INSULINOMA

- Epidemiology
- Pathophysiology & Symptoms
- Dignosis & Locallization
- Management
- Anaesthetic considerations

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Epidemiology

- First described by Harris in JAMA 1924
- Commonest hormone producing NET of GIT
- 99% of pancreatic origin
- 90% solitary, 90% < 2cm, 90% benign
- 8% ass. with MEN I (multiple, malignant in 25%)
- Median age at presentation is 47yrs
- F to M ratio 1.4:1

Pathophysiology

Hypoglycemia

↓

↑glucagon(glycemic threshold 65-70mg/dl)

↓

↑catecholamines

↓

↑cortisol & GH

↓

Neuroglucopenic symptoms(<50mg/dl)

Pathophysiology

- Reduced epinephrine response in response to chronic hypoglycemia (hypoglycemia unawareness)
- Present with neuroglucopenic symptoms
- Nonspecific & episodic in nature

Symptoms

- Neuroglucopenic symptoms
  - Headache
  - Visual disurbances
  - Lethargy,lassitude,confusion
  - Difficulty in speech, thinking
  - Personality changes
  - Convulsions, coma

Symptoms

- Neurogenic
  - Cholinergic symtoms
    - Hunger
    - Sweating
    - Parasthesia
  - Adrenergic symptoms
    - Anxiety, nervousness
    - Tremors
    - Tachycardia, palpitations
    - hypertension
- Wt gain in 20-30%
- Appear in early morning, after fasting
- Ppt by exercise

Diagnosis

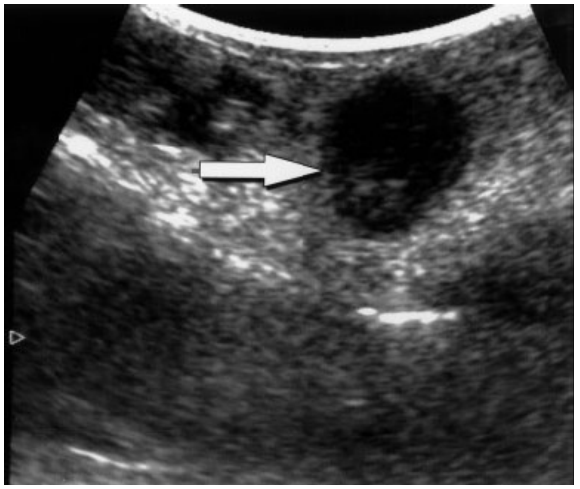
- Whipples triad
  - Hypoglycemic symptoms brought about by fasting or exercise
  - ↓BS during symptoms
  - Relief on administration of glucose
- ↑ C peptide level
- ↑ plasma insulin
- Absence of sulfonylurea

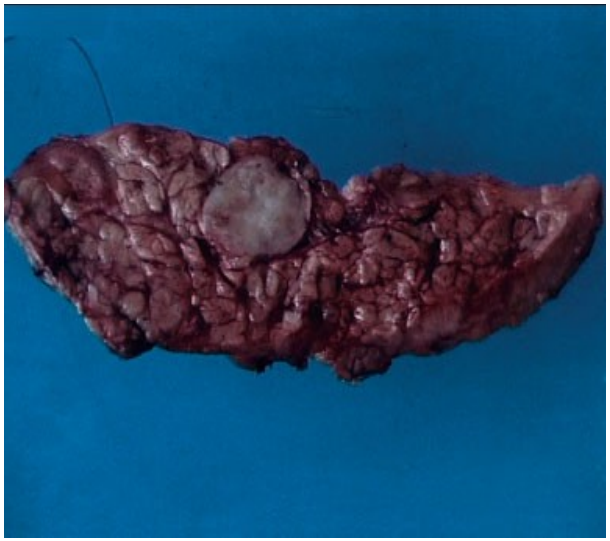
Diagnostic testing

- 72 hrs fast(gold standard)
  - Plasma glucose ≤2.5 mmol/l
  - Plasma insulin ≥6 μunits/ml (43 pmol/l)
  - Plasma C-peptide ≥0.2 nmol/l
  - Plasma proinsulin ≥0.5 nmol/l
  - Plasma sulphonylurea Negative
  - Plasma β-hydroxybutyrate <2.7 mmol/l
  - Change in glucose with 1 mg glucagon ≥25 mg/dl at 30 min
  - symptoms develop in 35 %of patients within 12 h, 75 % within 24 h, 92 % within 48 h and 99 % within 72 h
- C peptide suppression test
- Stimulation tests with glucagon, Ca, tolbutamide

Locallization

- CT, MRI
- Transabd USG, EUS
- Intraop US
- Somatostatin receptor scintigraphy
- Angiography
- Selective intra-arterial Ca. stimulation with hepaic venous sampling





Management

- Medical
  - When awaiting surgery
  - Metastatic disease
  - Failed surgery
    - Dietary
    - Diazoxide (with hydrochlorthiazide)
    - CCBs, Verapamil, Nifedipine
    - Somatostatin analogues, Octeotride
    - CT- Streptozocin, 5FU, Doxarubicin
    - Hepatic art. embolization

Management

- Surgical
  - Resection is the treatment of choice
  - Specialized units
  - Enecluation in most cases
  - Distal pacreatectomy/ whipples's procedure in a few
  - Blind resection shouldn't be performed

Anaesthetic considerations

- Association with MEN I (pancreas, pituatary, parathyroid tumors)
- Preop dehydration
- Periop BS management
- Hyperglycemic rebound
- Postop BS management

Anaesthetic considerations

- Preop dehydration
  - Osmotic diuresis
  - ↑ glucose metabolism
- CVP line
  - Monitor fluid status
  - Give hypertonic glucose
- Effect of anaesthetics
  - Hyperglycemic effect, Enf>Halo
  - TIVA(Sato et al,Masui. 1998 Jun;47(6):738-41)

Anaesthetic considerations

- BS management
  - Frequent monitoring, every 15-30min(satisfactory as long as BS≥60mg/dl)
  - BS level≥ level at which pt becomes symptomatic
  - Glucose requirement ≥ 6-8 mg/kg/min
  - 4 approaches to avoid intraop hypoglycemia
    - Epid anaesthesia(ZianZui et al, CMJ 1980)
    - Mod hypeglycemia by continuous glucose infusion
    - Mod hyperglycemia with nonglucose IVF
    - Biostater

Anaesthetic considerations

- Intraop hypoglycemia
  - Symptoms are masked under GA
  - Cholinergic symptons like sweating?
  - Hypotensio & brady?? (Chari et al, Anaesthesia 1977)
  - Neural dysfunction measured by BAER/SSEP
  - Treatment
    - IV dextose (0.5g/kg bolus→ 4-8mg/kg/min, titrate)
    - Glucagon 0.1-0.3mg/kg
    - Diazoxide, IV octeotride
  - Ppt by tumor handling

Anaesthetic considerations

- Hyperglycemia rebound
  - Can be E/o of tumor removal
  - Mayn’t be as effective as thought for diagnosis (Muir et al, Anesthesiology 1983)
  - Confusion with BT, mod hyperglycemia approach
- Postop BS management
  - Hyperglycemia likely for 2-3 days
  - May need small amount of sc insulin

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