19 Year Old Pregnant Woman with Diabetes

Matthew Wise, MD
Med-Peds Endo

HPI

- CC: 19yo BF - Management of uncontrolled type 1 diabetes in pregnant patient on insulin pump
- 33 weeks gestation, switched to insulin pump from MDI in first trimester
- 1-2 days before admit – pump battery dead, was off pump for ~24hrs using bolus insulin only
- Day of admit, domestic dispute with brother, was shoved in abdomen, developed vaginal bleeding
- Transferred from OSH: glucose 135, pH 7.4, bicarb 16, AG 16, B-OH 2.5 (large)

HPI continued

		B	L	D	qhs	2a
Day 1	Glucose				135	116
	Ketones				2.5→3.2	0.7
	Insulin					gtt x4hrs
Day 2	Glucose	134	90	221	220	175
	Ketones	0.3	0.3			
	Insulin	NPH 32 Aspart 16	Aspart 4 Pump on	Aspart 12.2	Aspart 3.7	
Day 3	Glucose	263	367			
	Ketones		5.9			
	Insulin	Aspart 13.5				

Endo Consult

HPI & ROS

HPI

States last Endo appt 2 wks prior

Notes that glucose has been 200's-300's x 2wks, occasionally with trace ketones

Pump – using R thigh, last site change 1 day ago

ROS

+ fatigue
- contractions, - vaginal bleeding
- N/V/abd pain
- SOB, cough
- dysuria, hematuria
- fever

PMH and Meds

PMH

A1C 7.2%

- Diabetes type 1 since 5 yrs old
- G3P1011
- 1st preg: Preeclampsia, 37wks 3kg

ALLERGIES: NKDA

MEDICATIONS

- PNV
- Humalog insulin via Medtronic pump

Basal (40 U/d)
12a 1.6 U/hr
3a 1.7 U/hr
10a 1.5 U/hr
12p 1.7 U/hr

Bolus 1:7g CHO (avg ~60g)
1:27 mg/dL >80-120

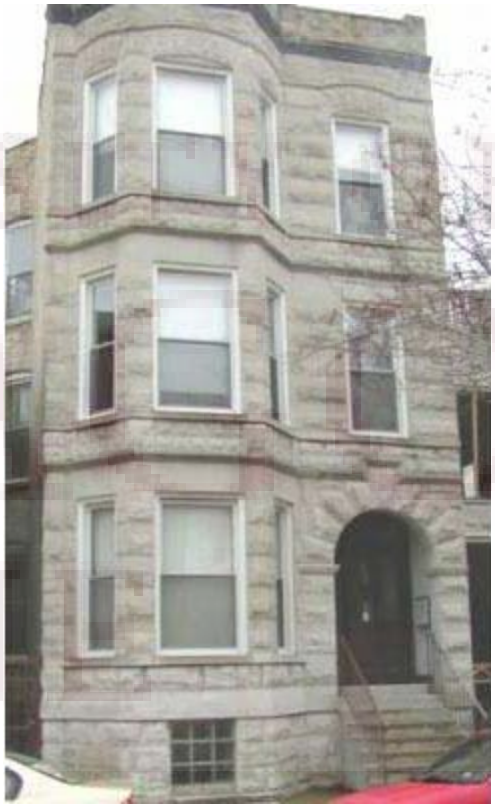
Family and Social History

Family

- No primary relatives with DM

Social

- Urban apartment, lives with 2 year old son
- Father of current pregnancy uninvolved
- Finished 11th grade high school
- Denies substance abuse



Ketone Troubleshooting

- Pump-related malfunction
- Pregnancy related stress/physiology
- Physical injury
- Underlying infection/illness
- Thyroid
- Ineffective insulin
- Poor insulin absorption

Physical Exam

T 98.1 HR 110, BP 120/83 Wt 91.6 kg Ht 5'4"

Gen: Awake, alert, NAD

Heent: mucosa moist

Neck: no goiter, no acanthosis

Resp: clear bilaterally, unlabored

CV: RRR no m/r/g

Abd: pregnant abdomen

Derm:

+ Lipohypertrophy

Assessment and Management

- DM1 on pump with acute DKA, likely related to poor absorption of insulin related to lipohypertrophy
- A1C 7.9%, above goal during pregnancy
- Treated with insulin gtt until following day when ketones cleared and pump restarted at separate site
- Advised continued monitoring inpatient to ensure adequate insulin dose and absorption + psychosocial concerns
- Pt left AMA

Clinical Questions

1) How common is lipohypertrophy seen with newer insulin analogs?
2) Is there an evidence-based advantage of pump-based insulin therapy over multiple daily injections in pregnancy?
3) What is the incidence of DKA in pregnancy? Why are pregnant women more prone?

Lipohypertrophy

NEJM 2012; 366;5(e9)

- Pathogenesis unclear
  - insulin lipogenic
- Incidence before analogs:
  - 29% in DM1, 3.6% in DM2
- ?Incidence in pts on analogs
- ?Incidence in pts on CSII
- Reports of benefit from change to analogs
  - structure difference?
  - decreased adipocyte exposure?

CSII in Pregnancy

- Cochrane Systematic Review (2011 update, Farrar et al)

  5 trials, 153 women (129 with DM1)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Rate of caesarean section	3	71	Risk Ratio (M-H, Fixed, 95% CI)	1.09 [0.66, 1.77]
2 Perinatal mortality	3	71	Risk Ratio (M-H, Fixed, 95% CI)	2.33 [0.38, 14.32]
3 Fetal anomaly	2	61	Risk Ratio (M-H, Fixed, 95% CI)	1.07 [0.07, 15.54]
4 Maternal hypoglycaemia	2	61	Risk Ratio (M-H, Fixed, 95% CI)	3.0 [0.35, 25.87]
5 Maternal hyperglycaemia	2	61	Risk Ratio (M-H, Fixed, 95% CI)	7.0 [0.39, 125.44]
6 Maternal 24 hour mean blood glucose (mg/dl) first trimester	3	67	Mean Difference (IV, Fixed, 95% CI)	0.12 [-7.19, 7.43]
7 Macrosomia	2	61	Risk Ratio (M-H, Fixed, 95% CI)	3.2 [0.14, 72.62]
8 Gestation at delivery	3	71	Mean Difference (IV, Fixed, 95% CI)	-1.18 [-2.92, 0.57]
9 Neonatal hypoglycaemia	1	32	Risk Ratio (M-H, Fixed, 95% CI)	1.0 [0.07, 14.64]
10 Small-for-gestational age	2	61	Risk Ratio (M-H, Random, 95% CI)	1.40 [0.10, 18.71]
11 Mean HbA1c first trimester	1	32	Mean Difference (IV, Fixed, 95% CI)	-0.20 [-2.13, 1.73]
12 Mean HbA1c second trimester	1	32	Mean Difference (IV, Fixed, 95% CI)	0.70 [-2.29, 3.69]
13 Mean HbA1c third trimester	1	32	Mean Difference (IV, Fixed, 95% CI)	0.10 [-2.38, 2.58]
14 Mean birthweight	2	61	Mean Difference (IV, Fixed, 95% CI)	220.56 [-2.09, 443.20]
15 Maternal 24 hour mean blood glucose (mg/dl) second trimester	3	73	Mean Difference (IV, Fixed, 95% CI)	1.77 [-5.02, 8.56]
16 Maternal 24 hour mean blood glucose (mg/dl) third trimester	3	69	Mean Difference (IV, Fixed, 95% CI)	0.08 [-5.57, 5.72]
17 days hospitalised	1	10	Mean Difference (IV, Fixed, 95% CI)	9.40 [-6.04, 24.84]

Insufficient data to support a superior method of insulin delivery

DKA in Pregnancy

- Incidence in pregnancy 1-2%
- Maternal mortality <1%
- Fetal mortality 35% (Montoro 1993) *highest in 3rd trim
  9% (Cullen 1996)

- Insulin resistance (HPL, GH, prolactin, progesterone)
- Progesterone-induced respiratory alkalosis with compensatory metabolic acidosis

Take Home Points

1) Lipohypertrophy is a common cause of poor glycemic control, especially in DM1

2) There is presently insufficient data to support superiority of CSII in pregnant diabetics

3) Pregnant women with diabetes have higher risk of DKA due to physiologic changes

References

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