Precautions for Patients on Steroids Undergoing Surgery

Introduction

Since the 1940s synthetic corticosteroids (or steroids) have been developed for their anti-inflammatory and immunomodulatory effects. Patients on steroids who present for surgery may be at increased risk of complications because of:

- **The adrenal suppression** caused by steroid therapy. This often poses the greatest risk and deserves particular attention. It is important for patients to be educated about the risk. Steroid cards should be carried by patients taking steroids.
- **The disease or condition which required them to take steroids.** Corticosteroids are used in a wide variety of conditions. Some of these may also have attached risks for anaesthesia (those, for example, affecting lungs, neck joints or drug metabolism).
- **Long-term and other side-effects of steroid therapy.** These include:
  - Hypertension.
  - Diabetes mellitus.
  - Fatty liver.
  - Susceptibility to infection.
  - Osteoporosis.
  - Avascular necrosis of bone.
  - Skin sepsis.
  - Electrolyte disturbance: hypokalaemia, metabolic alkalosis.

There are pre-operative, peri-operative and postoperative factors to be considered when assessing and managing these risks.

The risk of adrenal suppression

In normal healthy patients there is a prompt secretion of cortisol with the onset of surgery and secretion remains elevated for several days after surgery. Glucocorticoids are not stored and must be synthesised when required - for example, during and after surgery. This response depends on the hypothalamic-pituitary axis which may be suppressed or unresponsive to stress when steroids have been taken. Failure of cortisol secretion may result in the circulatory collapse and hypotension characteristic of an hypoadrenal or 'Addisonian' crisis.

Pre-operative considerations

- Establish how much steroid has been taken and for how long. The degree of adrenal suppression depends on the dose and duration of steroid treatment. However, the integrity of the adrenal response is not routinely tested and steroid cover or supplements are given according to the surgical stimulus (minor, moderate and major surgery).
- Dosages of less than 5 mg prednisolone per day are not significant and no steroid cover is required.
- 10 mg/day or more of prednisolone (or equivalent) is generally taken as the threshold dose for "steroid cover".
- Steroid cover is required if taken within three months of the surgery. This is because adrenal suppression can occur after only a week and may take as long as three months to recover.
Peri-operative considerations

- Normal cortisol secretion is about 30 mg/day. The normal rise in plasma adrenocorticotropic hormone (ACTH) and hence cortisol is in response to the severity of surgery. The adrenals are capable of secreting about 300 mg/day (equivalent to about 75 mg of prednisolone) but output rarely exceeds 150 mg of cortisol/day even in response to major surgery.

Postoperative considerations

- The normal rise in cortisol secretion after surgery lasts for about three days. In recent years, doses used for steroid cover have been reduced.[3] This is because excessive doses cause adverse effects such as postoperative infection, gastrointestinal haemorrhage and delayed wound healing.[4]

Preoperative assessment

This should focus on the history of steroid usage, routine examination (including blood pressure) and basic investigations including FBC, U&Es, blood glucose and LFTs.

Investigation for adrenal suppression is rarely done.[1] It is possible to assess this with:[5]

- Serum and urinary cortisol.
- Short synacthen test (SST) - more popular but interpret with care.[5]
- Insulin tolerance test.
- Corticotropin-releasing hormone (CRH) measurement.

Peri-operative management

Patients who should receive steroid cover for surgery (and during major illness) particularly include:

- Patients on corticosteroids at a dose of 10 mg or more of prednisolone (or equivalent) daily (equivalent to betamethasone 1.6 mg, dexamethasone 1.6 mg, hydrocortisone 40 mg, methylprednisolone 8 mg daily).
- Patients who have received corticosteroids 10 mg daily within the three months preceding surgery.
- Patients on high-dose inhaled corticosteroids (for example, beclometasone 1.5 mg a day).

Patients who stopped their steroids more than three months ago or who are taking 5 mg or less require no steroid cover.

Peri-operative steroid cover

Infusion is now preferred to bolus (this avoids excessive doses of steroid with possible complications). Historically, doses were even higher; further revision of doses may be recommended with further research but, for the moment, empirical recommendations are:[3]

- **Minor surgery** - 25 mg hydrocortisone at induction of anaesthesia and then resume normal medication postoperatively.
- **Moderate surgery** - usual dose of steroids pre-operatively and then 25 mg of hydrocortisone intravenously (IV) at induction, followed by 25 mg IV every 8 hours for 24 hours. Usual pre-operative dose is then continued.
- **Major surgery** - usual dose of steroids pre-operatively, then a bigger 50 mg of hydrocortisone IV at induction, followed by 50 mg IV every 8 hours for 48-72 hours. Continue this infusion until the patient has started light eating, then restart the normal pre-operative dose.

Remember that patients receiving <10 mg of prednisolone or equivalent do not need steroid cover but should continue with their usual maintenance steroid dosage. Patients on long-term steroids do not require supplementary steroid cover for routine dentistry or minor surgical procedures under local anaesthesia.[6]
The risk of underlying disease
There is a wide range of diseases for which corticosteroid treatment is commonly used. It is important to remember that these conditions may also carry risk for both anaesthesia and surgery. Examples of conditions likely to have a consequence for surgery and anaesthesia include:

- Asthma.
- Rheumatoid arthritis.
- Glomerulonephritis.
- Immune thrombocytopenia.
- Cerebral oedema.
- Malignancies and chemotherapy.

These conditions should be fully assessed pre-operatively.

The risks of long-term steroid treatment
There are many risks associated with long-term steroid treatment and these should be borne in mind pre-operatively, peri-operatively and postoperatively.

Further reading & references

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