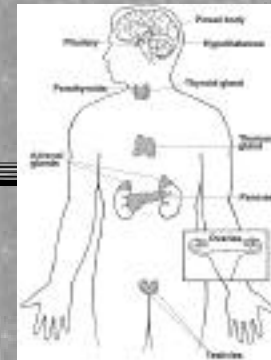


Endocrine Emergencies

- Diabetes Mellitus
- Thyroid Disorders
- Adrenal Conditions

Endocrine



Endocrine

- Applied to organs and structures that release their products into the blood or lymph
- Applied to substances that exert specific effects on other organs
- Pertaining to internal secretions; hormonal

Endocrine Disturbances Likely to Cause Altered Consciousness

- Thyroid gland dysfunction
- Diabetes mellitus
 - Hyperglycemia
 - Hypoglycemia

Endocrine Disturbances Likely to Cause Unconsciousness

- Acute adrenal insufficiency

Case 1

- A 67 year old is scheduled for multiple extractions. She was diagnosed with diabetes mellitus and wishes to have the procedure performed under general anesthesia.

Endocrine: Diabetes Mellitus

- Type I
 - absolute deficiency
 - environmental, genetic, autoimmune, viral infection (CMV, measles, mumps, rubella, mono)
 - Prone to ketosis
- Type II
 - Resistance & inadequate secretion
 - Obese patient
 - Can get temporary ketosis (ex. surgical stress)

Etiology of Diabetes

- Genetic disorder
- Primary destruction of the Islets of Langerhans
- Endocrine condition-hyperpituitarism, hyperthyroidism
- Iatrogenic
 - Steroid induced

Endocrine: Diabetes Mellitus

- Secondary (due to another cause)- ex. pancreatic disease
- Gestational-Up to 50% diabetic in a non-pregnant state within 10 years

Diabetes Mellitus: Diagnosis

- Urine dipstick- correlates poorly with plasma glucose
- Serum glucose- reasonably accurate when correctly performed; day-to day monitoring, “spot check”
- Fasting glucose/ glucose tolerance test
 - Random > 200 mg/dl plus symptoms
 - Fast > 140 mg/ dl (2 occasions)
 - Glucose Tolerance Test: Fast 10 to 16 hours, administer 75g glu, check 30 min, 1 hr, 2hr post glu; 2 hr and one preceding > 200 mg/dl

Diabetes: HbA1C

- Average glycemia control over past 6-8 weeks –non enzymatic-carbohydrate+protein
 - (actually: 50%-1 month before; 25%- 2 months before; 25% 2-4 months before)
 - Correlates with disease state, complications
 - Relative to patient; “high” and “low” glycotors (likely secondary to RBC survival (avg=120 days))

Diabetes Mellitus: Traditional Management

- NIDDM: (D/C oral hypoglycemic agent day prior)
- IDDM: 30-50% a.m. dose NPH/ Lente, (hold regular); post operative insulin sliding scale
- Consider plasma glucose check day of surgery


Table 8. CLASSIFICATION OF INSULIN PREPARATIONS

		Hours After Subcutaneous Administration (Estimated)		
		Onset	Peak	Duration
fast acting	Regular	0.5-1	2-4	5-8
	Semirapid	1-2	3-10	12
intermediate acting	isophane (NPH)	2-4	6-12	18-26
	Lantus	2-4	9-12	18-26
long acting	protamine zinc	4-8	14-24	28-36
	Lisproa	4-8	14-24	28-36

Modified from: Diabetes: An Approach to Management and Control, 10th Edition, by R. G. Barr, MD, FACG, © 2005 Lippincott Williams & Wilkins, Inc.

- ### Endocrine: Diabetes Mellitus
- Considerations regarding treatment:
 - Autonomic neuropathy
 - Orthostatic hypotension
 - Dysrhythmia risk (also with electrolyte disturbances)
 - Urinary retention
 - Gastroparesis (decreased gastric emptying)
 - Renal complications
 - Electrolyte disturbances

- ### Diabetes as a Silent Killer
- Many become aware of the disease when faced with a life threatening complication
 - 2-4X likely to have cardiac disease
 - 2-4X likely to have a CVA
 - Leading cause of kidney failure

- ### Endocrine: Diabetes Mellitus
- Side effects
 - Eye- retinopathy, cataract, glaucoma
 - Neuropathy- “stocking- glove”
 - Hypertension
 - Cutaneous
 - Skin infections
 - Xanthoma diabeticorum- lipid filled nodule
 - Necrobiosis lipoidica diabeticorum- necrosis
- 

- ### Conditions from Diabetes
- Leading cause of blindness ages 20-74
 - Risk of leg amputation 15-40X
 - Leading cause for dialysis or kidney transplant

- ### Hyperglycemia
- Usually does not lead to acute life threatening situations
 - May progress to DKA (diabetic ketoacidosis)
 - Malaise
 - Slow onset
 - Polydipsia, polyphagia, polyuria

Clinical Signs of Hyperglycemia

- Florid face
- Dehydration
- Deep and rapid respirations
- Breath fruity sweet
- Tachycardia
- Hypotension
- Altered consciousness

Treatment of Hyperglycemia

- Conscious patient
 - Do not treat
 - Refer to medical provider

Treatment of Hyperglycemia

- Unconscious patient
 - Terminate dental procedure
 - Position patient
 - Basic life support
 - 911
 - IV infusion
 - Oxygen
 - Assume hypoglycemia and administer glucose

Hypoglycemia

- May manifest rapidly
- Caused by
 - Delay of meals
 - Excessive exercise
 - Overdose of insulin

Diagnosis of Hypoglycemia

- Weakness
- Pale
- Moist skin
- Shallow respirations
- Headache
- Altered level of consciousness
- $\text{Glu} < 50 \text{ mg/dL}$

Treatment of Hypoglycemia

- Conscious patient
 - Recognize hypoglycemia
 - Terminate, position, BLS
 - Administer oral carbohydrates
 - Recovery

Treatment of Hypoglycemia

- Unresponsive conscious patient
 - Recognize
 - Terminate, position, BLS
 - Oral carbohydrates
 - Parenteral carbohydrates
 - Glucagon 1 mg
 - 50 ml of 50% dextrose (1 ampule of D50)

Treatment of Hypoglycemia

- Unconscious
 - Terminate, position, BLS, 911
 - Parenteral therapy
 - 50% dextrose
 - Glucagon 1 mg
 - 0.5 mg of epi

Case 2

- A 42 year-old has recently been diagnosed with hyperthyroidism. She states she is nervous and you notice she is sweaty. As part of your routine assessment of blood pressure and heart rate you note that her heart rate is 100.

Endocrine: Thyroid

- Gland palpable below cricoid cartilage
- TRH (hypothalamus)->TSH(ant pituitary)-> T4 converted to T3 (80% in periphery)
- Increase mitochondrial oxidative/ enzymatic reactions
 - Metabolism (BMR)
 - Protein synthesis
 - Somatic growth

Endocrine: Thyroid

- Anesthesia- increase T4 production
- Surgery- increase conversion of T4 to T3
 - Similar effects for NPO, acute illness, renal failure

Causes of Hyperthyroidism (Thyrotoxicosis)

- Toxic diffuse goiter (Graves)
- Toxic multinodular goiter
- Toxic uninodular goiter

Endocrine: Thyroid



- Hyperthyroidism- wt loss, nervous, irritable, muscle weakness, exophthalmos, warm moist skin, dysmenorrhea, heat intolerant, pretibial myxedema
- PE- tachycardia, goiter, tremor, A fib in elderly
- Autoimmune=Grave's disease-Human Thyroid Stimulating Globulin (IgG)- stimulates TSH receptor
- Management
 - elective- postpone 2-3 mos while on antithyroid med (PTU)
 - Urgent/ emergent-surgical ablation/ subtotal thyroidectomy or I¹³¹ and beta blocker (propranolol)

Endocrine: Thyroid

- Thyroid Storm
 - Can be triggered by surgery, infection
 - HTN, Sinus tachycardia, Atrial fibrillation, hyperpyrexia, delirium, emesis, abdominal pain, CHF, neuropsych
 - Supportive- oxygen, crystalloids, cooling blanket
 - Not ASA- displaces T4 from binding proteins
 - Tx- Iodine 1-2g IV over 24h (+/-PTU); antiandrogenic agent to block the peripheral effects of thyroid hormone

Hyperthyroidism

- Terminate, position, BLS, 911
- IV
- Oxygen
- Definitive management
 - Antithyroid medications
 - Propranolol

Endocrine: Thyroid

- Hypothyroidism (myxedema)
 - Most cases post ablation
 - Goiter, wt gain, weakness, dry skin, constipation
 - Periorbital edema, bradycardia, low volt ECG
 - Possible- cardiomegaly, pericardial effusion, decrease respiratory reserve
- Autoimmune=Hashimoto's Thyroiditis
 - Lymphocytic
 - Anti-microsomal and antithyroglobulin antibodies

Endocrine: Thyroid

- Hypothyroidism: Management
 - Pre-op- CXR, ECG, CBC, electrolytes
 - Sensitivity to sedatives and opioids
 - Levothyroxine 75-150 microg/ day
 - Urgent/ emergent surgery
 - Mild hypothyroidism- cardiopulmonary monitoring
 - Levothyroxine post op
 - Hydrocortisone 100 mg (prevent adrenal insufficiency)
 - Fluids, O₂, warm, diuretics

Hypothyroidism

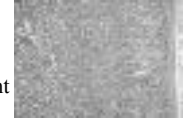
- Unconscious
 - Terminate, position, BLS, 911
 - IV
 - Oxygen
 - Definitive management
 - IV thyroid hormone

Case 3

- A 24 year old man has been taking prednisone for asthma for the past 3 years. Are there any precautions or considerations in regards to his steroid ?

Endocrine: Adrenal

- Cortex
 - Zona glomerulosa-mineralocorticoid--aldosterone
 - Zona fasciculata-glucocorticoids
 - Zona reticularis-androgens, estrogen
- Medulla-Catecholamines
- CRH (hypothalamus)→ ACTH (ant pituitary)→adrenals
- Diurnal + stress (2-7 times normal)



Endocrine: Adrenal- Diagnosis

- Cortrosyn test
 - Synthetic ACTH- tests for hypoadrenocorticism
 - Baseline cortisol should double with 25U cortrosyn
- Dexamethasone suppression test
 - Evaluate hypersecretion
 - 1mg dexamethasone 11 pm; measure serum cortisol 8 am (nl< 5microg/dl)

Endocrine: Adrenal- Addison's (primary adrenal insufficiency)

- Wt loss, anorexia, fatigue, N/V, hypotension, hyperpigmentation
- Syncope, decreased cardiac output, low voltage ST, flat T
- Anemia, eosinophilia
- Hyponatremia, hyperkalemia (not seen in secondary- aldosterone production is normal)

Endocrine: Adrenal- Cushing's

- Cushing's syndrome (adrenal)
 - Most cases-bilateral adrenal hyperplasia
 - Adrenal adenoma (20%)
- Cushing's disease (pituitary)- most- ACTH tumor
- Secondary- oat cell Ca- ACTH (15%)
- Thick body habitus, thin extremities, moon face, buffalo hump, weakness, hirsutism, abdominal striae, bruising, poor healing, vertebral fx
- Granulocytopenia, lymphopenia, hypokalemia, hyperglycemia

Endocrine: Adrenal- Management

- hypo (Addison's)
 - Steroids: hydrocortisone 100mg q 8h (approx. normal stress output)- first dose preop then continue until all stress is removed
 - Monitor BP, electrolytes, glucose, H2 blocker
- hyper (Cushing's)
 - Possible adrenalectomy, pituitary adenoma removal
 - Urgent /emergent- K+ sparing diuretics (triamterene, spironolactone)- inhibit steroid synthesis

Corticosteroid Dose Comparisons

<i>Corticosteroid</i>	<i>Equivalent Dose</i>
Cortisone	25 mg
Hydrocortisone (cortisol)	20 mg
Methylprednisolone	4 mg
Prednisolone	5 mg
Dexamethasone	0.75 mg
Betamethasone	0.6-0.75 mg

Acute Adrenal Insufficiency

- Sudden withdrawal of steroids in a patient with primary insufficiency
- Sudden withdrawal of steroids in a patient with secondary insufficiency
 - Unable to adapt to ***stress***

Primary Criteria of Diagnosis

- History of current or recent steroid use
- Mental confusion, ***Altered consciousness***
- Nausea and vomiting
- Abdominal pain
- Hypotension

Rule of Twos

- Adrenocortical suppression should be suspected if a patient has received glucocorticoid therapy:
 - 20 mg of cortisone (or equivalent) daily
 - 2 weeks or longer
 - Within 2 years of dental therapy

Adrenal Crisis

- Can be caused by the rapid withdrawal of steroids in a chronic steroid user (20 mg prednisone for more than 2 weeks during the past 2 years)
- Caused by stress: infection, trauma (including surgery), GI upsets
- N/V, abdominal pain, fever, lethargy, hypovolemic shock with cardiovascular collapse
- Tx: Cortisol administration (100-200 mg hydrocortisone), treat electrolyte disturbances

AAI

- Conscious
 - Terminate, Position, BLS, 911
 - Oxygen
 - Glucocorticosteroid
 - Hydrocortisone (Solu cortef) 100 mg IV

AAI

- Unconscious patient
 - Terminate, position, BLS, 911
 - Oxygen
 - Administer glucocorticosteroid
 - Hydrocortisone 100 mg
 - Transfer to hospital

Endocrine: Adrenal- Medulla= Pheochromocytoma

- Adrenal tumor 85%
- Paroxysmal tachycardia, sweating, HA, HTN
- Can lead to MI, CVA
- Dx-vanillylmandelic acid (VMA), metanephrine in urine
- MENS

MENs (Multiple Endocrine Neoplasms)

- MENs I (Wermer Syndrome)
 - Parathyroid, pancreatic, pituitary
- MENs IIa (II) (Sipple Syndrome)
 - Parathyroid hyperplasia, pheochromocytoma, medullary thyroid carcinoma
- MENs IIb (III) (Mucosal Neuroma Syndrome)
 - Pheochromocytoma, medullary thyroid cancer, neuromas (conjunctiva, labial/ buccal mucosa, tongue, larynx, G.I. Tract)
 - Marfan-like habitus



Conclusion

- Endocrine medical emergencies can be avoided with careful evaluation of the medical history, patient interview, and treatment modification
- Endocrine emergencies most often result in a patient with altered consciousness or loss of consciousness