EMC 370 Introduction to Medical Emergencies

29 Diabetes

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Diabetes

Definition
- failure of the pancreas to make sufficient insulin

Pathophysiology
- no insulin → no glucose transport into cells
  - no glucose into cells → body metabolizes fat
  - excess fat metabolism → xs H^+ and ketones

Diabetes

DM Type I
- Insulin dependent DM (IDDM)
- Usually begins when patient is young ("JODM")
- Theories of etiology
  - heredity
  - virus attacks β cells
  - autoimmune reaction attacks β cells

Pancreas

Review
- BOTH endocrine and exocrine or digestive
- Endocrine
  - Islets of Langerhans – specialized cells
    - **α**- release glucagon- stimulates "glycogenesis"
      - stimulates liver to convert glycogen → glucose
    - **β**- release insulin
      - antagonist of glucagon
      - body cells take up glucose
      - rapidly broken down
        - must be secreted constantly
    - **δ**-somatostatin
      - inhibits both glucagon + insulin (poorly understood)

Diabetes

DM Type II
- Non-insulin dependent
- More common than type I
- Begins later in life ("Adult Onset DM")
- Often associated with obesity
- Usually insulin is not required for control
- May result in DKA, though not often
- More likely to result in NKHC
  - Non Ketotic Hyperosmolar Coma

Diabetes

Acute pathophysiology
- acute - " 911" diabetic calls
  - directly related to either
    - increased serum glucose → "hyperglycemia,"
    - insulin overdose → hypoglycemia

Chronic pathophysiology
- pathological (ASCVD,…) changes → " nondiabetic" emergencies
  - MI, renal failure, retinal dz., CVA,…
- increased glucose → osmotic diuresis + vomiting → decreased ECF → shock

Diabetes Clinical Presentation

Clinical setting
(often some sort of stress)

- infection (57%)
- MI
- CVA
- trauma
- stress
- none (30%)

Diabetes Clinical Presentation

Cardinal symptoms of hyperglycemia of diabetes

- Polyuria
- Polydipsia
- Polyphagia
- Nausea / Vomiting
- Fatigue
- Abdominal Pain

Diabetes Clinical Presentation

Chief PE Findings of DKA (9)

- Increased HR
- Increased RR- Kussmaul
- Warm dry
- Altered consciousness
- Orthostatic changes
- Signs of precipitating events (infectious,…)
- Fruity odor (not pungent acetone odor)
- Fever (often absent)
- Abdominal tenderness ± gastric distension

DKA Complications

- Coma
  - hypoxia
- Dehydration
  - shock
    - metabolic acidosis
- Electrolyte Imbalances
  - K^+ is of critical importance
    - hypokalemia → arrhythmias

Treatment of DKA

(1) protect airway (be alert for aspiration)
(2) O_2
(3) IV
draw blood
then infuse NS 1000 mL rapid drip / 1 hr
(4) cardiac monitor
R/O arrhythmia
R/O MI
R/O T wave abnormality

CC EMT-P
(5) give insulin…
(6) pH > 7.2 should not be treated.
*Treat ph < 7.1 with HCO_3 **
*controversial
(7) NG tube (esp. for unconscious pt)
(8) GU catheter
(9) R/O sepsis shock (obtain blood culture, then begin antibiotics)

Hypoglycemia

Clinical setting of hypoglycemia

- Delayed or missed meal(s)
- Unusual physical exertion
- New (increased) insulin dose
- "Brittle" diabetes
- "New" CRF
- drugs causing hypoglycemia

mnemonic: **P A B A**

Propoxyphene (Darvon)
ASA (aspirin)
Beta blockers
Antipsychotics

Hypoglycemia

Clinical setting of hypoglycemia, cont.

Drugs causing hypoglycemia (mnemonic: P A B A)
- Propoxyphene (Darvon)
- ASA (aspirin)
- Beta blockers
- Antipsychotics

Hypoglycemia

Cardinal Symptoms of Hypoglycemia
- HA
- Weak "clumsy"
- Confused ; lethargic
- "Drunk"; "on drugs"
  - irritable
  - irrational behavior
- Seizures
- Coma

Hypoglycemia

PE signs of Hypoglycemia
- HR rapid, weak
- Skin changes: cold, clammy skin
- Sensorium changes / ALOC
  - seizures
  - coma

Treatment of Hypoglycemia

(1) Airway
(2) O_2
(3) IV
- draw blood
- NS or D_5W KVO
- $D_{50}W$ 50cc IV push for CBG <60, then reassess q 10 min

(4) oral feedings (***only*** if conscious)
- frosting mix, cola,…
- protein (milk)

(5) Glucagon 1mg IM
- if you cannot establish an IV

Treatment of Hypoglycemia

2 General rules of diabetic emergency treatment
1. "comatose patients should always receive $D_{50}W$ 50cc" *
2. "when in doubt, give glucose"

* Unless :
- contraindicated (CVA)
- reliable, documented nonhypoglycemic glucometer reading

HHNKC

Hyperglycemic
Hyperosmolar
Non-Ketotic
Coma (or ALOC, seizure, "crazy," "stroke")

HHNKC

Pathophysiology

- partial insulin production - just enough is produced
  - prevent ketone formation
    - thus: no complications of metabolic acidosis
- serum glucose levels ≥ 600 mg/dL
- high serum osmolarity
- high osmotic diuresis = dehydration

HHNKC – Clinical Setting

- often in the mild, type 2, or even occult [not previously diagnosed] diabetic patient
- mortality is 40% !! (more serious than MI)
- precipitating events (look for the ppt.ing cause)
  - Infection (common)
  - CVA
  - Burns
  - Renal failure
  - Drugs

HHNKC - Clinical Presentation

Clinical Setting for HHNKC

- precipitating event (simple Hx may yield the ppt.ing drug)
  - Drugs
    - Diuretics (thiazides)
    - Steroids (prednisone)
    - Cimetidine
    - Dilantin
    - Inderal
    - Thorazine

HHNKC - Clinical Presentation

Cardinal Sx.s of HHNKC

- Gradual onset
- Weakness
- Polys
- Dehydration Sx
  - dizziness
  - thirst
- Poor po intake
- ALOC changes

HHNKC - Clinical Presentation

PE finds

- RR
  - may be slightly ↑ [pneumonia,…]
  - but Kussmaul respirations are ***not*** present
- BP
  - postural hypotension / orthostatic changes

HHNKC - Treatment

- Same for DKA
- IV NS
  - 4-6 L / first 10hr
  - patient's volume deficit is usually 9-10 L

For diabetic ketoacidosis DKA and Nonketotic hypergycemia, hyperosmolar coma (NKHHC), . note the associated . clinical problems or findings:

	DKA	NKHHC
• Kussmaul breathing, usually	+	-
• Glucose use>>200	+	+
• Coma, possible complication	+	+
• PH 7.2, often	+	-
• Infection (pneumonia), possible	+	+

Comparing DKA and NKHC

DKA

- Kussmaul Breathing
- fruity odor
- glucose > 300
- Coma
- pH < 7.3
- infection

NKHC

- ***NO*** Kussmaul breathing
- ***NO*** fruity odor
- glucose > > 400
- Coma
- pH : *NORMAL*
- infection

All the CNS emergencies
can be secondary to or mimiced by these "sugar disorders"

- delirium/ confusion
- coma
- seizures
- "stroke"

So for 911: "possible stroke"

- Always think <u>cardiac</u> and R/O emergent cause
- But also think <u>sugar</u> and R/O emergent diabetic complications
- Standard ALS
  - Fluid challenge as indicated