Perioperative corticosteroid supplementation
Diabetes

Classification
Type I
- Autoimmune disease, 40-50% concordance, β-cell destruction, ? viral or environmental trigger, insulin deficiency
- Prone to diabetic ketoacidosis
- Presents at an early age
- Require insulin replacement

Type II
- 100% genetic concordance, increased in obese, insulin resistance
- Not prone to DKA, but may develop hyperglycaemic hyperosmolar coma
- Presents in middle aged or elderly (except MODY)
- Initial therapy often with diet, exercise, oral agents, later insulin

Insulin
- Synthesized in endocrine pancreas (islets of Langerhans) by β-cells
  - α-cells secrete glucagon, δ-cells secrete somatostatin, F cells secrete pancreatic polypeptide
- Normal secretion 1 U/kg/day, peaks after meals, t_{1/2} 5 min
- Release stimulated by: Plasma glucose and fructose, amino acids, glucagon, gastrin, secretin, CPK, ACh, catechols via β receptors
- GH increases insulin responsiveness
- Release inhibited by: Somatostatin, catechols via α-receptors

Perioperative management

Evidence
- Diabetics are at increased risk of complications
  - Due to secondary effects of diabetes (IHD, renal disease…) not due to hyperglycaemia
- Tight control of blood sugar
  - Reduces chronic complications of diabetes
  - Benefits foetus in pregnancy
  - Less macrosomia
  - Beneficial during cardiopulmonary bypass
    - More responsive to inotropes
    - Stress response produces hyperglycaemia
    - Hypothermia diminishes insulin sensitivity
  - Beneficial during cerebral ischaemia
    - Lower risk of neurological damage
  - Otherwise little evidence for advantages in tight perioperative control

Major risks in the diabetic patient
- Cardiovascular: IHD, PVD, microvascular disease
- Renal impairment
- Neuropathies
- Impaired cellular immunity
- Joint collagen abnormality (jaw stiffness, poor deep wound healing)

Resuscitation of the DKA patient for emergency surgery
- Usually time for fluid replacement, electrolyte correction
- Fluid deficit 3-10 l (Saline 5-10 ml/kg plus 1-4 l/h)
- Potassium deficit 3-10 mmol/kg (KCl 10-20 mmol/l fluid)
- Insulin deficit
  - Correct K⁺ < 3 mmol/l first
  - 10 U bolus plus 5-10 U/h titrated against blood sugar
Add 5% dextrose to fluids when glucose < 15 mmol/l
Hourly ABG and glucose
Aim for glucose 10-14 mmol/l, pH > 7.35, Na⁺ < 155 mmol/l, K⁺ 3-5 mmol/l
Also phosphate, magnesium deficient
Classic “non-tight control” regimen
Fast from midnight for morning surgery
5% dextrose 125 ml/h IV from 6am
Half normal morning dose of insulin
Check BSL 1-4 hourly
Sliding scale insulin from recovery until return to normal diet
“Tight” regimen
Check fasting glucose day before surgery
5% dextrose 50 ml/h IV
Initial insulin IV rate (U/h) = BSL/8.3 (mmol/l) (or BSL/5.5 if on steroids)
Titrate insulin rate to BSL 5.5-11.1 mmol/l
Check BSL at start of surgery and every 1-2 h for 24 h

Other perioperative concerns
Autonomic neuropathy
↑ gastric emptying time, risk of aspiration
Painless myocardial ischaemia
Signs include hypertension, lack of sweating, lack of R-R variability, postural hypotension, peripheral neuropathy
Microvascular disease
↑ risk of neuropraxia with regional
Perioperative corticosteroid supplementation

Evidence
- Few patients with adrenocortical suppression have problems even without steroid cover: documented cases are rare
- Acute adrenal insufficiency is life-threatening
- Perioperative steroid cover carries minimal risks
- Primate study found no difference between physiologic and supraphysiologic doses

Physiology
- Maximum adrenal cortisol output 200-500 mg/d
- Normal 25 mg/d

Risks of supplementation
- Possible
  - Minor impairment of wound healing (antagonized by vitamin A)
  - Impaired immune function
  - Hypertension, fluid retention, stress ulcers, psychosis
  - Aseptic necrosis of head of femur

Recommended regimen
- Indicated for all patients receiving steroids within past year
- Not less than usual preoperative dose equivalent
- Hydrocortisone 200 mg/d for 70 kg adult (100 mg for minor procedures)
- Reducing 25% per day until oral steroids resumed