

Intraoperative Diagnosis and Management of Euglycemic Diabetic Ketoacidosis During Emergent Cesarean Delivery



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INTRODUCTION

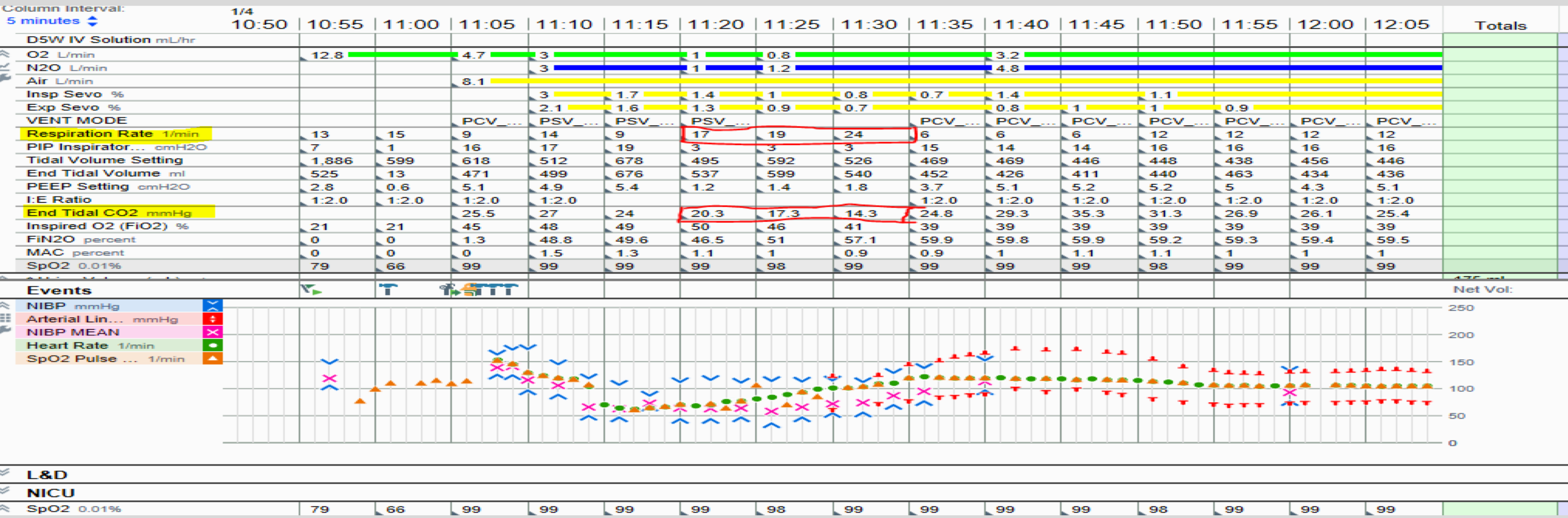
- Euglycemic diabetic ketoacidosis (EDKA) is a form of DKA that is a life-threatening emergency but can be misleading on diagnosis due to normal glucose ranges ¹.
- Common etiologies are pregnancy, infection and low calorie intake.
- Metabolic acidosis, ketosis and glucose < 200 mg/dL are typically found on presentation ².
- We present a case of a parturient with type 1 diabetes mellitus (T1DM), found to be in EDKA under general anesthesia and the challenges to her management intraoperatively during an emergent cesarean delivery.

CASE DESCRIPTION

- A 17 year old G1P0 at 29 weeks with history of T1DM, presented to us as a STAT primary cesarean section for recurrent fetal bradycardia. She initially presented in OB triage with complaints of decreased fetal movement, cough, shortness of breath, nausea, vomiting and inability to tolerate oral intake for three days.
- Unknown to us at the time, in triage, she was tachycardic, hypertensive and breathing 24 times a minute. She had a history of multiple admissions for DKA with reported intermittent compliance with her insulin regimen.

CASE DESCRIPTION

- Given the emergent nature of her delivery, history and physical, intravenous access, and labs were not obtained prior to arrival in the OR. After 5 minutes and multiple attempts, a right antecubital 20 gauge peripheral IV was established. Rapid sequence induction was performed and after connection to the anesthesia machine, end tidal CO2 measured in the 20s. Hemodynamics, bilateral breath sounds, and tubing connections were assessed and confirmed. Ventilator settings were adjusted, without improvement of optimal respiratory mechanics. Patient’s history was discussed with obstetricians and made her abnormalities suspicious for DKA.
- The infant was delivered with APGARs 1 and 7 at 1 and 5 minutes, with pH cord gas less than 6.79. A radial arterial line was placed and maternal arterial blood gas revealed pH 7.07 pCO2 19, HC03 5, base excess -24.9 and glucose 181 with calculated anion gap of 24. Due to significant acidosis, additional crystalloid bolus, sodium bicarbonate and regular insulin were administered intravenously. MICU was consulted intraoperatively to assist with EDKA management. Recommendations included increasing respiratory rate and initiating dextrose and insulin infusions.
- Postoperatively, patient was transferred to MICU intubated for further management, and resolution of EDKA. She was discharged home on post-operative day 4 with optimized insulin regimen. The infant remained in NICU for prematurity complicated by hypoxic ischemic encephalopathy.



DISCUSSION

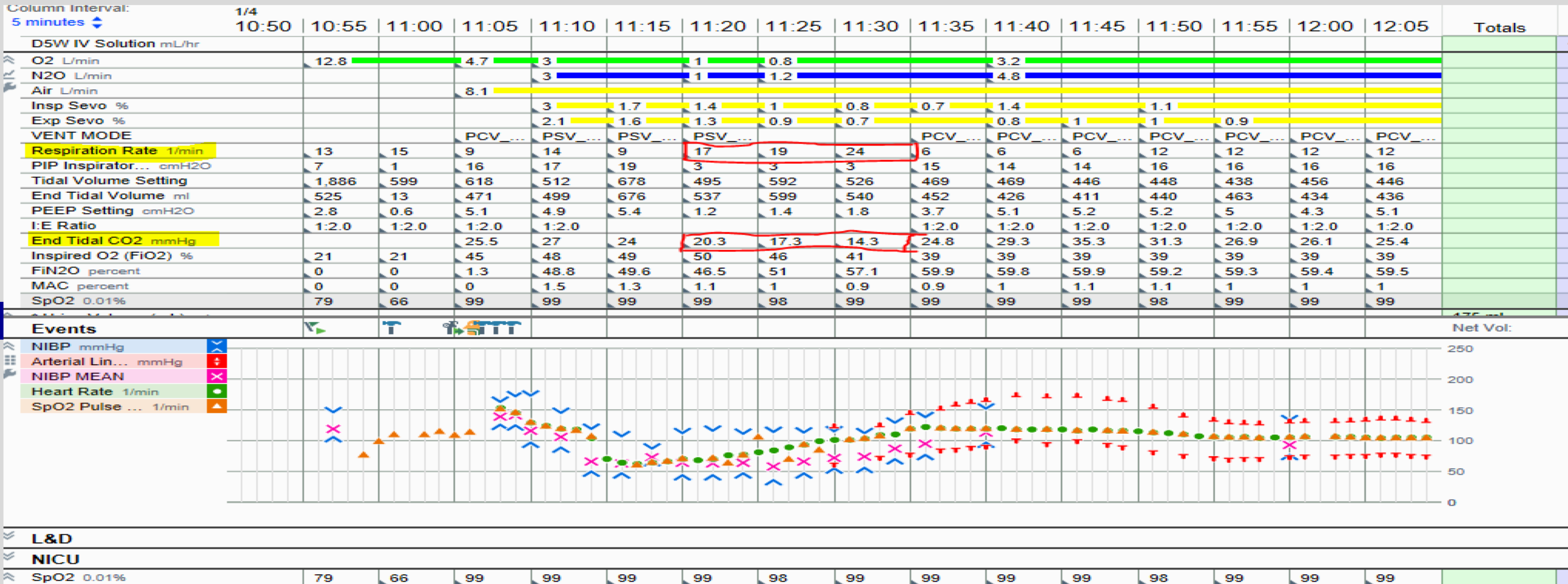
- Early diagnosis of euglycemic DKA in pregnancy may be more challenging in emergent deliveries under general anesthesia as a full history or lab values may not be known.
- Our patient risk factors for euglycemic DKA
 - pregnant
 - fasting (inability to tolerate po)
 - poor compliance with insulin
 - URI (possible viral infection)
- Our patient presented with recurrent late decelerations likely reflecting the severity of acidosis.
- Pregnancy is a known cause for EDKA, therefore early recognition and aggressive management are important to avoid serious maternal and fetal complications.

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↑ Respiratory rate
NI Tidal volume
↓ ETCO2
Kussmaul breathing?

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EUGLYCEMIC DKA

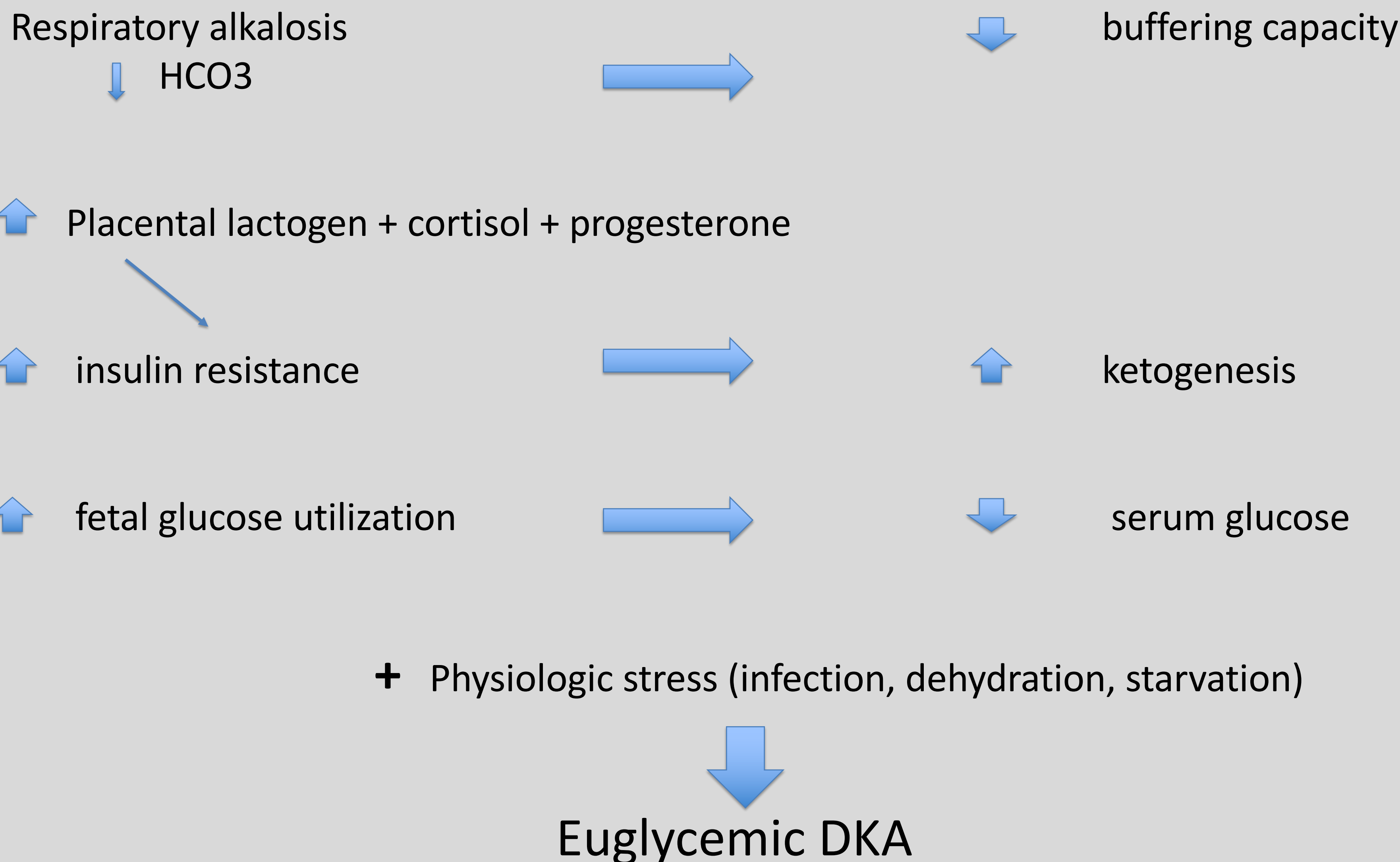
- Blood glucose levels <200 mg/dL, anion gap metabolic acidosis, and ketonemia
- Pathophysiology
 - relative or absolute carbohydrate deficit
 - insulin deficiency or resistance (mild)
 - increased glucagon/insulin ratio
- Can present in patients with type 1 , type 2 or gestational diabetes mellitus

MANAGEMENT

- Correction of metabolic acidosis and anion gap
 - Insulin: infusion 0.1u/kg reduces ketosis via glucose metabolism
 - Dextrose (10% or 5%) infusion: prevents hypoglycemia
 - Fluid resuscitation with crystalloid: correction of dehydration
 - Serial labs: correction of electrolytes
 - ICU admission

WHY IS PREGNANCY A RISK FACTOR?

- Incidence: 0.8-1.1% of all pregnant DKA cases
- Physiologic changes of pregnancy
 - Hypoinsulinemia and carbohydrate deficit due to glucose requirement of fetus and placenta
 - Respiratory alkalosis and excretion of bicarb -> reduced buffer for metabolic acidosis
 - Insulin resistance due to hormones
 - Hemodilution of blood glucose
- Ketogenesis and metabolic acidosis occurs more rapidly and at lower blood glucose levels than nonpregnant patients



CONCLUSION

- Very few case reports of intraoperative diagnosis of euglycemic DKA however should be highly considered in a patient with history of DM and unexplained high anion gap metabolic acidosis
- Early recognition is crucial in pregnancy as fetal morbidity is high
 - Neurologic complications
 - Fetal demise risk 35%
- Counseling should be provided for patients to check ketones or blood glucose in the setting of acute illness

REFERENCES

- 1.Jaber et al. Euglycemic Diabetic Ketoacidosis in Pregnancy: A Case Report and Review of Current Literature. *Case Rep Crit Care*. 2019
- 2.Muppidi V, et al. Euglycemic Diabetic Ketoacidosis in a Young Pregnant Woman Precipitated by Urinary Tract Infection. *Cureus*. 2020
- 3.Nasa P et al. Euglycemnic diabetic ketoacidosis: A missed diagnosis. *World J Diabetes*. 2021; 12(5):514-523.
4. Seger et al. Intraoperative Diagnosis of Sodium-Glucose Cotransporter 2 Inhibitor-Associated Euglycemic Diabetic Ketoacidosis: A case report. *A A Pract*. 2021; 15(1)