat Narula 01:48

You know, that's an interesting question. It's an important question of pretty much any lung disease that progresses to that stage, where it's deemed what we call end-stage or advanced, you know, and patients have tried therapies, medical therapies, in some cases they've even tried surgical therapies. And the disease's refractory are progressing at that stage, lung transplant comes on the table as an option. So, you know, you come to think of it, lungs are a complex organ, you know, there are multiple, multiple parts to a lung, people think about it as one big air sac. That's not what it is. Lungs, if you were to look under a microscope and look at what they look like, they have a scaffolding or a support structure, you know, on which you have these small air sacs attached all over. And then there are these tubes that lead the air in and out of the lungs. So, you can imagine damage to any of those parts of the lungs can result in diseases that can progress and become end-stage. Let me give you an example. The scaffolding or the support structure of the lung, you know, that can get scarred, that disease is called pulmonary fibrosis. It's actually one of the commoner indications for lung transplant. Essentially, when that scarring starts and progresses, the lungs just get very stiff, and those stiff lungs, you know, they just can't fill up with air, and patients start feeling very short of breath. It even, over a period of time, the passage of air from the air sacs to your blood that can be inhibited, and then these patients can start requiring oxygen. So, that's one category of diseases, scarring of the lungs, the pulmonary fibrotic category. Then we were talking about these tubes that move air in and out of the lungs. There are diseases that can affect these breathing tubes. The term that is, you know, you will hear commonly as COPD or emphysema. That's kind of, these are big generic terms, but essentially, it's damage to the breathing tubes that can happen from lots of, typically it's damaged from some poison. You know, we think about tobacco smoke as probably the most common driver of COPD. But there are other things, you know, pollution, outdoor pollution, believe it or not even indoor pollution can put you at risk of developing damage to the lungs, the breathing tube. So, there are, you know, not that common but you can have damage to the breathing tubes from even some genetic disorders where you have some protein in the body which may not form properly, may be deficient and patients can develop damage to the lungs. And then a third category is the category of infections. There are some diseases, there is an

unfortunate disease called cystic fibrosis. And I say unfortunate, because it tends to affect people who are relatively young and they get these repetitive infections and these infections tend to linger and many of them will progress to a point where the lungs get damaged irreversibly and they end up requiring or being considered for a therapy, like lung transplant.

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Dr. Halena Gazelka 05:10

I think many of us wouldn't have thought of infections as an indication for a lung transplant.

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Dr. Tathagat Narula 05:14

Yeah, you know, absolutely right. And even for all these diseases, you know, treatment options are improving, even short of lung transplant. But despite that we see a lot of patients who still end up progressing to that point where for them to have a reasonable quality of life and hopefully have a life, to get some longevity, they have to be considered for lung transplant.

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Dr. Halena Gazelka 05:42

How does the process to be considered for a lung transplant begin? And what is the evaluation like

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Dr. Tathagat Narula 05:50

Yeah, so you know, it all has to start with a referral. Right. It has to come. Not every hospital, not every facility offers a lung transplant. And many of these people with these advanced diseases are working with doctors, physicians, pulmonologists in facilities that don't have lung transplant as an option. So, it has to start with a referral from those physicians to a facility where lung transplant is offered. Now, for a patient, it's extremely important, I tell our patients, for them to start a conversation with their physician about lung transplant. We've been doing transplants, the field has been, you know, up and running for many decades now. And despite that we end up in situations where patients come to us relatively late many times. And it's important that that question is asked early, you know. So, ask your physician if you have a disease that you think could merit or benefit from lung transplant. It's extremely important to ask your physician and then the physician will send a referral. To come to your, you know, question about the evaluation, you know, once we receive a referral at our center or any transplant center, the first order of things is to review the records that come through. And sometimes, you know, just based on those records, you get a good sense of what you're looking at, and if transplant is going to be a potential option or not. You know, once that is done, if there is an obvious barrier, obviously, you don't want to put the patient through the journey, you know, coming to a different center, meeting more people, if there's an obvious barrier, and obviously, you know, we will reach back, and we will inform the referring physicians, sometimes even talk to the patients directly. But then, if there is promise, the next step is for the patient to be set up for a formal meeting at the transplant center, where they come in, they end up meeting, not just a transplant pulmonologist, people like us, you meet other members of the team. You would meet a transplant nurse coordinator. And then there's a discussion, there's a lot of, you know, we learn about the patients, they learn from us, we try to share with them what the transplant journey looks like, what the process entails, what to expect with the surgery, what the outcomes are, what potential complications could be. And typically, you know, at that point, I would say one of three things can happen. As I said, sometimes we will discover a barrier that is unfortunately not surmountable, and the process stops there for those patients, and they do not go any further. The second scenario is that somebody comes in and we do not see any barriers, and they are ready to go through a transplant evaluation. So, we start that. The third group of patients is, you know, they may have a disease that could benefit from transplant but they may be relatively early. But that's actually a good thing. And

there's nothing wrong in getting established with a transplant center relatively early in the process of your lung disease. You know, that's important because most of these lung diseases are progressive. So, even if you're early, as the disease progresses, you know, having that head start in the process is critical many times. You know, there are things that we can work on early. Some patients need to lose weight, you know, these are completely modifiable things. But if they start early, they have the time where they can work on those goals early, and when the time comes for transplant they're ready to go.

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Dr. Halena Gazelka 09:30

What should patients expect when they go for an evaluation for a lung transplant?

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Dr. Tathagat Narula 09:36

You know, that's important. I'm glad you asked me that question. Evaluation for lung transplant is probably the most comprehensive health check you will get in your lifetime. And it entails extensive blood work. You know, we are looking not just at the function of your lungs, we are actually looking for your other body systems, how they are working. We are looking at your likelihood of any infections. We are typing your blood so that when it comes time to find a compatible donor we know what your blood type is. Then there is lots of imaging tests, x-rays and CAT scans. We are looking at the size of your lungs, the structure of your lungs, because surgical planning needs that information. We are looking at other body organs. Some organs we take actually. we look, you know, we do a very deep dive into. Heart is one of them. So, you will get what we call an echocardiogram, these are moving images of the heart with an ultrasound machine where you can see how the heart squeezes, how it relaxes. Angiography where we are looking for, not just pressures in the lung in the heart, but also for blockages and any blockages in the blood supply to the heart. You know, sometimes you know, it's important for us to find them not just because you want the heart to be in good shape for the surgery. Many, many times we can actually fix them at the time of the lung transplant surgery because you're right there. Remember, the lungs in the heart sit right next to each other. There is evaluation of the food pipe, and the stomach, and you name it. And then there are a host of consultations that you have to go through. As we discussed, you meet your nurse coordinator and you meet your transplant pulmonologist. But then you will also meet the surgical team. You will meet experts from infectious diseases, psychiatry, palliative care, social work, finance experts. So, it takes a village to do a transplant, and some more to do it. Right. So yes, the evaluation is pretty comprehensive, and for most patients, even though it seems pretty overwhelming and intense, it can still be accomplished, you know. And it's most frequently done in an outpatient setting. You know, this can stretch out over a week or so, but it gets accomplished in the outpatient setting for most patients. And I'll tell you, when patients start there, and they look at the schedule, they're pretty, they're overwhelmed by just, you know. Typically, most of us are used to visiting our physician once every few months for a short or sick visit. And here you are appointment after appointment and test after test. But most patients do just fine with the evaluation, and it's critical for us to make the decisions that are in their best interest. We need all that information.

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Dr. Halena Gazelka 12:30

So, when you say it's a process to be evaluated, it sounds like it is a process.

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Dr. Tathagat Narula 12:34

It sure is. It sure is.

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Dr. Halena Gazelka 12:37

Is it possible to be too old to receive a lung transplant?

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Dr. Tathagat Narula 12:42

You know, that's a moving target. So, if you had asked me this question about five to 10 years ago, the answer would have been a discrete yes. That's not the case anymore. You know, we do not look at the chronological age or the calendar age as much as we now try to focus on the biologic age. And the way we look at it is we look at the functional status and how the rest of the body is. You can have a patient who's younger and much sicker and not a candidate, and sometimes, and many times these days, patients who are older even going as much into 70's now, mid 70s, you know, we have done transplants. And many large volume centers are doing that with excellent outcomes, you know, so long as the rest of the body is in good shape. And so, if you select carefully, age increasingly is not being recognized as a barrier. So, you could be in your 70s as I said. I don't know of a center or a place which has gone into the 80s yet, but yeah, 70s we are definitely going there, and we are doing transplant successfully in that population.

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Dr. Halena Gazelka 13:49

Why do some individuals receive a single lung and some receive a double lung transplant?

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Dr. Tathagat Narula 13:57

It's a question Halena, you know, we get asked often. And it has many layers to it. This answer is not, you know, one size fits all kind of answer. And I will tell you what I mean by that. I'll explain it a little more. So, just medically there are some problems that you cannot fix with a single lung transplant. Remember, when we transplant, somebody receives a transplant for the rest of their life they have to be all these very potent, very strong medicines that essentially completely suppress their body's defenses, their body's ability to fight infections. So, if somebody comes in for a transplant with an infectious process, you cannot leave one of the infected lungs in the body because that infection will then take over their body. So, you have to do a double lung transplant for those diseases. Cystic Fibrosis we touched upon earlier is one of those diseases that you have to do a double lung transplant for. Then there are diseases where you have a very high pressure in the lungs, you know, that is a disease called pulmonary hypertension. And that disease, if you try to do a single lung transplant, that single lung cannot handle that pressure, and it tends to fail very quickly. So, it's another medical reason why somebody would be considered for a double lung transplant.

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Dr. Halena Gazelka 15:23

Don't we need two lungs?

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Dr. Tathagat Narula 15:25

We actually don't. Believe it or not, we actually can get by just fine in our day-to-day activities with one lung. Lungs are a very smart organ. What we do not appreciate is a single lung for somebody can do, you know, can sustain them just fine, unless you are somebody who's going to be running a marathon, you know, doing things in that

domain where you're stretching your physical, you know, your physical abilities to the hilt, single lungs work just fine. But there is another layer to this argument. And that layer is the ethical argument, right? We know that there are people on the waiting list, you know, who are desperate for organs. And if you were to split the organs and give them to two recipients, the society stands to benefit. And that argument is a strong argument, as you can imagine, you know, with so many people on the waiting list, as I said. But then, so at a societal level, this makes sense. But at an individual level, what we have learned over the years is that double lungs do better. The survival over the long haul, with patients who receive a double lung tends to be better on an average by a few years. And that has to be taken into account. The reality in the field is that most centers are drifting towards offering double lung when they can. And close to 70% plus transplants that are done across the globe now are actually double lung transplants. So, that's where the field is drifting.

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Dr. Halena Gazelka 17:04

How long does the surgery itself take?

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Dr. Tathagat Narula 17:07

You know, it's a long surgery. It's a, if I had to ballpark, it could range anywhere from six hours to 12 hours. And, you know, the reason is there's exactly, even though it's one surgery, lung transplant surgery, there are many components to it. You know, you have to get the patient, like any surgery, you have to get the patient comfortable when they get into the operating room. So, they get that anesthetic part, and they have to have tubes and catheters placed for their monitoring for supporting them. Because you're taking a vital organ out of the body, you know, you have to many times put them on support heart/lung machines. That's another part of the surgery. Then think about it, the surgeon doesn't just have to transplant. Before that, he has to take the old lungs out of your body. And then he has to put the new lungs in, and then they have to make sure that the lungs are working well before they close everything and send you out of the operating room. So, when you add that all up, that can easily get into, you know, the eight to 12 hour range. The fastest I've seen people come out, as I said, is at six hour window or so, but mostly these surgeries tend to linger into the eight to 12 hour range.

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Dr. Halena Gazelka 18:21

And then how long are individuals hospitalized after a transplant typically?

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Dr. Tathagat Narula 18:27

Everybody heals at a different pace. You know, if you look even for regular cuts and bruises, everybody heals differently. And that's true for transplant also. Uncomplicated normal healing, you can expect to stay in the hospital for 10 to 14 days. But then again, you know, that just as we said for other aspects of this process, one size does not fit all. So that's a ballpark, but it again depends on if you have any complications, you know, things can become longer. Some people just heal faster and would leave at the, you know, within 10 days or so. But 10 to 14 days.

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Dr. Halena Gazelka 19:08

In these days of rapidly moving people through the hospital, that's a fairly long hospitalization.

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Dr. Tathagat Narula 19:13

It is, it is, but it also is a big surgery. It's a big surgery. It's a complex process. And it's not just healing from the surgery. Remember, there is a radical change for these patients in their life after transplant. So, there's a lot of coaching and training and education that they have to go through before they can safely leave the hospital. So, they have to learn not just their new medications, they have to learn how to protect themselves, you know, when they go to the outside world because their body, as I said, doesn't have those defenses. You know, I talk about this often. What we are seeing with the pandemic around us, you know lung transplant patients have been dealing with this since the field came into work, because they've always been trying to protect themselves, not necessarily live in a bubble, but definitely be more careful in terms of protecting themselves from infections and things like that. So, yes.

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Dr. Halena Gazelka 20:15

Well, I have something that I've been wondering about as well. And I'm wondering if you can tell us about Mayo Clinic's ex vivo lung perfusion program and what this means for patients?

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Dr. Tathagat Narula 20:26

I'm glad you bring that up, you know, lung is a very, very vulnerable, very sensitive organ, you know, and many times as you procure organs, these lungs will show signs of some insult. It could be something as simple as some excess fluid on the lungs, a little bit of inflammation, a little bit of aspiration. And historically, you know, if you saw that, and you would always worry how will it do when I put this lung in a new recipient. And if unsure, nobody wants to use a compromised lung, so we would just turn them down. And the reality is only about 20% of organs that were offered, historically, we're being used.

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Dr. Halena Gazelka 21:13

Oh wow.

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Dr. Tathagat Narula 21:15

Now, ex vivo lung perfusion is a potential solution for this problem. Essentially, what it entails is our ability to take the organs from the donor, and if you have any of these concerns, we can place them on what we call actually a perfusion rig. But it's essentially a heart lung machine outside the body. And you can circulate, you can run some special fluids and special gases through these lungs and assess them over a period of time, and ascertain that these lungs are really good to be used. Many, many times, using this platform, we can actually apply treatments and heal the lungs, and then at the end of the process if the lungs look like they're usable, then we go ahead and transplant them just like we would do with lungs that are taken directly from donors. And what we have learned is, not only does this technology allow us an opportunity to use more lungs, the outcomes of these lungs, as has been studied, are similar to the lungs that are taken directly from donors. So, it's in some ways revolutionizing our field. And patients stand to benefit because then they don't have to, they don't have to wait on the waiting list, they don't have to, that option, there's an extra option for them to get these organs. And, you know, talking about what we're doing here at Mayo Clinic, you know, we have historically been at the forefront of newer technologies trying to help our patients, and ex vivo lung perfusion is no exception. We've been a part of the clinical trials in ex vivo lung perfusion here at Mayo Clinic, Florida for many, many years since the trial started in the country. And for the last two years or so now we have had, we established a lung restoration center here on campus. It's a collaboration with United

Therapeutics, and we've been offering this technology and using it actively to, you know, support and preserve and improve lungs that otherwise were marginal and may not have been used. And this has translated into a higher transplant rate, better, you know, our patients are having to wait less. So, we're very excited about this technology and having access to it right here on campus.

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Dr. Halena Gazelka 23:43

That truly sounds like science fiction, like movies I might have seen years ago with organs in containers. That's really fascinating and amazing.

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Dr. Tathagat Narula 23:55

It is, and you know, we have, you know, even for us in the field, you know, it has come a long way. This ex vivo has completely changed the paradigm of how we used to look at, you know, organs when our teams go out to procure those organs, just having this option, you know, gives so much flexibility to the decision making, and adds that extra peace of mind that, you know, what I'm transplanting into my patient is truly the right organ for that patient. And I'm not, you know, we're not testing the waters here.

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Dr. Halena Gazelka 24:32

Or in a rush because the number of hours was always something that I was familiar with in anesthesia.

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Dr. Tathagat Narula 24:37

Yeah, yeah, that is, you're absolutely right. That's a valid point, and I think we should talk about it. You know, lungs don't have a shelf, or historically did not have much of a shelf life. You know, you had only so much time between procuring the lungs from the donor and putting them in the body of the recipient. And this technology gives you an extended duration. So, now you can place these lines on this rig, and you have a few more hours to plan your surgery to, you know, yeah, it offers a lot of flexibility in that regard also. You're absolutely right. Sometimes patients are farther away, and this gives them time to get in to be prepared for this, you know, to reach the center. It brings a lot to the table. Yeah.

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Dr. Halena Gazelka 25:22

What is the life expectancy after a lung transplant?

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Dr. Tathagat Narula 25:27

Good question. You know, like any disease process, any complex disease process, it varies from patient to patient, you know, the kind of surgery, as I said, single versus double, but when you look at averages, about one in two patients, 50%, will hit for five years or beyond. Now this number is actually just steadily improving. If, as I said, you know, a decade ago or so, we were not doing as well. The most recent data report suggests that on an average, patients are living more than six years now after they receive a lung transplant. And with the way the field is evolving, the way the therapeutics are improving, the way the surgical techniques are improving, I foresee this

improving even further in the coming years. Yes, but that's, you know, on the flip side though Halena, we see that we still are not where many other organs are. Other solid organs still tend to do better than lungs. And there are many reasons for that, you know, one of the ways I explained it to our patients, because they asked me, you know, I have so and so who received a liver transplant and has done so well for so many years, and why are lung transplant outcomes not that good? And the reality is we never really are able to do a lung transplant and then, you know, close out that organ and separate it out as segregated from the outside world. You know, you're always breathing in and out, and the lung itself is just exposed to these insults continuously. So, outcomes with lung transplant are improving, but I think there is room for improvement, more improvement. As I said, at this time, we are looking at about six years or so.

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Dr. Halena Gazelka 27:20

So, if an individual is looking for a transplant center, how do they evaluate whether this is the center for them?

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Dr. Tathagat Narula 27:29

So, you know, again, the first and foremost, they have to, you know, like anything else, when you go looking for a physician, you have to see who's in network and who's out of network right? So, they have to talk to their insurance and see what centers are covered in the insurance plan. So, that's where you start. But in terms of just looking at understanding the kind of work that center is doing, you know, what their outcomes are like, how long do people have to stay on the waiting list. There are, you know, there are databases, and the most, I think the best database that any patient can access is the scientific registry of transplant recipients. And I will say what the website is srrtr.org. It's a resource for patients. You must, if you are looking for a lung transplant, I would strongly encourage you to log in, and they have data for pretty much every lung transplant center in the country. And some critical outcomes data is available. And it can help you, you know, move in a particular direction. You should be looking for ideally centers which have experience. So, the number of transplants each center is doing is important. You know, the kind of options they have for their patients, we touched upon EVLT, it's important, I think in current times to make sure that your center has the ability to offer access to technologies of that kind. And then, you know, you want to look at what are the support systems exist in that facility? Or do they have support groups for their patients where patients can talk to each other, and learn from each other, and support each other through this journey. It can be taxing, and those resources are important, you know. Resources in terms of housing. Resources in terms of organizational support. All of those things you should be looking at, but a good starting point, as I said, is ones you are looking at once you know from your insurance, what your options are, is to look at the scientific registry of transplant recipients and compare the centers that are your options, and see what would be a better fit for you.

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Dr. Halena Gazelka 29:42

It does make sense that the higher volumes in terms of the surgery that an individual's hoping to pursue, the type of transplant would be important.

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Dr. Tathagat Narula 29:52

Absolutely, absolutely. You know, there is a degree of, you know, objective data out there that you can gather. But medicine, unlike many other fields, I always say, you know, you cannot put a price on experience. It is critical, you know, that you end up in safe hands, and safety is not necessarily always taught in books. You know, there are things

you learn only from experience and many, many times the hard way. So, if you've gone through the wringer a few times, I think you're better placed to take care of this very complex patient population. So, absolutely a large volume center, I think, is if I was a recipient of care, I would put a lot of value in going to a relatively large volume center.

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Dr. Halena Gazelka 30:45

Well, this has been an absolutely fascinating conversation. Any last thoughts you'd like to share with the listeners?

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Dr. Tathagat Narula 30:53

You know, yeah. You know, the overarching, you know, hope for all of us, and the overarching vision is that we don't want anybody, any potential recipient on the waiting list to not receive an organ. And the reality is that the field is that, you know, we are all working to make that come true. There's a lot of innovation in the field. And there are other things that, you know, you will start hearing about in the coming years. You will hear about what we, the medical term is xenotransplantation, but things like where we are going to be transplanting hopefully organs across species, you know. We all have heard about valves from pigs, heart valves and things like that. But, I think in the near future, we will be hearing about organ transplants from other species. You know, so that people at least get a bridge before they get a human transplant. There is this bio artificial lung in the works. So, the the field is evolving, and we continue to hope that we'll be able to help many more patients in the coming years. And as I said, hopefully nobody will ever have to die on the waiting list.

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Dr. Halena Gazelka 32:03

What a fascinating field of medicine, and how gratifying it must be to work in this area.

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Dr. Tathagat Narula 32:09

It is. It is. I wouldn't trade it for anything else.

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Dr. Halena Gazelka 32:13

Thank you so much for being with us today.

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Dr. Tathagat Narula 32:16

Thank you. Thank you.

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Dr. Halena Gazelka 32:18

Our thanks to Mayo Clinic pulmonologist, Dr. Tathagat Narula for being with us today to talk about lung transplants. I hope that you learned something. I know that I did. We wish each of you a wonderful day.



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Narrator 32:31

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