MECHANICAL MADNESS: TECHNOLOGY, DIABETES AND PREGNANCY

Alyson Blum, PharmD, CDE
Clinical Pharmacist in Obstetrics
Sacred Heart Medical Center, Center for Maternal Fetal Medicine
Washington State University

OBJECTIVES

• Review the different types of diabetes
• Review pregnancy implications of uncontrolled diabetes
• Discuss the role of insulin pumps and continuous glucose monitors (CGM) in pregnancy

DIABETES REVIEW

• Type 1 Diabetes
  • Autoimmune disease
  • Don’t make any insulin
  • Must have exogenous insulin to survive
  • Usually diagnosed in childhood
  • Not a disease of insulin resistance

• Type 2 Diabetes
  • Generally a disease of insulin resistance
  • Makes extra-insulin
  • May need exogenous insulin with disease progression
  • Usually diagnosed in adulthood
  • Associated with metabolic disturbances

• Type 1.5 Diabetes (LADA)
  • Latent autoimmune diabetes of adults
  • Don’t make enough insulin to manage blood glucose
  • Insulin resistance varies
  • Diagnosed in early adulthood
  • 1st pregnancy can often be the trigger

• Gestational Diabetes
  • Disease of resistance related to hormones of pregnancy
  • Diagnosed after 1st trimester
  • Increases risk of developing type 2 diabetes by 50% in the next 10 years
FETAL IMPLICATIONS

• Uncontrolled diabetes in the 1st trimester
  • Congenital anomalies
  • Heart defects
  • Musculoskeletal defects
  • Pregnancy loss
  • Type 1, Type 2 and Type 1.5 are at highest risk

• Uncontrolled diabetes in the 2nd and 3rd trimesters
  • Macrosomia
  • Jaundice
  • Hypoglycemia of the newborn
  • Preterm delivery
  • Neonatal RDS, polycythemia or hypothermia
  • Still birth
  • Lifelong struggles with obesity and diabetes
  • All types of diabetes

BLOOD GLUCOSE GOALS IN PREGNANCY

<table>
<thead>
<tr>
<th>Test Time</th>
<th>ACOG/ADA</th>
<th>Sweet Success/MFM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>&lt;95mg/dL</td>
<td>&lt;90mg/dL</td>
</tr>
<tr>
<td>1 hour post prandial</td>
<td>&lt;140mg/dL</td>
<td>&lt;120mg/dL</td>
</tr>
<tr>
<td>2 hour post prandial</td>
<td>&lt;120mg/dL</td>
<td>__________</td>
</tr>
</tbody>
</table>

TREATMENT OPTIONS IN PREGNANCY

• Metformin
  • Increases insulin sensitivity
  • Decreases glucose release from the liver
  • Type 1, 1.5, 2 and gestational diabetes

• Glyburide
  • "Cheerleader for the pancreases"
  • Forces insulin secretion
  • Type 2 and gestational diabetes

INSULIN IN PREGNANCY

• Long Acting
  • Lovenir (twice daily dosing)
  • Lantus (once daily)
  • Toujeo U300 (one daily)
  • Tresiba U100 or U200 (once daily)

• Short Acting
  • Humalog (U100 or U200)
  • Novolog (U100)
  • Humulin R (U100)

• Intermediate Acting
  • NPH (twice daily)
  • Humulin R (U500)
  • Inhaled insulin
  • Not approved in pregnancy

• Patient centered regimens
  • Long and/or short acting
  • Concentrated or not
  • Set dosing or insulin to carb ratio
  • Pumps and CGMs
INSULIN PUMPS

- Continuously delivers insulin under the skin and can be programmed to calculate and deliver a bolus for meals and high blood glucose
- Place pump sites at acceptable injections sites
- Many 3 kinds of pumps
- Type 1, 1.5 and 2 diabetes controlled or uncontrolled

CONTINUOUS GLUCOSE MONITORS

- Not approved in pregnancy (not tested)
- Only approved to place on abdomen (patients put it almost everywhere)
- Changed every 7-14 days
- Calibrated 0-4 times daily

ADVANTAGES OF PUMPS AND CGMS

- Barriers to meeting blood glucose goals
  - Too many injections needed for good control
  - Withholding carbs to avoid additional injections
  - Inability to have a consistent diet
  - Too many finger sticks (up to 10 times daily)
  - Embarrassment issues
  - Pumps and CGMs address all these issues

ADVANTAGES OF PUMPS AND CGMS

- Too many injections needed for good control
  - 1 new site (injection) every 3 days
- Withholding carbs to avoid additional injections
  - Can dose for all carbs without extra work
  - Inability to have a consistent diet
  - Pump is programmed with insulin:carb ratio and correction factor tailored to the patient.
  - Can have small meals or large meals
  - Need to count carbs
ADVANTAGES OF PUMPS AND CGMS

• Too many finger sticks
  • CGMs are replaced every 7-14 days
• Calibrate (requires finger stick) 2-4 times daily
• Embarrassment issues
  • Blood sugar can be seen on phone
  • Pumps are discrete and dosing can be done very quickly

DISADVANTAGES OF PUMPS AND CGMS

• Higher chance of DKA
• Requires interaction/connection to diabetes
• Can break/malfunction
• CGMs are 15 min behind actual blood glucose.

CGMS ARE BEHIND BLOOD GLUCOSE?

• Direction and velocity
  • 120mg/dL
  • Not changing
  • See trend graph?
    • Was dropping but has now leveled out

EXAMPLE

• 95mg/dL is a great number (on a meter)
• Slight arrow up (increasing by >1 point/min)
• Arrow straight up (increasing by 2 points/min)

PATIENT CASE: HOW USEFUL ARE CGMS?

• AC is a 42 year old G3P3
• Was with me in her previous pregnancy when she was diagnosed with type 1.5 diabetes. Put her on a pump and CGM
• Repeat CS in 2016
• Texts me that she just had a positive home pregnancy test.

HOW USEFUL ARE CGMS IN PREGNANCY?

• Still had her “Dexcom Share Data Code”
HOW USEFUL ARE CGMS IN PREGNANCY?

- We made first adjustments over the phone and after 1 week:

  - This was able to be done remotely, before she even made it to the office.
  - Better for baby
  - Better for mom
CONCLUSIONS

• Uncontrolled diabetes has poor maternal and fetal outcomes.
• Pumps and CGMs have a role in pre-existing diabetes.
• Better control can be obtained in these patient populations with CGMs and pumps.

QUESTIONS?

REFERENCES