

Q&A 323.3

What steroid supplementation is required for a patient with primary adrenal insufficiency undergoing a dental procedure?

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Summary

- ◆ Patients with primary adrenal insufficiency (Addison's disease) lack endogenous steroid hormones cortisol and aldosterone and require daily steroid therapy (usually hydrocortisone) to replace them.
- ◆ These patients are unable to physiologically adapt to stress and may need supplemental steroid therapy when having dental procedures, to prevent adrenal crisis.
- ◆ Patients having minor dental procedures (e.g. filling replacement) do not usually require steroid supplementation, but a 'top-up' dose prior to the procedure may be needed if they find dental procedures emotionally stressful.
- ◆ Patients having minor oral surgery that causes physical stress, such as tooth extraction, require steroid supplementation prior to the procedure, and possibly for up to 24 hours afterwards.
- ◆ Those requiring major dental surgery should be referred to secondary care.
- ◆ Patients with primary adrenal insufficiency are invariably well informed about their medical condition and additional steroid requirements. Discussion with the patient in advance of the dental procedure is vital to plan required steroid therapy in relation to the type and timing of the procedure.

This document is for guidance only. Patients with primary adrenal insufficiency should be assessed individually as steroid requirements will vary.

Background

Primary adrenal insufficiency (Addison's disease) is a rare disorder of the adrenal glands. It affects production of two steroid hormones, cortisol and aldosterone, by the outer layer (the cortex) of the adrenals. Cortisol regulates extracellular fluid, helping to control the amount of fluid in the body. Lack of cortisol causes symptoms such as muscle weakness, poor concentration and low blood sugar [1]. Aldosterone regulates salt and water balance, which maintains blood volume and blood pressure [1,2]. Production of cortisol and aldosterone normally increases when the body experiences stress, for example, during surgery, trauma or serious infection.

Patients with primary adrenal insufficiency must take life-long corticosteroid replacement therapy usually prescribed as a combination of hydrocortisone (a glucocorticoid) and fludrocortisone (a mineralocorticoid) [2]. A daily dose of 20 to 30mg of hydrocortisone is normally required and given in two or three doses. A larger dose is taken in the morning on waking and a smaller dose at lunchtime and or/in the early evening in order to mimic normal diurnal rhythm of cortisol secretion [2]. A 50 to 300microgram dose of fludrocortisone is given once daily. Prednisolone and dexamethasone, which are longer acting glucocorticoids, may sometimes be used as an alternative to hydrocortisone. A 5mg dose of prednisolone is roughly equivalent to hydrocortisone 20mg [2].

Patients with primary adrenal insufficiency may require their usual glucocorticoid dose to be increased or supplemented at times of stress as they are unable to adapt physiologically to stress by producing more endogenous corticosteroid. Without additional steroid cover the patient may suffer shock known as Addisonian, or adrenal, crisis. Symptoms of Addisonian crisis include extreme weakness, a drop in blood pressure and confusion. A crisis is usually preceded by symptoms of adrenal insufficiency, including headache, dizziness, nausea and vomiting [1].

This Medicines Q&A gives guidance on dental procedures for which steroid supplementation may be required in patients with primary adrenal insufficiency and gives advice on doses and timing of

supplementation. It does not address management of patients with secondary adrenal insufficiency caused by long-term use of high doses of steroids.

Answer

The risk of adrenal crisis associated with dental procedures, and hence the need for steroid supplementation, is dependent on the type of dental procedure [1]. Where supplementation is required this is given as additional or increased doses of hydrocortisone (or other glucocorticoid); supplemental fludrocortisone is not required. Suggestions for doses for steroid supplementation and timing of these doses given below are for guidance only. Patients with primary adrenal insufficiency are invariably very well informed about their medical condition and will probably be aware of their steroid requirements prior to a dental procedure. Discussion with the patient in advance of the procedure is vital to plan additional steroid needs and timing of the dental appointment.

Which dental procedures require additional steroid cover and what cover should be given?

Dental procedures can be split into three categories depending on the associated physical stress:

1. **Minor dental procedure e.g. scale and polish, replacement of a filling, root canal treatment.**

Most minor dental procedures undertaken by General Dental Practitioners (GDPs) and performed under local anaesthesia are at low risk of causing adrenal crisis and steroid supplementation is not usually required [1,3,4,5]. However, some patients may be more sensitive to anaesthetics and the demands of dental procedures than others and it is important to be prepared [1].

The patient should be advised to take their usual morning dose of steroid on the day of the procedure and continue taking their usual daily dose(s) after the procedure [1]. Some patients may need to take an additional dose of hydrocortisone (or equivalent glucocorticoid), if symptoms of adrenal insufficiency occur after the procedure. Patients may take a small top-up dose (e.g. 5mg hydrocortisone) just before the procedure if they find dental work emotionally stressful [1].

2. **Minor oral surgery e.g. tooth extraction.**

A double dose of hydrocortisone should be taken one hour prior to surgery, up to a maximum dose of hydrocortisone 20mg (or equivalent glucocorticoid). Advice from the Addison's Disease Self Help Group and local endocrinology experts is to continue taking a double dose for a full 24 hours after the procedure, before returning to the usual dose [4]. Some patients may feel this unnecessary based on previous experience.

On the day of the procedure:

- Take the usual morning dose.
- One hour before the procedure, take a double dose of the next dose due, to a maximum of 20mg hydrocortisone (or equivalent).
- Double all the other doses due that day to a maximum of 20mg hydrocortisone (or equivalent) per dose.

The day after the procedure:

- Double the morning dose, to a maximum of 20mg hydrocortisone (or equivalent). Continue to double dose until 24 hours after the procedure.

The following are examples of additional dosing requirements for patients undergoing minor oral surgery. These are for guidance only and requirements may differ between patients.

Example 1:

The patient normally takes 10mg hydrocortisone twice daily (at 7.30am and 5pm) and the dental appointment is at 10am:

- take 10mg at 7.30am,
- take 20mg at 9am (one hour before procedure),
- take 20mg at 5pm,
- take 20mg at 7.30am the morning after the procedure,
- resume normal dosing at 5pm (i.e. take 10mg as usual).

Example 2:

The patient takes 15mg hydrocortisone at 8am and 5mg at 6pm and the dental appointment is at 2.30pm:

- take 15mg at 8am,
- take 10mg at 1.30pm (one hour before procedure),
- take 10mg at 6pm,
- take 20mg at 8am the morning after the procedure,
- resume normal dosing at 6pm (i.e. take 5mg as usual).

Example 3:

The patient takes 20mg hydrocortisone at 7am, 5mg at 1pm and 5mg at 6pm and the dental appointment is at 12 noon:

- take 20mg at 7am,
- take 10mg at 11am (one hour before procedure),
- take 10mg at 1pm,
- take 10mg at 6pm,
- take 20mg at 7am the morning after the procedure,
- resume normal dosing at 1pm (i.e. take 5mg as usual).

3. Major dental surgical procedure e.g. multiple tooth extraction under general anaesthetic

Patients needing a major dental surgical procedure will be managed in secondary care. They will be given intramuscular or intravenous hydrocortisone pre-operatively. After surgery, the usual oral dose of steroid should be doubled for the next 24 hours.

What can dentists do to prevent Addisonian (adrenal) crisis?

- ♦ Discuss the procedure and steroid cover with the patient in advance. Most patients will be knowledgeable about their steroid requirements.
- ♦ Provide written advice on any supplementation and top-up doses of hydrocortisone required. Ensure the patient knows what to do if symptoms of adrenal insufficiency occur after the procedure.
- ♦ Plan the procedure for the morning when steroid levels will be higher [5].
- ♦ Ensure the patient has taken the correct dose of steroid prior to the procedure.
- ♦ Ensure an Addison's emergency hydrocortisone injection kit is available. Most patients will have their own emergency kit; determine whether they will bring this with them or whether the surgery will obtain a kit to be used if necessary.
- ♦ Keep the patient relaxed and ensure the procedure is made as pain free and stress free as possible.
- ♦ If in doubt, discuss treatment with the patient's endocrinology team (consultant endocrinologist or endocrinology specialist nurse) prior to the procedure.

What about patients who are seen as an emergency?

- Patients with Addison's disease presenting as an emergency with pain and dental swelling will require immediate treatment to establish drainage. Delaying treatment prolongs stress.
- Establish the patient's usual corticosteroid replacement dose regimen.
- Establish when the last dose was taken and what this dose was. The patient may have already increased their dose to cover the stress of the dental pain/swelling.
- If an extraction is required, additional supplementation will be needed (see above). The patient should take a double dose of the next dose of hydrocortisone due (to a maximum of 20mg), ideally one hour before the procedure as it takes approximately one hour for peak blood concentrations of hydrocortisone to be reached [6].
- If a simple incision or root canal treatment under local anaesthetic is planned, no additional doses may be required.

Limitations

- ♦ This Q&A does not address steroid replacement requirements in patients with secondary adrenal insufficiency caused by long-term use of high doses of steroids or other disease.
- ♦ This Q&A does not cover the steroid replacement requirements for individuals with primary adrenal insufficiency who have an elevated temperature and signs of systemic infection and are being treated with antibiotics.

References

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Bibliography:

This document is based on advice produced by the Addison's Disease Self Help Group. Patients and health professionals can obtain further information from the website via: www.addisons.org.uk.

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Search strategy

- ◆ Embase 1996 to date:
[ADDISON DISEASE] and [DENTAL SURGERY or MINOR SURGERY or ORAL SURGERY]
- ◆ Medline 1996 to date:
[ADDISON DISEASE] and [ORAL SURGICAL PROCEDURES OR TOOTH EXTRACTION OR DENTISTRY OR SURGERY, ORAL OR DENTISTRY, OPERATIVE OR SURGICAL PROCEDURES, MINOR]
- ◆ In-house dental specialist book/resources.
- ◆ Search of British Dental Journal website (accessed via www.nature.com/bdj/index.html). Used search terms "Addison's disease", "Steroid cover", "Addison's disease and steroid cover".
- ◆ Addison's disease self help group www.addisons.org.uk

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