Endocrinology Summary

Dec 2014

Adrenal Insufficiency

Primary

Mineralocorticoid + glucocorticoid deficiency
- Low Na
- High K and Ca
- NAGMA
- Mild hypoglycaemia
- Shock (reduced vasomotor tone and hypovolaemia)

Causes:
- Addison's disease (80%) - autoimmune
- Bilateral adrenal haemorrhage (sepsis, newborn Vit K def)
- CAH
- Drugs (etomidate, fluconazole)
- Infection (TB, viral)
- Ca (primary; lung and lymphoma secondary)
- Infiltrative (sarcoid, haemochromatosis)

Secondary

Glucocorticoid deficiency - compensatory increased aldosterone - euvolaemia, low K
- Normal or high Na
- Normal or low K
- Mild hypoglycaemia
- Hypotension/shock

Causes:
- HPA axis suppressed due to longterm steroids
- Hypopituitarism

Investigations

Cortisol: within 1hr of waking; <200 = insufficiency; 200-500 = needs ACTH stimulation test
ACTH stim test: Synacthen IM - cortisol >550 normal. ACTH: high = primary; low = secondary

Management

If uncertain diagnosis: Dexamethasone 4-8mg IV stat - 4mg QID
If known Addisons: hydrocortisone 200mg IV stat - 100mg QID

CAH

Girls - virilisation at birth
Boys - salt-losing form = Addisonian crisis age 1-2/52; non-salt-losing = early virilisation

Adrenal Excess

Cause: Iatrogenic (steroids)
- Pituitary adenoma (Cushing's disease)
- Adrenal adenoma/Ca/hyperplasia
- Ectopic CRH (Pancreas, bronchial carcinoid, thymic Ca)
- Ectopic ACTH (Oat cell Ca lung)

Moon face, buffalo hump, obesity, striae, hursutism, atrophic skin, OP, HTN, peripheral oedema, DM, psych

Investigations

HTN, Hyperglycaemia
- Hypokalaemia
- Metabolic alkalosis
- Cortisol: at 00:00 >200 = Cushings
- Dex supp test: cortisol/ACTH at 09:00; dex 1mg at 11pm; normal decr to <50% baseline level

Aldosterone Excess

Primary

Conn's syndrome

Investigations

High Na, low K/Ca

HTN

Metabolic alkalosis (chloride resistant/volume overloaded)

Ddx

Liddle syndrome

Renin-secreting tumour – rare, in JGA

Excess Liquorice

Management

Adrenal adenoma – spironolactone then surgery

Adrenal hyperplasia – spironolactone

Treat HTN (ACEi, thiazides, Ca blockers)

Phaeochromocytoma

Catecholamine-producing tumour of chromaffin cells in adrenal medulla

Ix: 24hr urine - total catecholamines, VMA and metanephrines

Plasma free metanephrines, TFTs, BSL. CT/MRI or PET

Ddx: Anxiety disorder, carcinoid tumour, EtOH withdrawal, labile hypertension, drug abuse

Management

Hypertensive crisis:

Phentolamine 2-5mg IV

Alpha blockade with phenoxybenzamine PO once controlled

Then beta blockade to control reflex tachycardia

Hyperparathyroidism

PTH increases calcium absorption - Incr Calcium

Presentation

Bones, Stones, Groans, Thrones – polyuria, Psychic overtones

Short QT

Management

Surgery

Treat hypercalcaemia

IV fluids (aim UO ~100ml/hr)

+/- frusemide

Bisphosphonates

Calcitonin (short lived)

Glucocorticoids

When to treat hypercalcaemia

< 3 no treatment

3-3.5mmol/L treat if symptomatic

> 3.5 treat

Hypoparathyroidism

Decr PTH causes decr calcium, Incr phosphorus levels

Muscle cramps, tetany, tingling finger/toes, Seizures, Chvostek sign (facial nerve), Trousseau sign (BP cuff)

Rx: calcium, vitamin D

Hypopituitarism

Causes:
1. Mass lesion - Pituitary tumours, Non-pituitary tumours: meningiomas, brain tumours, mets
2. Bleed (pituitary apoplexy)
3. Hypothalamic disease
4. Ischaemia and infarction: Sheehan's syndrome (post-partum), CVA, SAH
5. Infiltrative processes: sarcoidosis, histiocytosis X, haemochromatosis
6. Infections: cerebral abscess, meningitis, encephalitis, tuberculosis, syphilis
7. Iatrogenic: irradiation, neurosurgery

Presentation

Deficiency of:
- ACTH: Adrenal Insufficiency; TSH: Hypothyroidism; Gonadotropin: oligomenorrhoea, infertility
- GH, Prolactin: inability to lactate postpartum – may be only sign of Sheehans
- ADH: DI rare

Features due to underlying cause:
SOL: headaches or visual field deficits
Large lesions involving the hypothalamus: polydipsia, SIADH

Hyperthyroidism

Primary Graves (toxic diffuse goitre), Toxic multinodular goitre, Toxic adenoma
Central Pituitary adenoma
Thyroiditis De Quervains, post-partum, radiation
Drug-induced Lithium, iodine, amiodarone, thyroxine
Ectopic thyroid tissue
Metastatic thyroid tissue

TSH <0.1; incr T3/4; thyroid autoab's; normochromic anaemia, incr WBC, mild incr Ca, decr alb, incr AST/ALP

Thyroid storm

Life-threatening, hypermetabolic state: mortality untreated 90%
Diagnostic criteria: sudden onset
fever (>37.8)
tachycardia - incr HR out of proportion (120-200)
CNS disturbance (altered LOC, seizures)
CCF (high output)
Incr T3,4; decr TSH; K+, ECG, Graves autoantibodies, thyroid USS/NM

Management

ABC (O2 as consumption incr; IVF with dextrose; DCC for arrhythmias, likely resistant to drugs)
Block new hormone synthesis
- propylthiouracil (200-600mg po bd)/carbimazole (10-45mg po bd)
- iodine - block release hormones (after PTU)

Block systemic effects
- beta blockers: propranolol
- glucocorticoids – prevent conversion T4-T3

Treat precipitant – stop meds, sepsis/infection, trauma/surgery, iodine contrast, seizure
Supportive: fluid status, electrolytes, glucose, decr fever (not aspirin), cooling
Others: dialysis, plasmapheresis, charcoal haemoperfusion
Disposition: ICU
Ddx: sepsis, heat stroke, malignant hyperthermia, NMS, phaeo, sympathomimetic ingestion

Hypothyroidism

Painless causes
Hashimotos – autoimmune, chronic (1st world)
Drugs (amiodarone, lithium, iodine)
Post-partum thyroiditis
Iodine deficiency (3rd world)
Infiltrative (lymphoma, sarcoid, TB, amyloidosis)
Idiopathic
Painful causes:
Subacute thyroiditis – de Quervains
Infectious

Incr TSH, decr T3/T4; anaemia, thyroid autoAbs in Hashimotos
Rx: T4 – thyroid hormone +/- iodine. Thyroxine 75-150mcg/day (half dose in elderly)

Myxoedema coma

Life-threatening decompensation with multi-organ involvement - 50% mortality
Same triggers as thyroid storm
Decr LOC, decr T, seizures, decr RR, decr BP, decr HR, hypoG, hypoNa, paralytic ileus, megacolon, retention, ankle oedema, CCF, hoarseness, glottic oedema, low voltage ECG (long QTc, flat/inverted T waves)
Management
ABC – volume replacement, correct electrolytes, vasopressors, warming
Treat cause; ICU
Definitive care: T3 25-50mcg IV bolus - 10-20mcg TID
or T4 300-500mcg IV bolus - 50mcg IV/day
Hydrocortisone 100mg QID; as impaired glucocorticoid response to stress

Diabetic Ketoacidosis

Na	correct for glu: Na + ((Glu – 5.5) / 3)	average Na deficit 5-10mmol/kg
K	correct for pH: decr pH 0.1 = incr K 0.5	average K deficit 3-5mmol/kg
Osmolality	osm: (2 x Na) + Glu + Ur	increased

Management
Aim decr BSL by no more than 5/hr, decr osm by 1-2/hr; endpoint: ketones cleared, normal AG
Fluids:
Kids 10-20ml/kg to start → replace deficit over 48hrs
when BSL <15 change to D4S
Electrolytes:
NO INSULIN until K+ checked
If K <3.3 give 40mmol KCl and no insulin until >3.5
If K >5.0 give insulin and NS, no KCl
Add 20-30mmol K to 1L saline in 2nd hour and once UO established and K <5
Insulin:
Start 1hr after initial fluids, only if K>3.4
0.1 iu/kg/hr (max 6iu/hr) - decr to 0.05 iu/kg/hr when BSL <12 and acidosis improving

Treat complications (NBM, NGT if ileus, consider heparin – risk VTE)
Treat precipitants
HCO3: if pH<7, HCO3<5, life-threatening hyperK, coma, haemodynamic compromise unresponsive to fluids
Endpoint: pH >7.1, HCO3 >10
Admit ICU if: In children: <2yrs, pH <7.1, altered LOC, need arterial line, severe hyperosmolar dehydration

Cerebral oedema
0.5-1g/kg mannitol or 3ml/kg 3% saline over 30mins
Give half maintenance fluids; admit PICU; neurosurg review; CT; hyperventilate if ETT

DKA vs HHOS

DKA	**HHOS**
BSL >14	BSL >33
pH <7.3	pH >7.3
HCO3 <15	HCO3 >15
Ketones +++	Ketones -/+
Osmolality varies	Osmolality >320-350
AG >12	AG <12
H20 deficit 5-10L (10%, 100ml/kg)	H20 deficit 8-12L (20-25%)
Resus with N saline	
0.1iu/kg/hr insulin (max 6u/hr)	0.05iu/kg/hr insulin (max 3 u/hr)
Aim BSL 9-14	Aim BSL 14-18
Use N saline unless Na >150	Use 0.45% saline after boluses over
Replace over 48hrs	Replace over 48-72hrs
Cerebral oedema	Cerebral oedema uncommon
Mortality 5-15%	Mortality 15-45%

Hyperglycaemic Hyperosmolar State

Management
Nurse head up, NBM, NGT (if ileus), heparin important, treat underlying cause
IVF: Adults: N saline bolus until haemodynamically stable
→ use 0.45% saline to replace over 48-72hrs
If corrected Na low → use N saline
When BSL <15 → use 0.45% saline + 5% dex
K replacement similar to DKA

Prognosis
Complications: DVT/PE, ARDS, cardiogenic shock, DIC, MOF, rhabdo/ARF, cerebral oedema

Hypoglycaemia

Causes
Diabetes treatment (insulin/sulfonyureas) }
Alcohol intoxication (decr gluconeogenesis) } most common in ED
Sepsis (decr gluconeogenesis + incr response to insulin) }
Liver disease
Starvation
Toxic ingestions

Symptoms
CNS: altered GCS, lethargy, confusion, agitation, coma
ADRENERGIC: anxiety, N/V, palpitations, sweating, tremor

Treatment
1. iv dextrose: 1g/kg (50ml of 50% = 500mg/ml = 25g), change to infusion 10%
2. oral replacement: complex CHOs
3. Glucagon: 1mg im or iv (will not work if depleted glycogen – alcoholics, elderly)
4. Octreotide: for sulfonylurea OD and recurrent low BSL
5. Thiamine
6. Hydrocortisone – consider in refractory hypoglycaemia

Thiamine deficiency (Vitamin B1)
Chronic EtOH (poor dietary intake)
Extreme diets
Dialysis
Poor nutrition
Wernicke's encephalopathy (AMS, ataxia, ocular dysfunction eg nystagmus)
  Rx: thiamine 500mg iv/day
Korsakoffs psychosis (STML, unaware of condition, irreversible)
High output cardiac failure (Wet beriberi)
  Chronic thiamine deficiency

Niacin deficiency (Vitamin B3)
Pellagra
Due to lack in diet or carcinoid syndrome
In green leafy veges, fish, grains
4D's: diarrhoea, dermatitis, dementia, death

Cobalamin deficiency (Vitamin B12)
Animal products only. Stored in liver – takes years to run out
Must be able to absorb from gut
Causes:
Decr GI absorption (Crohns)
Decr intake (vegan, EtOH, elderly)
Genetic
Meds (PPIs)
Clinical manifestations:
Megaloblastic anaemia
Neuro symptoms: demyelination, paraesthesia, ataxia, clonus, paraplegia
Psych: memory loss, depression, psychosis
Ix: oval macrocytic RBCs, hypersegmented neutrophils, may develop into pancytopaenia
Low B12, Antibodies to intrinsic factor (pernicious anaemia)
Rx: parenteral B12 (im or sc) – daily 1/52 then weekly for a month then monthly forever +incr diet

Folic acid deficiency
Animal products, green leafy veges, fortified foods
Causes: poor nutrition, EtOH, elderly, infants on goats milk, drugs (phenytoin)
Clinical manifestations: similar to B12 but NO NEURO sx. Occurs faster than B12 (months)
Sx mainly due to anaemia
Ix: oval macrocytic RBCs, hypersegmented neutrophils, decr serum folate
Rx: oral folic acid + diet changes

Vitamin D deficiency
Facilitates calcium absorption from gut
Clinical manifestations: Kids – Rickets, stunted growth. Adults – osteomalacia (bone/muscle pain)
Rx: po Vit D, sunlight, braces/surgery

Vitamin C deficiency
Scurvy
Clinical manifestations: rough/haemorrhagic skin, gum disease, poor wound healing