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Evaluating the Evolving Field of Fetal Neurology

Dr. Lisk:
Diagnosing a neurological disorder in a child can be challenging. But recent advancements in fetal neurology can help clinicians detect and treat neurological diseases before the child is even born. What do we need to know about this rapidly changing field?

Welcome to *NeuroFrontiers* on ReachMD. I'm Dr. Jerome Lisk and joining me to discuss fetal neurology is Dr. Anthony Fine, a pediatric neurologist and epileptologist at Mayo Clinic, Rochester. Dr. Fine, welcome to the program.

Dr. Fine:
Thank you, Dr. Lisk. Thanks for having me.

Dr. Lisk:
Dr. Fine, what is fetal neurology? To start, how is a fetal neurologist different from a pediatric neurologist?

Dr. Fine:
So, a fetal neurologist can be considered a sub-specialty within pediatric neurology. Fetal neurology involves the identification and diagnosis of brain abnormalities during pregnancy. And it does require a knowledge of the developing nervous system and what is normal at what expected gestational age.

Dr. Lisk:
Yeah, well I've long forgot what's normal at what gestational age as an adult neurologist, so, this is definitely fascinating to me. When does fetal neurology begin and end?

Dr. Fine:
So fetal neurology is really from any time in pregnancy until the birth of the child and then we kind of move on to neonatal neurology. But in terms of fetal life, you can have a consultation at any time, but most typically it's during the second trimester or third trimester after imaging has already been done.

Dr. Lisk:
Well, that's interesting. You wonder how the pregnant woman will know that they even need a fetal neurologist, so can you tell us what clues in a pregnant lady or the OB/GYN that they need your services?

Dr. Fine:
Sure. There really aren't any symptoms that a woman would experience that would give her clues that she needs to see a neurologist prenatally. Sometimes if there's a family history of a neurologic or genetic disorder or a previous pregnancy with a genetic disorder, they may request consultation with a pediatric neurologist. But typically, the patients I see are referred by obstetricians and maternal fetal medical specialists and usually following an ultrasound that identifies a brain or spinal cord abnormality.

Dr. Lisk:
Interesting. So, what does your consultations consist of when you do get involved with a case?

Dr. Fine:
Typically, it's a lot of counseling and reviewing images with families and going over what may be happening to the fetus, in terms of neurologic changes and also what possible outcomes there are.

Dr. Lisk:

OK. And so if there's a family history of a genetic disorder, I'm assuming that sometimes you get involved before the second trimester, correct?

Dr. Fine:
Possibly. Especially if there's a family history, they may come to me just for recommendations on additional testing that might be done during pregnancy or timing of imaging.

Dr. Lisk:
So, what neurological conditions do you normally see?

Dr. Fine:
So, the most common conditions that I see are ventriculomegaly, midline abnormalities such as callosal or septal agenesis, and then posterior fossa abnormalities, such as a Dandy-Walker malformation. Also, if there's suspicion for acquired lesions such as in-utero stroke or a TORCH infection, I may see a patient, but definitely the most common conditions that I see are ventriculomegaly and agenesis of the corpus callosum.

Dr. Lisk:When are ultrasounds done that clue in the OB/GYN that they may need you, and what follow-up testing do you do for these different conditions?

Dr. Fine:
So typically, these issues are identified on the anatomy scan, which tends to be a higher resolution ultrasound between 18, 20, 21 weeks gestation and during that ultrasound, careful attention is paid to major structures, in particular, the brain is at a point where you can accurately assess how it's developing. If there is an abnormality on ultrasound, we may then do a fetal MRI to get more information, just because there are limitations with ultrasound, in terms of being able to see everything you need to see, based on body positioning and, penetration of the probe. And so then we may do an MRI to get more information.

Dr. Lisk:
So, besides amniocentesis, what other workup or testing do you do for these genetic abnormalities?

Dr. Fine:
Sure, so it can be quite difficult to get a clear and firm diagnosis, prenatally. Early in pregnancy, or really throughout pregnancy, there's the option of doing a blood test on the mother and doing cell-free DNA testing, and that looks for circulating fetal DNA in mom and for that, it's really more helpful for conditions like trisomy 21, 13 or 18, and, sometimes depending on the test, it may get less accurate over time. Amniocentesis, which involves aspirating amniotic fluid and running tests on the fluid and the cells within that, you can do genetic testing that you would otherwise do when the patient is there in front of you, such as a chromosomal microarray or even a whole exome sequencing.

Dr. Lisk:
Wow. That's very interesting. For those just tuning in, you're listening to *NeuroFrontiers* on ReachMD. I'm Jerome Lisk, I'm speaking with Dr. Fine about the field of fetal neurology. So, Dr. Fine, why is it important to have a prenatal consult?

Dr. Fine:
So, these consultations are important because they lay the foundation for what parents can expect following the birth of their child, and it also introduces them to the neurologist who will, likely, be in their child's life long-term. There's a lot of uncertainty during pregnancy, and especially if you're given news that you weren't expecting, sometimes consultation with a specialist can help families come to terms with what may come or what the possibilities are. So, if we identify that the child's most likely to have a certain disorder, it gives time for parents to prepare for it and identify what they need to do in the future.

Dr. Lisk:
Yeah, I remember when I was in neurology residency training and we did pediatric neurology and had to go in the ICU, that was probably one of the more terrifying parts of adult neurology training. So really you're doing important work and I know it's very challenging. What is your most challenging experience that you have had in fetal neurology?

Dr. Fine:
In neurology, it can be hard to get a firm diagnosis. A In fetal neurology, it's even harder. There's a lot of prognostication that occurs during my consults. And depending at what stage of pregnancy a woman's in, there can be a lot of changes that are still to come, so these consultations occur during a time when the brain is still undergoing rapid development and is still quite plastic.

Dr. Lisk:
I imagine that you're working with multiple other services, especially at a place like the Mayo Clinic where you could come there and

kind of have all of your appointments in one day. Can you kind of expand upon the support services that you provide to families , the other fields of medicine that you work with, team members and how it is the Mayo Clinic?

Dr. Fine:
So, one of the great things about Mayo Clinic is that we're able to arrange complex multi-specialty evaluations on short notice and with these cases, often an abnormality is found during routine prenatal care and these evaluations aren't set up, they're just, there to see the obstetrician. And so, with these consultations, we're able to get patients in with multiple sub-specialists within hours and have complete itinerary that they can attend appointments and it's not spread out over several weeks or months, even. So at Mayo, we have a multi-disciplinary fetal center and at most institutions, where they have fetal neurology, they likely have a fetal center, and so I work with multiple specialists and sub-specialists, the obstetricians, maternal fetal medicine specialists, and then really any pediatric sub-specialty, and pediatric surgical sub-specialty so general surgeons, ENT surgeons, cardiologists, geneticists, nephrologists.

Dr. Lisk:
Dr. Fine, can you tell me how you work with neonatologists and why they are important.

Dr. Fine:
Yeah, absolutely. Our colleagues in neonatology are extremely important as part of this prenatal evaluation. And almost always, our neonatologist will meet with families and introduce themselves and what they do and talk to families about what could be in store for their child. And it provides a nice connection from prenatal consultation to neonatal life. We often will have families tour our NICU, get familiar with the space and know the resources ahead of time, so they're more prepared during this time of uncertainty.

Dr. Lisk:
Finally, what is the greatest takeaway that you would like to leave our audience? And when you give that takeaway, I want you to give some advice to these pediatricians that may not have a fetal neurologist in their area; or OB/GYNs that may not have a fetal neurologist in their area; or even the neonatologists that may not have one. What is your advice to those physicians?

Dr. Fine:
I'd say my biggest takeaway is that fetal neurologic consultation can play an important role in the care of these patients. In terms of advice, if you do not have a fetal neurologist at hand, or nearby, I think just knowing when you identify a brain or spine abnormality, if you don't have a fetal neurologist who you can, contact or refer to, I would say if you have a pediatric neurologist, they should be able to help, but with complex cases, I would say that it would be worth referring to a maternal fetal medicine specialist.

Dr. Lisk:
And let me ask you one more question. During the times right now that we have COVID, are you guys providing at the Mayo Clinic telehealth for fetal neurology yet?

Dr. Fine:
In terms of virtual visits, often these are very sensitive appointments, they can be emotionally charged, and sometimes, especially if you're delivering bad news, I think sometimes it's best to do that in person. That being said, there definitely are opportunities for certain follow-up appointments, so if we're reviewing updated imaging or studies, they can certainly be done long distance by virtual visit.

Dr. Lisk:
Well, I am Dr. Jerome Lisk. To access this and other episodes in our series, visit ReachMD.com/NeuroFrontiers where you can Be Part of the Knowledge. Thanks for listening.