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### Diabetes in Pregnancy: The Risks For Two Patients

Each month ReachMD XM 157 presents a special series. This month is Focus on Diabetes. Listen each hour at this time as we explore with American's top medical thought leaders for latest information on diabetes.

Diabetes during pregnancy can pose a serious threat to mother and fetus. What are the risks, do long-term diabetics face different dangers than those with a new diagnosis during pregnancy?

You are listening to ReachMD, The Channel for Medical Professionals. I am your host, Dr. Michael Benson, a clinical assistant professor of obstetrics and gynecology at Northwestern University. This month is diabetes month here at the station.

Our guest today is Dr. Thomas Moore, Professor and Chairman of the Department of Reproductive Medicine, University of California School of Medicine at San Diego. He is a nationally recognized expert on diagnosis and treatment of diabetes in pregnancy.

#### DR. MICHAEL BENSON:

Welcome Dr. Moore.

#### DR. THOMAS MOORE:

It's good to be here.

#### DR. MICHAEL BENSON:

Okay, well, let's distinguish between two groups of pregnant diabetics and then consider them separately. Those who have preexisting disease and those who developed carbohydrate intolerance in their third trimester, what about this more mild group, the latter group, those newly diabetic during pregnancy, what are their maternal risks?

**DR. THOMAS MOORE:**

The risks that they don't have are of having glucose abnormalities during embryogenesis so it's really by and large, and I want to come back and qualify that in a minute. By and large, their diabetes or glucose intolerance appears somewhere between 20 and 28 weeks of pregnancy, so their real problem is just if you are well overfeeding of the fetus, so the fetus accumulates excessive nutritional stores and compiles this as fat. Now, the process of accumulating all those additional stores has other untoward effects on the baby, but obviously an over fat fetus is a challenge in delivery, and as we know, later in life.

**DR. MICHAEL BENSON:**

What about any other risk for other medical condition such as gestational hypertension, any other comorbidities that increase with the late onset of diabetes in the third trimester pregnancy.

**DR. THOMAS MOORE:**

Well, to the extent that individuals who develop gestational diabetes often times are of older age and have higher body mass index, gestational hypertension, chronic hypertension; these two elements are more common in women who have gestational diabetes. Whether they are linked causally, I think, is not clear, but there is no question they tend to occur together.

**DR. MICHAEL BENSON:**

Do the gestational diabetics have an increased risk of cesarean section that will be predicted by their body mass index, is it a separate risk factor.

**DR. THOMAS MOORE:**

Yes, it is a separate risk factor and although interestingly enough if you compare the effect on fetal growth of gestational diabetes versus a woman of equivalent body mass index who doesn't have gestational diabetes, it's the body mass index that is the stronger driver of excessive fetal growth than maternal diabetes. That's an interesting observation that's been made multiple times so I think we can believe it that fat mother is more likely to have an obese fetus in newborn, but what are the mechanisms that lead to this are, at present, I think largely speculative.

**DR. MICHAEL BENSON:**

Well, I think that's worth repeating for our audience and that, you know, again a very important point that I think a lot of physicians don't realize and that is an elevated body mass index is actually a more important predictor of excessive fetal growth than simply having gestational diabetes. Did I get that right?

**DR. THOMAS MOORE:**

You got that right and that's definitely a clinical peril that we need to live by everyday.

**DR. MICHAEL BENSON:**

I think a lot of obstetricians have been taught traditionally that fetuses born in mothers with gestational diabetes, particularly diabetes that wasn't preexisting are at an increased risk for shoulder dystocia because they are at increased risk for excessive weight gain. Now, is that a principle they should apply to simply the woman with the elevated body mass index who doesn't have gestational diabetes?

**DR. THOMAS MOORE:**

Well, now we get into this confusing problem of fetal weight and if you want to call it fetal weight percentile and the problem of fetal obesity because we know that to use a sort of a male analogy you could have a 6 feet 3 inches 175-pound male that we would not think of as being obese whereas in somebody that was 5 feet 2 inches we consider very obese. Well, the problem is, so we have the body mass index for adults, but we don't have a good measure of obesity for the fetus or even in a newborn. There is something called the ponderal index, which is the baby weight divided by the length, and in fact it is so gestational age dependent that it isn't a good descriptor of how fat the baby is. When you get around to the question of shoulder dystocia, the problem that I think will be familiar in many listeners is having a baby's head pop out that delivered without any problem and yet there is rather massive shoulder and trunk that is left to deliver. The reason is we have a baby in diabetes that's accumulating fat. The baby of the mother who herself is fat has accumulated some truncal fat, but the rest of the picture of those babies is not as well described as babies whose mothers have gestational diabetes, so for the present time I would have to say most of the data say that the worst situation is having a 4-kilo baby whose mother has diabetes in which the delivery has been assisted with forceps or vacuum; that's a very high risk group, and the mother with the obese newborn is herself is obese, but not under our best definitions not diabetic has a lower risk, but is definitely for that woman still higher than if she was of normal body mass.

**DR. MICHAEL BENSON:**

What about the direct risks of the fetus of gestational diabetes in the third trimester, what are some of the issues for the babies, for instance, do they have an increased risk of respiratory distress syndrome?

**DR. THOMAS MOORE:**

Yes, the way I like to think of it that this is even though may be only for, you know, 10 or 15 weeks of gestation, the baby is subjected to episodes of extra glucose crossing the placenta into the fetal compartment. The fetus really is an obligation to store all those extra calories and those extra calories, you know, obviously produce truncal body fat. The other thing that it does is it's actually the work, and if you monitor the oxygen in a fetus who is hyperglycemic the oxygen level was reduced because there is work involved in storing the glucose. So every time a mother's glucose goes high, fetal oxygen level drops down. Now, you know what's high and how far down is obviously on a scale, but babies whose mothers have glucoses that are not in control have episodic hypoxemia and this causes changes in the myocardium, thickens the myocardium as the baby responds to hypoxemia with hypertension and we've got a sort of a stiff heart that may not perform well after birth even if the lung profile has been checked and found to be mature. The issue about the lungs and their readiness to be born is I think still somewhat controversial because many babies with today's management of diabetes come out and have just perfectly good lung function. In a study that we did, where we went back over a large series of amniocenteses between two institutions and compared pregestational diabetic women to women with gestational diabetes and a group of normals, we found about a 7 to 10 day delay in the onset of phosphatidylglycerol production in the amniotic fluid at approximately 35 weeks so if at 35 weeks all the diabetic pregnancies studied on average were 10 days behind in production of the phosphatidylglycerol, by the time one gets to around 38 weeks, that difference is actually not statistically significant, so the delay in lung maturation is probably not functionally important after about 38 weeks and instead what we see with babies that don't perform well in the newborn intensive care unit after a diabetic pregnancy, even gestational diabetics, is either related to cardiac dysfunction from myocardial thickening or the sort of wet lung phenomenon that we see more commonly, also with diabetes.

**DR. MICHAEL BENSON:**

Does this have any effect on developing brain?

**DR. THOMAS MOORE:**

Well, we don't know of that. There really haven't been any great studies of long-term followup of the neurological performance of infants, who have been just exposed to hyperglycemia, certainly we recognize that in pregestational diabetes or glucose abnormalities are imposed during embryogenesis and early development that there are structural abnormalities as well as probably structural abnormalities of heart, spinal cord, and even brain, but in gestational diabetes we cannot show that, although there are some issues about downstream adult or even childhood and adolescent obesity that may have to do with brain programming in the presence of hyperglycemia.

**DR. MICHAEL BENSON:**

What about the risk of stillbirth in women with diabetes that just begins in a third trimester, do they have an increased risk?

**DR. THOMAS MOORE:**

The increased risk if it exists, and theoretically it does exist, is very difficult to detect in today's modern environments where most patients with recognized gestational diabetes are in some form of testing regimen that really brings their risk of stillbirth back to the levels that we expect in the general population, so we would say it's the undiagnosed diabetic pregnancy that's at risk, the testing regimens we use today pick up only 80-90% of the truly hyperglycemic individuals and those babies are at increased risk.

**DR. MICHAEL BENSON:**

If I listened carefully, then you are suggesting that the actual antenatal testing that people do with fetal monitoring and ultrasounds actually does mitigate the stillbirth risk in gestational diabetics?

**DR. THOMAS MOORE:**

I would like to say that, but in order to do that we'd have to have a nice randomized trial where we don't test gestational diabetics or we do, but everything else is the same and that hasn't been shown, instead what's been done is to look to see compared to a group of controls, who were normal glycaemic, is there any difference of stillbirth rate, but remember the controls don't necessarily get all this testing and so the tested gestational diabetic population and the general population seem to have similar stillbirth rate.

**DR. MICHAEL BENSON:**

I see, so we actually just don't know what the utility of testing is because nobody has really done the study and not sure anybody wants to either.

**DR. THOMAS MOORE:**

Yeah, it's true.

**DR. MICHAEL BENSON:**

What about the risk of congenital anomalies in those diabetics, who are diabetic before they get pregnant?

**DR. THOMAS MOORE:**

The risk of the congenital anomaly is definitely related very specifically to the degree of hyperglycemia that existed during the embryonic period, that was recognized about 30 years ago and one can roughly scale the risk of a congenital anomaly against the hemoglobin A1c in maternal blood obtained somewhere in the first trimester and it raises the risk on an order of 2 to 4 times higher than one would expect in a normal glycemia population.

**DR. MICHAEL BENSON:**

So a key take-home point would be before a diabetic becomes pregnant, it would be exceptionally desirable to have ideal glucose control well before conception, is that a fair statement?

**DR. THOMAS MOORE:**

That's a fair statement and actually in the studies that have looked at pre-conceptional control in diabetic population compared to a group that didn't get pre-conceptional control and compared to normals, at least two studies show that the outcomes of the diabetic patient, who obtained excellent or normal pre-conceptional control their risk of birth defects was actually lower than the general population.

**DR. MICHAEL BENSON:**

I want to thank Dr. Thomas Moore who has been our guest. We've been discussing the maternal and neonatal morbidity of diabetes in pregnancy.

I am your host Dr. Michael Benson. You've been listening to the Clinician's Roundtable on ReachMD, The Channel for Medical Professionals. We would really like to hear from you. For comments and questions about this program or suggestions for other shows, send your e-mail to [xm@reachmd.com](mailto:xm@reachmd.com). We really do read your mail. Also, please visit us at [www.reachmd.com](http://www.reachmd.com). Our new on-demand and podcast features will allow you to access our entire program library. Be safe, be informed. Thank you for listening.

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