Perioperative Medicine: Management of chronic steroids

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Your patient

Ms. L is a 55 year-old F w/ h/o RA who presents for pre-op evaluation for right hip arthroplasty for avascular necrosis of the right hip.

Current medications:
Methotrexate 20mg/week
Etanercept 50mg/week
Prednisone 10mg daily

She receives long steroid tapers or bursts 2 times per year.
Adrenal Physiology

• Baseline daily cortisol secretion ~5.7 mg/m²
• Surgical stress increases baseline secretion
  • Has high as 50-200mg of cortisol²
• Exogenous steroids inhibit CRH and ACTH secretion (HPA axis)
  • Adrenal atrophy may result and blunt normal stress response

Adrenal Physiology

Chronic steroids

No chronic steroids

Marik PE. Arch Surg. 2008;143(12):1222-1226
Perioperative adrenal insufficiency

• Incidence reported to be 0.01% to 0.7%\textsuperscript{1}
• Symptoms include nausea, vomiting, muscle cramps, weakness, dizziness
• Signs include hypotension, leading to shock/CV collapse and death

### Secondary adrenal insufficiency

<table>
<thead>
<tr>
<th>Assume HPA suppression</th>
<th>Assume no HPA suppression</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Greater than 20mg/day prednisone &gt; 3 weeks</td>
<td>• Any daily dose &lt; 3 weeks</td>
</tr>
<tr>
<td>• Clinically Cushingoid</td>
<td>• Less than 5mg/d prednisone for any duration</td>
</tr>
<tr>
<td></td>
<td>• Alternate day regimen</td>
</tr>
</tbody>
</table>
Secondary adrenal insufficiency

Intermediate risk of suppression

• Prednisone 5-20mg daily
• Inhaled glucocorticoids\(^1\)
  • ≥750 mcg daily of fluticasone; > 1500mg/daily of others
• Topical steroids
  • ≥2g/day of high potency or super high potency topical corticosteroids
• Significant/intermittent use of oral steroids over the last year

1. Lipworth BJ. Arch Intern Med. 1999;159(9):941
Contributing factors

• Etomidate inhibits the conversion of 11β-deoxycortisol into cortisol (↓ cortisol synthesis) for up 48 hours after single intubating dose.
Pre-operative testing for adrenal suppression

• Can be considered in patients with intermediate use of steroids
  • Not routinely recommended, because...
• Poor sensitivity for secondary adrenal insufficiency (57%)\(^1\)
• Positive testing is not correlated with clinical outcomes
  • Correlated with poor intra- and postoperative cortisol response (labs)

Testing

• Morning cortisol
  • <5 mcg → likely suppressed
  • >10 mcg → likely not suppressed

• ACTH stimulation test
  • Hold morning steroid dose
  • Check cortisol 30 min after 250mcg of cosyntropin
  • >18 mcg → not suppressed
Data on use of stress dose steroids

• No formal guidelines
• Marik, et al. systematic review (2008)¹
  • 2 RCTs and 7 cohort studies
  • 315 patients and 379 surgical procedures
• One additional RCT published in 2014 comparing “high-dose” stress dose steroids vs. “low-dose” stress dose steroids²

¹ Marik PE and Varon J. Arch Surg. 2008;143(12): 1222-1226
Data on use of stress dose steroids

• No study has reported a statistically significant difference in hypotension when patients are treated with their chronic steroids alone compared to chronic steroids + stress dose steroids\(^1\)

• No data on adverse effects of steroid use

• No difference between “high-dose” and “low-dose” stress dose steroids\(^2\)

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Important ?’s when obtaining steroid exposure history

• Indication for steroid use (acute or chronic)
• Current steroid type and dose
• Duration of steroid therapy (present or past)
• History of underlying disease flare with steroid cessation
• History of adrenal insufficiency with steroid cessation
Clinical use of stress dose steroids

• Patients with PRIMARY adrenal insufficiency require stress dose steroids to prevent adrenal crisis
  • Includes patients with primary adrenal failure, congenital adrenal hyperplasia, hypopituitarism, and adrenalectomy
Clinical use of stress dose steroids

- No universal agreement on use and dosing of stress dose steroids in patients on chronic steroids
- *Given theoretical risk of adrenal insufficiency and absence of data on adverse effects of steroids, seems reasonable to administer to high risk patients*

- Patients should be continued on chronic steroid dose perioperatively
## Steroid equivalents

<table>
<thead>
<tr>
<th>Name</th>
<th>Equivalent dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocortisone</td>
<td>20</td>
</tr>
<tr>
<td>Prednisone</td>
<td>5</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>5</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>4</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>0.75</td>
</tr>
</tbody>
</table>
# Recommendations for stress dose steroids

* Suggested approach, based on “expert” opinion

All patients should continue their home steroid regimen

<table>
<thead>
<tr>
<th>Prednisone (mg/day)</th>
<th>Surgical Stress</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td>(ie. inguinal hernia)</td>
</tr>
<tr>
<td><strong>≤ 5</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>6-20</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>&gt; 20</strong></td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Taper over 1-2</td>
</tr>
</tbody>
</table>

* Suggested approach, based on “expert” opinion
Ms. L

• Continue prednisone 10mg daily through surgery
• Hydrocortisone 25mg IV x 1 pre- or intra-operatively
• Discuss with surgical team and anesthesia
Take Home Points

• Determine steroid use over last 12 months
• Patients should continue home steroids in the perioperative period
• Testing for adrenal insufficiency is not recommended
• Dosing based on chronic steroid dose, surgical risk, history of post-op stressors (n/v, pain)
• Discuss with surgeon and anesthesiologist
References

12. Lipworth BJ. Systemic adverse effects of inhaled corticosteroid therapy: A systematic review and meta-analysis. Arch Intern Med. 1999;159(9):941