

Perioperative steroid therapy – consideration

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Introduction

Steroids used for wide range of indications. Anaesthetist faces various steroid preparations used for common perioperative patients posted for elective surgeries.^[1] chronic steroid use may lead to hypothalamic pituitary axis suppression and that may lead to haemodynamic instability under stressful conditions like surgery & anaesthesia.^[2]

Steroid therapy initiation & indication

Steroid replacement is required in perioperative period in patients who has previously on chronic steroid treatment. The basic principle for patients using chronic steroid based on to increase their dose of glucocorticoids when under stress. Chronic steroid therapy is necessary treatment required for many common diseases like inflammatory bowel disease, reactive airway disease and immunosuppression for transplant recipients.^[3]

Various steroid indications are as-

1. Perioperative replacement therapy
2. Anti-inflammatory use in hyper reactive airway disease
3. Postoperative nausea & vomiting
4. Anaphylaxis
5. Septic shock
6. Day care surgery
7. Others-eg. Cerebral oedema

Current recommendations for perioperative stress dose of steroids based on duration & dose of maintenance steroids. The sudden perioperative withdrawal or inadequate preoperative dose of steroid is the main reason behind adrenal crisis. All patients should take their regular daily dose of steroid preoperatively and additional stress dose based on patient risk of adrenal suppression and stress induced during anaesthesia & surgery should added as Inadequate steroid replacement may lead to haemodynamic instability, metabolic, electrolyte & fluid imbalance. Time require pituitary adrenal axis suppression commonly occur when steroid intake persist from 2-5 days ^[4] to nine months ^[5]. Conservative steroid therapy should consider in patients who have received steroids for atleast one month in past 6-12 months.

Maintenance and weaning off steroids

Any Fixed steroid replacement protocol not widely accepted. We should prefer balanced, individualised steroid supplementation dose and the duration should be based on the magnitude of surgical stress as well as preoperative ongoing steroid dose and the degree of Hypothalamic - pituitary axis suppression ^[6]. Most commonly used regimens which are widely practiced steroid replacements in perioperative setting is given by

Kehlet, Symreng et al and Salem et al^{[6],[7],[8]} & Nicholson et al^[9] [Table 1].

Patients may either need no supplementation, a single dose or regimen delivered over number of days. A few studies suggest that supplemental exogenous stress steroids may not need for perioperative stress.^[10,11,12]

Marik and Varon^[13] in a systemic review suggested that patients receiving therapeutic dose of corticosteroids who undergoing a planned surgery do not require stress dose of corticosteroids as long as they receive their daily dose of steroids. Another study Yong et al^[14] concluded that patient's daily maintenance dose of corticosteroid is sufficient and additional supplemental dose of corticosteroid not required.

If there is any confusion regarding requirement of corticosteroid then the steroid dose should be given as there are no long-term adverse effects of short-term corticosteroid therapy.^[15]

As per consideration for steroid therapy if patient had stopped steroid more than 3 months, we consider patient as on steroids and if patient had stopped steroids more than 3 months back then no perioperative steroids required.^[16] Steroid infusion preferable as it avoids large surge caused by bolus injection and on other end daily dose of one quarter administered every six hourly may be adequate.^[17]

As per anaesthetic consideration for patients on chronic steroid therapy conclude avoidance of etomidate use and no other specific anesthetic agent or technique recommended. It should consider that the oral steroids must be supplemented by parenteral steroids in equivalent doses during perioperative period till oral intake established.

Table 1: Perioperative steroid replacement therapy.

Patient currently taking steroid	<10 mg per day (Prednisolone)	Assume normal HPA response	Additional steroid cover not required	
	>10 mg per day	Minor surgery	25 mg hydrocortisone at induction	
		Moderate surgery		Usual preoperative steroid+25 mg hydrocortisone at induction+ 100 mg/day for 24 hrs.
			Major surgery	Usual preoperative steroid+25 mg hydrocortisone at induction+100 mg/day for 48-72 hrs.
	High dose immunosuppressive	Give usual immunosuppressive dose during perioperative period		
Patient stopped taking steroid	< 3 months	Treat as if on steroids		
	> 3 months	No perioperative steroids necessary		

For steroid regimen evaluation of equipotent dose of steroid mentioned in [Table 2].

Table 2: The bioequivalent doses of various steroid preparations.

Equivalency: Prednisone 10 mg is equivalent to

Betamethasone 1.5 mg

Cortisone acetate 50 mg

Dexamethasone 1.5 mg

Hydrocortisone 40 mg

Methylprednisolone 8 mg

For inhaled steroids: ≥ 750 mcg fluticasone or 1500 mcg beclomethasone/day, treat as ≥ 10 mg prednisolone/day

As chronic steroid therapy associated with risk of immunosuppression, impaired wound healing, hyperglycaemia and psychological disturbance in post-operative period.^[18] As these high dose perioperative steroids associated with many postoperative complications that should not ignored and consider gradual weaning off of high dose steroid and maintain on chronic maintenance dose to provide adequate coverage for postoperative stress or withdrawal.

In conclusion for postoperative steroid replacement and weaning off for major surgery continue hydrocortisone 100mg/day by IV infusion or 50mg every 6 hourly by IM inj. then resume enteral glucocorticoid at pre-surgical therapeutic dose if recovery is uncomplicated. Otherwise continue double oral dose for up to a week^[15].

For intermediate surgery double glucocorticoid dose for 48hrs then continue usual treatment dose if uncomplicated^[15].

For minor surgery continue normal dose of hydrocortisone

Obstetrics consideration

Pregnancy does not influence the severity of the disease, but may delay the diagnosis as similar signs and symptoms the pregnancy itself. Higher maintenance dose required for women with adrenal insufficiency in the latter stages of pregnancy^[18].

^[22]. The recommendations for peri- and postoperative surgical stress doses are the same in pregnancy as for other adults.

During delivery, 100 mg glucocorticoid loading dose given at the onset of active labour followed by continuous infusion of glucocorticoid 200 mg.24 h1, or 50 mg every 6 h, with rapid tapering (over 1–3 days) to the regular replacement dose after an uncomplicated delivery.

Paediatric consideration

Children are more vulnerable for problem of glycaemic control or dehydration as they poorly tolerate fasting so minimise fasting period for paediatric patients and prioritize them on routine surgery list. Regularly hourly check blood sugar if pre-operative fasting exceeds 4 hours. Avoid fasting more than 6 hours. Treat as bolus of glucocorticoid at induction of anaesthesia followed by continue glucocorticoid infusion or alternate bolus doses 4 hourly. The child should continue to take their regular doses of glucocorticoid until the time of surgery. After surgery, blood glucose should be checked every hour until enteral intake is resumed.^[23] All children who have known glucocorticoid deficiency (primary or secondary) should receive an i.v. dose of glucocorticoid at induction 2 mg.kg1 for minor or major surgery under general anaesthesia). Postoperatively, 2 mg.kg1 glucocorticoid

should be administered every 4 h, following major surgery. When enteral intake is established, the patient should receive double the normal dose of hydrocortisone for 48 h, and then it reduced to standard hydrocortisone doses once stability has been achieved.

Conclusion

Patients who are on chronic steroid therapy should continue their usual preoperative steroid dose on day of surgery and who are on risk of adrenal insufficiency should receive perioperative stress dose steroids. Hydrocortisone is the drug of choice for stress and rescue dose steroid coverage as dexamethasone is not adequate as glucocorticoid treatment in patients with primary adrenal insufficiency as it has no mineralocorticoid activity.

Further studies require for evaluating perioperative steroid dose in various surgical settings for patients with adrenal insufficiency.

References

1. Grover VK, Babu R, Bedi SPS. Steroid therapy- Current Indications in Practice. *IJA* 2007;51(5):389-93.
2. Fraser M, Tainsh RE Jr, Bromberg J, Loriaux DL, Chernow B. Perioperative glucocorticoid coverage. A reassessment 42 years after emergence of a problem. *Ann Surg* 1994; 219:416-25.
3. Liu MM, Reidy AB, Saatee S, Couard CD. Perioperative steroid Management: Approaches Based on Current Evidence. *Anesthesiology* 2017 jul;127(1):166-72.
4. Robinson BHB, Mattingly D, Cope CL. Adrenal function after prolonged corticosteroid therapy. *BMJ* 1962; 1:1579-84.
5. Livanou T, Ferriman D, James VHT. Recovery of hypothalermo-pituitary adrenal function after corticosteroid treatment. *Lancet* 1967; 2:856-9.
6. Kehlet H. A rational approach to dosage and preparation of potential glucocorticoid substitution therapy during surgical procedures. *Acta Anaesth Scand* 1975;19: 260-4
7. Symreng T, Karlberg BE, Kagedal B, Schildt B. Physiological cortisol substitution of long-term steroid treated patients undergoing major surgery. *BJA* 1981; 53: 949-53.
8. Salem M, Tainsh RE, Bromberg J, Loriaux DL, Chernow B. Perioperative glucocorticoid coverage:a reassessment 42 years after emergence of a problem. *Ann of Surg* 1994; 219: 416-25.
9. Nicholson G, Burrin JM, Hall GM. Peri-operative steroid supplementation. *Anaesthesia* 1998; 53:1091-104.
10. Mathis AS, Shah NK, Mulgaonkar S. Stress dose steroids in renal transplant patients undergoing lymphocele surgery. *TransplantProc* 2004; 36:3042-5.
11. Friedman RJ, Schiff CF, Bromberg JS. Use of supplemental steroids in patients having orthopaedic operations. *J Bone Joint Surg Am* 1995; 77:1801-6.
12. Yong SL, Coulthard P, Wrzosek A. Supplemental perioperative steroids for surgical patients with adrenal insufficiency. *Cochrane Database Syst Rev* 2012;12:CD005367.
13. Marik PE, Varon J. Requirement of perioperative stress doses of corticosteroids: A systematic review of the literature. *Arch Surg* 2008; 143:1222-6.
14. Yong SL, Coulthard P, Wrzosek A. Supplemental perioperative steroids for surgical patients with adrenal insufficiency. *Cochrane Database Syst Rev* 2012;12:CD005367.
15. Woodcock T, Barker P, Daniel S et al. Guidelines for the management of glucocorticoids during the perioperative period for patients with adrenal insufficiency. *Anaesthesia* 2020; 75:654-63.

16. Chilkoti GT, Singh A, Mohta M, Saxena AK. Perioperative “stress dose” of corticosteroid: Pharmacological and clinical perspective. *J Anaesthesiol Clin Pharmacol* 2019; 35:147-52.
17. Kehlet H, Binder C. Alterations in distribution volume and biological half-life of cortisol during major surgery. *J Clin Endocrinol Metab* 1973; 36:330-3.
18. Royal College of Anaesthetists. Perioperative medicine: the pathway to better surgical care. 2015. <http://www.rcoa.ac.uk/perioperativemedicine> (accessed 08/06/2015).
19. Albert E, Dalaker K, Jorde R, Berge LN. Addison’s disease and pregnancy. *Acta Obstetrica Gynecologica Scandinavica*. 1989; 68: 185–7.
20. Nelson-Piercy C. Handbook of obstetric medicine. 5th edn. Boca Raton, FL: CRC Press.
21. Quinkler M, Hahner S, Johansson G, Stewart PM. Saving the lives of patients with adrenal insufficiency; a pan-European initiative? *Clinical Endocrinology* 2014; 80: 319–21.
22. Lebbe M, Arlt W. What is the best diagnostic and therapeutic management strategy for an Addison patient during pregnancy? *Clinical Endocrinology* 2013; 78: 497–502.
23. British Medical Association, Royal Pharmaceutical Society, the Royal College of Paediatrics and Child Health, and the Neonatal and Paediatric Pharmacists Group. British National formulary for children. 2018/19. <https://www.medicinescomplete.com/#/content/bnfc/PHP107864?hspl=body> (accessed 29/03/2019).