

[MUSIC PLAYING]

ARMANDO
GANOZA:

Thank you, Amin. I don't know how many of you guys do pediatrics, or take care of pediatric patients, or even as a pre or post, but it's a little bit of differences. In my case, sometimes I do the donor and bring the kidney to the other side and put it in.

I don't know why this is smaller maybe because it's Amin's computer, huh? It's Amin's computer, you know? So we're going to review the most common indications in renal transplants in children in case you ever have to take care of a kid, the difference between the kids and the adults, and some things about the perioperative management.

As in the adult side, in our kids we know the kidney transplantation is the best treatment for children. However, there's a big difference. Kids, the neurologic developmental is critical. So when they are on dialysis, malnutrition is a big thing on them. So we try to do most of our kidney transplants in a preemptive manner. And most of the policies done a couple of years ago, more than that-- I mean 10 years ago-- changed based on that. That must be, you're getting some emails.

But there are some improvements. Things change, surgical techniques, perioperative care. We understood how important is our anesthesiologist in the OR and immunosuppression have changed also, not only at the adult, but in the pediatric. Definition of end stage renal disease is no different from the adult side.

How frequent we see end stage renal disease in kids is not as frequent. The US has a high incidence, prevalence of end stage renal disease in kids. But I would think that in general, it's because we have a better registry. Don't ask me why it's really low in Japan.

Since the creation of the program in 1998, we have done 500 kidney transplants. We have done more liver, kidneys than most of the centers around the country. And we particularly-- see, we have one of the first centers doing liver and small bowel transplant in kids. We are now starting to see the complications after being under immunosuppression for a long time, CNI toxicity.

The difference basically are immunologic. The primary disease that leads into end stage renal disease, the immunization is a big game in the pediatric population. Most of our adult patients, they're already immunized. The kids, they're not. So that's a big delay in listing our patients. You're going to see later that almost 40% or more than that of our patients are listed, they're on the waiting list, but as on a status seven. They're not actively listed. Because they're waiting for immunizations and all other things that needs to be addressed first.

The donor allocation policies are different, surgical techniques. Primary viral infection, most of our patients are naive for the most common viral infections. CMV, EBV is almost all of them are negative. So they are technically, 80% of them are at high risk for a CMV or EBV transmission. We talk about neurocognitive developmental and the transition.

The immunologic factors are also different. The immune system is also naive and is learning. So the small kids, they don't have as much rejection as in the adults. However, it becomes a big problem in the adolescents when they stop taking the immunosuppression.

They're also different, not only between children and adults, but also differences between the young children and the older children. The congenital disorders are more frequent in young kids. And older children that have pathologies are more similar than the adult population.

This is our report from 2017. Almost 40% of all the kidney transplants performed are related to congenital anomalies of the kidney and the urologic tract. And other, 43%, almost half of them, they don't have a definite diagnosis. Again, the difference are also between the different ages in kids less than 18 years old.

The donor sources is no different between the adult side. However, we try on kids that are less than 30-20 kilos or 40 to 60 pounds, we try to do all of them from a living donor. I will discuss a little bit more later. In October of 2005, the units changed, the allocation system for a Share 35 policy. It's different from the liver policy Share 35 that allocates regional all the patients that have a MELD score more than 35.

In this case, all the donors that are younger than 35, they are over first to a pediatric patient. Is that good? It sounds good. But unfortunately, the best quality donors come from living donors. So what we have seen over the past 10 years after this new policy came is that the families are coming to us, not willing to donate.

Dr. Molinari was talking a little bit on the waiting times on the list. For a pediatric patient in our center it's around six months, no more than that. So we have families that come and say like, I'd rather wait six months, and then I can donate later. However, the quality we know that of a cadaver is not as optimal as a living donor.

We had a kid last year, two years old, 10 kilos. The family came and said, we're not doing it. We want to wait. Three months later, the kid was in the ICU with a severe sepsis from peritoneal dialysis. And then they went into a transplant.

So things have been reflected in the last SRTR report. Living donation has decreased significantly. And unfortunately it has decreased significantly from the family. If you see here, these are related to the recipients. And they're, we don't want to donate anymore.

Also, there are differences between the age of the potential recipients. There are less donations for kids that are older. Everybody wants to donate to a kid that is small and cute, right?

So recipient work-up is no different, with a physical examination, history, comprehensive laboratory, cardiopulmonary, dental. If 40% of our kids have congenital disorders, so from those patients almost 40% have other congenital disorders, vascular, cardiologic, pulmonary disorders, GI tract disorders, bladder disorders.

Our screen from virus is the same. We put a lot of effort in immunizing the children before going into transplant. This is critical. And the social service and psychosocial evaluation is probably more extensive. And we try to dig more into every detail. Since most of the family can-- OK, when they're five years old. But what's going to happen when the kid turns 15? They go and they just stop taking the medication. That's when things happen again and they can lose the organ.

[INAUDIBLE] considerations different, urologic considerations, vascular, and the size is really important. Our urologic evaluation is really extensive. We basically don't do a transplant unless the kid is already cleared by the urology team, meaning if the patient has a drainage issue, the bladder is not functional, we like to get that addressed.

They can have drainage procedures. Some kids have dysplastic bladders, they go augmentation on the bladder with a piece of intestine or colon. Urinary diversions, straight cath, all those things have to be thought of before even thinking about transplanting the kid. Because then the complication can be worse.

Vascular also, we try to do, as I said, most of them preemptively. As you know, putting contrast can jeopardize a small function that the kidney still has, the remnant kidney has. But going into transplant without knowing how the vasculature is, it will be risky.

One thing that is not considered when we do an adult, at least not in all the cases that we have, but we almost in all our patients less than 20-30 kilos is, if we were going to take out the native kidneys. And these are the reasons why we could potentially take the kidney out.

If there are chronic infections, if there are urolithiasis, heavy proteinuria, hypertension, polycystic as in the adult site, infected reflux. Again, 40% of our kids have congenital disorders of the urologic system. If we put a new kidney in, we still have hydronephrotic ureters and infected kidneys, they can lose the new one.

On top of that, on a kid 20 kilo or less, the new kidney, the adult kidney is going to be half of his abdomen, of its abdomen. And for that we will have to anastomose the new kidney to the main vessels. And we will need some room on it. So if that's the case, we'll remove the native kidneys.

Again, most of our patients are inactive, being evaluated, and then it's something it's around the country, again more than 40% they're listed because they are preemptive with an incomplete workup.

These are the basic differences when I see a pediatric patient. And I learned this. If they're less than 20 kilos, we have to think that we're going to do it intraperitoneal, which means that we're going to do a mid-line incision, a big incision, mobilize the entire intestine and the entire colon, and hook the new kidney to the main vessels, aorta and cava.

If a kid is more than 20 and 30 kilos, we can evaluate the possibility of doing it retroperitoneal. If the kid is more than 20 and 30 kilos, but have a severe proteinuria, congenital disorders, recurrent UTIs, or hypertension; we will go anyways intraperitoneal and remove the native kidneys. And this is how basically new kidney, half of the belly, the colon, and the intestine mobilize medially, and we put it behind the colon.

Since the colon with the appendix is removed here, it's going to be on top of the kidney, we remove the appendix in every case. Later on if they come with a lower quadrant abdominal pain, the appendix out of the game, of the question. This is the classic retroperitoneal access to the iliac vessels that you probably know very well, is in our picture. This vena cava and aorta isolated, and this is how this is going to be. This is the cecum without the appendix.

Again, our picture of more connections, this is half of the belly. This is all the colon retracted medially, and this is going to be connected to the main vessels. One or two arteries, nothing different from the adult. Size matters.

But what is different on a tiny kid? Again, they are still the minority. But there are the more complicated kids, 5% of the pediatric recipients. And those kids have the majority of congenital disorders, congenital abnormalities of urinary tract, nephrotic syndrome, and all the other pathologies that are listed there.

Most of these kids, they don't tolerate hemodialysis. So I'll say 95% of these kids are on peritoneal dialysis. A kid, this size less than 20 kilos, to get a huge vasc cath and being on hemodialysis, it's almost impossible. The blood pressure drops too much. And these kids, if they get hemodialysis at home, they get the hemodialysis 5-6 times, almost every day. So we try to do peritoneal dialysis on almost all the small infants. And as I said, 30-40% of them, they come with other congenital disorders.

In this recent publication and in our center we try to do most of them from a living donor. The advantage, you guys know it very well. We can time the procedure. The kidney transplant can be done preemptively. We have a better immunologic match. And the donors are young. The cold ischemia time is very short, and minimizes the risk of DGF.

Delay graft function on a kid this size is something that we cannot afford to have. And that's why we always try to do living donors. I would say what Dr. Humar taught me when I came back to just pediatrics, he said like, a cadaveric on an infant, on a kid less than 20 kilos, a cadaveric transplant is a contraindication.

So we will not even consider it. Why? If you have the risk of having DGF, 10-15% maybe on a good cadaveric donor, it will be higher on the pediatric patient to have a blood pressure, normal blood pressure, systolic blood pressure of 80. You put in your kidney, and it's done. It will not profuse. So you will have more problems after the transplant.

And if you remember that these kids were on peritoneal dialysis, and we already invaded the abdomen, we will have to put a central avascular cath and do hemodialysis after the transplant. And this kid will-- the only kids I have seen, they have to remain in pressors and on hemodialysis, and those are not ideal.

What considerations we have during the transplant? We have to make sure that we have a good communication with the anesthesiologist, the kidney has to be well perfused and maintain a PVC more than 10 centimeters of water. And we have to increase the cardiac output and maintain a mean blood pressure more than 60.

Anti-coagulation, we don't use it routinely. But when we clamp the aorta, we use it as in the adult side. However, there are centers that they use anti-coagulation in all their pediatric patients less than 20 kilos. We just use aspirin.

If there is any hypercoagulant disorder and they have an indication for that, of course, we do it. No difference between the immunosuppression in terms of the induction agents. We at Children's, we still-- I don't know if you guys remember-- we used to use Campath in our adult side. We still use it. I know, Christine. We still use it in the adult side. We haven't had any issues. And we have the protocol, and we still use it.

That's different with the adult side. On the adult side we use thymoglobulin. However, most of the centers around the country in the pediatric world, they use thymoglobulin.

The maintenance, the induction based on the CE BRA is also almost same trends on the immunosuppression. These have evolved as evolved in the adult side. Most of the patients are in CNIs.

Common post-transplant issues, as I said, most of our donors come from living donors, and most of the cadaverics are young donors. So DGF is not a frequent. We can call it a [INAUDIBLE] function. But by definition, the [INAUDIBLE] function, I haven't seen it in over the past three years at least.

Acute rejection is the same. It can be early or late. An antibody mediator rejection is the same definitions. It's not as frequent and it has been better over the past 10 years.

What is more frequent in these cases are the urologic complications. Urologic complications, 3% to 15%, and correlates with the pre-transplant problems that these patients have before; vascular thrombosis, 2% to 12% and 7% in the United States.

Malignancy, as I said, these patients are naive in terms of CMV/EBV. So prophylaxis is really important, as it is in any high-risk patient recipient. However, the risk of having PTLD is a little bit higher. From all the malignancies that kids have, 50% of them are going to be PTLD and related to EBV new infection.

The complications they have after surgery are related to urinary tract infections. As I said, 40% have congenital disorders. Wound infections, pneumonia; we don't see that. Probably wound infection we see it in the adult side, but they are related to probably obesity, diabetes. In this case wound infections are related to the type of incision that we do. We do a big inter-abdominal procedure.

One thing that I have, probably we will have another talk about non-adherence. All the patients that we have seen that patients are 14 or older, they start having problems with the kidney. And that's common. And that's where we-- we follow all our patients, even after they move to the adult side. And then it's a really important transition. They used to be followed by our center and they go to the adult side, and it's completely different. We babysit them too much probably.

But non-adherence is something that we-- we don't see as much rejection in the small kids. But we see it more in the teenagers. The immunological system, the immune system, is different, yes. But I think the change is also because of the non-adherence.

Graft survival rates are almost the same between deceased and living donors. The life expectancy of the graph is different. You can see 12 years old, survival is way different than less than two years old. So this is a big difference.

So how are we doing? I think we're doing OK. We would like to do more. We're trying to improve our outreach program, which we started a collaboration with the clinics for special kids in Lancaster. We want to have some more kids with metabolic problems being referred to our center. We would like to do more kidneys than livers, as it should be. But we're working on that.

Conclusions, I don't think any kids should be on hemodialysis. There are studies that have shown major difference between the developmental between a kid being on dialysis or having a transplant. The transplantation from living kidney donor is strongly recommended. In numbers, it seems that they do the same. But those numbers are in the ones that have survived the transplant. And that's a big difference.

Noncompliance may lead to rejection, and inferior graft outcomes in teenagers. And long-term outcomes for patients of graft survival after kidney transplant are excellent. And we hope that we keep it that way.