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EDWARD AHN: The traditional treatment for spina bifida is we generally fix the spine problem after the baby's born, usually within the first one or two days after the baby is born. But since the studies have shown that prenatal surgery is beneficial, we have an approach where the uterus is opened and then we can fix the spinal defect while the babies in their second trimester. And that, of course, shows the benefits. But again, the risks behind that are risks of uterine rupture requiring a Cesarean section afterward and the risk of premature labor.

With the fetoscope, what we're doing now, is we can access the uterus and access the fetus by looking through scopes. And we can, similarly, repair the spine defect just through the scopes itself. And this is involving simply placing ports within the uterus rather than opening the uterus up. And through the ports, what we do is we visualize on the screen the spine defect and we repair the defect through instruments, tiny instruments, that go through the scope itself. And that way we leave very little impact on the uterus. Studies have shown that prenatal surgery for spina bifida is beneficial.

It's proven to improve the infant's outcome with regard to being able to walk, and also with their outcomes with regard to hydrocephalus and development of chiari malformations. So that's been proven. And the development that we want to talk about is the use of fetoscopic surgery. The main disadvantage to a prenatal surgery is the risk of having a premature delivery. And with a less invasive fetoscopic approach, we can get closer to that target of a full term delivery and make the situation safer, for both the baby and the mother.

RODRIGO RUANO: The main objective is to reduce the risks, the obstetrical risks, so that means reduce the chance of opening the uterus, then that means that we want to reduce the risk of uterine rupture, contractions. So that those patients they can, they will be able to have the contraction, they will be able to labor. So they will be able to have vaginal delivery. And our goal is to have those patients delivering close to term. So we hope to improve also the gestational age that they are going to deliver those babies.

This procedure needs to be done, of course, in a sterile way, operating room. Usually we have generally anesthesia because we need to relax the uterus. Even though we are doing less aggressive under fetoscopic view, with a scopic view. But we need to relax the uterus, so we do that under general anesthesia. And then, we expose the uterus, so we do a laparotomy, we open the maternal belly, abdomen. And then we expose the uterus. Instead of make an incision in the uterus, we are just going to puncture, make a tiny, tiny incision, just to put the scope inside. And then we find the best way to avoid a placenta, so we need to be away from the placenta.

And then we position the baby, so the fetus, we put the head down usually, so we'll hold the head, and then we put the back up. It's interesting because the technique was developed in a way, that we developed together, that we put half gas and half water inside the uterus. So we expand a little bit with gas. Why? Because inside the gas we can visualize better the spina bifida defect. So we put the back of the baby up and we put some gas inside the uterus. So that means that the baby is going to be facing down, head inside the water or the amniotic fluid. But their back is going to be upward and then we are going to have the gas. And then we introduce the ports.

EDWARD AHN: So through the ports we can introduce a scope and look at the baby's back. The issue with the baby's back is that, there is an opening. so it's not covered by skin, and it's not covered by bone, instead we see the exposed spinal cord and nerves. So that's, by definition, the spina bifida defect. So with the scope we have that visualized. And then our job is then to free the spinal cord and the nerves from a cyst membrane that surrounds it and is attached to it.

And then to completely release it from all those attachments. And then the spinal cord the nerves is then tucked back into where it should be, the spinal canal, and then our job is then to close layers of skin over top of the opening. And then, by doing that, we're not letting any more of the spinal fluid, the nerves, come outside of the defect. So all that's done through the scope, through using sutures that are tied with visualizing under the scope. And by the end we should have a single incision that can heal as the fetus is developing.

I think that the family should have the option to this less invasive approach for several reasons. Through a less invasive approach, through scopes, effectively should be a reason to come here. Make the referral early. We're in a time window where we restrict our interventions for the fetal surgery for spina bifida to be somewhere between 19 and 26 weeks. But it has to be within that window. So often when the diagnosis is made, you really have to get a lot of steps in the process in place for the surgery to occur, many team members involved. And the planning really starts rapidly afterwards. So the earlier we know about it, the better.

RODRIGO RUANO: Patients carrying babies with spina bifida who are seeking for evaluation another place, there's no risk for traveling or flying, unless they have some other problems. For example, preterm contractions. If they rupture the membranes, of course. So of course, the communication between the referring provider and the center is very important. Because we need to see the initial condition of the patient. But if the patient is fine, is doing well, just the baby's concern, then there's no risk for traveling.

EDWARD AHN: The culture of Mayo Clinic is collaboration. So you have experts in each of their own disciplines working together. So in this specific scenario, you have a mother who's pregnant with a fetus diagnosed with a neurological condition. And you think about all the different specialists that you need involved. You need a specialist for the mother. You need a specialist for the fetus, who has the neurological condition. You need a specialist to provide the anesthesia for the mother, and then someone to provide the anesthesia for the fetus.

And then you have to think about who's going to care for the baby overall after the baby's born. And then the long-term needs of the baby. I mean, think about how many fields that you're talking about. And so one provider cannot manage all of this. And I think it's very fitting for Mayo Clinic, who has experts in all these different fields and encourages that the collaboration between all the different caretakers to come together. And there's no solo player here, we're all working together as a team. And I think this is a perfect example of how it works.

You know I've seen the perspective, as someone who takes care of children with spina bifida, go through the challenges of trying to live a normal childhood. And the challenges of being someone with a spine abnormality with weakness of your legs and not being able to have normal bladder function and potentially having hydrocephalus, dealing with depending upon a shunt for normal function. And that ends up becoming like a lifeline for the children. And it is something that we believe in, that if we can improve any of these things for the child then we need to do everything we can to make it possible for the families.

So if a baby's born with spina bifida, that child will live but will live potentially a completely different life if they didn't have the intervention. But they will live. And so it's not a life or death situation where we're intervening. However, it is a completely different life, in the sense of-- for example, not having hydrocephalus that affects the brain or being able to use your legs better if you have the fetal intervention. Or not having a brain stem problem. All those things are, of course, crucial for the neurological development of the child.

And when you ask why do we enjoy doing fetal surgery? It's the fact that, I like interacting with the family. I like interacting with the expectant mother. And when they're faced with the decision about doing this surgery, they could, a, choose the traditional path of having the baby, the baby undergoes all these interventions, and potentially has a completely different life. Or the mother then decides to have the surgery done by Dr. Ruano and myself.

And when the mothers then decide, well, if there's a potential benefit to my baby who's not even born yet, and I can do something about it and have surgery done on myself. Then, hands down, we find that the mothers will say yes, they will make that decision without a question. And I always step back and realize the bravery of the family. The mother, the father, and everybody involved, that they're going to put their lives, literally, on the line for the outcome of the baby.