

Location: Emergency room

Vital signs: BP:90/60 mmHg, HR:128/min regular, Temp:100.0° F, R.R:30/min rapid and shallow

C.C: Vomitings and abdominal pain.

HPI:

A 20-yr-old woman presents to E.R with 5 episodes of vomiting, abdominal pain, weakness and increasing drowsiness of one-day duration. During the last 2 months she has noticed increased thirst and increased urination. The abdominal pain is diffuse, 4-5/10 in severity, constant, non-radiating and there are no aggravating or relieving factors. Vomiting is non-bloody. She has no other medical problems. She has no known drug allergies. She is not on any prescription or over the counter medications. She is not a smoker or alcoholic, and denies IV drug abuse. She has a family history positive for Type 1 Diabetes Mellitus. Her father, and paternal uncle and grandfather are all diabetics.

Review of systems:

She denies weight changes, fever, chills, night sweats, diarrhea, constipation, skin, hair, or nail changes, blurry vision, acute bleeding, easy bruising, indigestion, dysphagia, changes in bowel movements, bloody stools, burning on urination, recent travel, ill contacts, vaginal discharge or itch, pregnancy, heat or cold intolerance, drug or alcohol use. Last menstrual period ended four weeks ago, was normal in flow and duration.

How do you approach this case?

First quickly examine the patient

General

HEENT

Neck

Heart

Lungs

Abdomen

Extremities

Here are the results of the exam:

General: Patient is in mild to moderate abdominal pain and appears very distressed.

HEENT: Very dry mucus membranes, no JVD, EOM are intact. Rest is unremarkable.

Lungs: Clear to auscultation B/L.

Heart: Completely normal except tachycardia.

Abdomen: Soft, non tender, normal bowel sounds and no guarding or rigidity.

Extremities: No edema, calf tenderness, but weak peripheral pulses.

Discussion:

Now, make a mental checklist of differential diagnosis, i.e.

1. Abdominal pathology like appendicitis, gastroenteritis, pancreatitis, acute intestinal obstruction etc.
2. Menstrual symptoms or pregnancy related complications
3. DKA (Based on the family history and presenting clinical features)
4. Nonketotic Hyperosmolar state
5. Alcoholic ketoacidosis
6. Drug intoxication

Order the following stat:

Pulse oximetry, stat and continuous

Oxygen, inhalation, continuous

IV access, stat

Cardiac monitor, stat

Normal saline, 0.9% NaCl, continuous, stat (This patient is severely dehydrated. She is

hypotensive and tachycardic. So, she needs IV fluids.)
Finger stick glucose, stat

Results:

Pulse oxymetry showed 96% on room air
Finger stick glucose shows 600mg/dL

Order:

Urine pregnancy test, stat
CBC with differential, stat
BMP, stat
Calcium, serum, stat
EKG, 12 lead, stat
Serum amylase, stat
Serum lipase, stat
UA, stat
ABG, stat
Serum osmolality, stat
Serum ketones, qualitative, stat
Regular insulin, IV, continuous
Phenergan, IV, one time (for nausea)
Discontinue oxygen

Ok here are the results:

Urine pregnancy test is negative
WBC 10,000/ μ L and normal differential
Sodium is 129, Potassium is 5.0, Chloride is 90, Co_2 is 14, calcium is 8.0, and a blood sugar of 600mg/dL
EKG sinus tachycardia, nothing concerning
Serum Amylase - mildly elevated
Serum Lipase WNL
UA showed 4+sugar, 2+ ketones but no evidence of infection
Serum Osmolality 305
Serum Ketones - high
ABG showed metabolic acidosis, compensated by respiratory alkalosis (pH of 7.3)

How do you approach this case?

So, this patient most likely has either DKA or Non-ketotic hyperglycemia. The diagnosis is based on clinical features, elevated blood sugars, and increased anion gap. To confirm the diagnosis we need to order serum ketones and serum osmolality, as above. She has pseudohyponatremia i.e. secondary to elevated blood sugars. Treatment of hyperglycemia resolves her hyponatremia.

Review orders:

Admit the patient to the intensive care unit
NPO
Bed rest
Vitals as per ICU protocol
Urine output
KCl, IV, continuous
HbA1C level, routine
Phosphorous, serum, stat (optional)
Follow the patient with
1. BMP Q 2-4 hours, then Q 8-12hours, then Q day
2. ABG Q 2 hoursx2

After 4 hrs

1. Stop 0.9% NS and give 1/2 Normal saline, IV, continuous

Monitor potassium deficiency and add IV potassium chloride as needed

Consider antibiotics if the precipitating cause is an infection, get a chest X-ray, obtain blood cultures, U/A and urine cultures.

Once nausea is decreased, start oral fluids.

Once the patient is stabilized transfer to ward/floor.

During discharge:

D/C IV insulin, IV fluids, cardiac monitor

NPH insulin, subcutaneous, continuous

Regular insulin, subcutaneous, continuous

Diabetic diet (Diet, American diabetic association)

Advance diet

Counseling:

Diabetic teaching

Patient education, diabetes

Diabetic foot care

Home glucose monitoring, instruct patient

No alcohol

No smoking

Safe sex

No illegal drug use

Regular exercise

Seat belts use

*Follow up appointment in 10 days

Discussion:

Diagnosis of DKA is based on an elevated blood glucose (usually above 250mg/dl), a low serum bicarbonate level (usually below 15 mEq/L), and elevated anion gap, and demonstrable ketonemia. Both amylase and lipase are often elevated in patients with DKA by an unknown mechanism (do not to confuse with pancreatitis).

Diagnosis of Hyperosmolar hyperglycemic is based on: serum glucose levels in excess of 600 mg/dl, serum osmolality greater than 330 mOsm/kg, absent or minimal ketonemia, arterial pH above 7.3, and a serum bicarbonate above 20 mEq/L. Hyperosmolar hyperglycemic state is characterized by severe fluid and electrolyte depletion due to the osmotic diuresis produced by the extreme levels of glucose in the serum (often >1000 mg /dL).

Hydration: Patients with DKA are profoundly dehydrated and foremost in the treatment of DKA is restoration of the intravascular volume. Estimates of fluid deficits in the decompensated diabetic is 4 to 10 liters (usually 5-6 liters). Initially, one to two liters of normal saline is given as bolus, followed by 500 mL/h for the first four hours followed by 250 mL/h for the next several hours. This initial management should be guided by the patient's general condition and response, with more or less fluid as indicated. After the first 3-4 hours, as the clinical condition of the patient improves, with stable blood pressure and good urine output, fluids should be changed to 1/2 normal saline at 250-500cc an hour for 3-4 hours. Ongoing reassessment is critical.

Insulin: The standard insulin dose is an initial bolus of 0.1 U/kg body weight followed by a continuous infusion at a rate of 0.1 U/kg per hour. When the glucose levels begin to approach 250 mg/dl, insulin infusions are continued, but the fluid composition is changed to include 5-10% dextrose in water to avoid hypoglycemia.

Potassium: Potassium: Regardless of the serum potassium level at the initiation of therapy, during treatment of DKA there is usually a rapid decline in the potassium concentration in the patient with normal kidney function.

Potassium replacement is indicated in all patients with the following features: K of < 5.3, no EKG changes, and normal renal function.

Bicarbonate Therapy: The use of bicarbonate in the treatment of DKA is highly controversial. Current recommendations for bicarbonate therapy are as follows. Use of bicarbonate is considered unnecessary when the blood pH is greater than 7.1.

Phosphate is normally an intracellular substance that is dragged out of the cell during DKA. Similarly to potassium, at presentation the serum level may be normal, high, or low while the total body supply is depleted. Despite this depletion, replacement of phosphate has not been shown to affect patient outcome and routine replacement is not recommended.

Primary diagnosis:

DKA

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