

Corticosteroids in Dentistry

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ABSTRACT

Background: Corticosteroids (CS) are an important class of naturally occurring and synthetic steroid hormones that affect virtually every aspect of human physiology. In dentistry, they are used primarily to decrease post-operative edema, which may cause post-operative pain. Oral submucous fibrosis, Oral Lichen planus, Erythema Multiforme, SJS & TEN, Pemphigus, Mucous membrane pemphigus, bullous pemphigoid, SLE, RAS, Chronic Ulcerative stomatitis, medication induced ulcer, haemangioma, bells's palsy, Melkersson Rosenthal Syndrome, Ramsay Hunt Syndrome, Mucocele, Post Herpetic Neuralgia, TMD Disorders, Giant Cell Granuloma, Traumatic Neuroma, Vitiligo, Endodontics, Orthodontics, Oral surgery. Systemic corticosteroids should be prescribed cautiously in patients with diabetes, active peptic ulcer, uncontrolled diabetes, heart diseases, psychiatric disorders, osteoporosis, cataract, infections, glaucoma, tuberculosis, mycobacterial diseases, pregnancy, herpes simplex infection, varicella zoster infection, underactive thyroid, mental disorders and immune deficiency.

Keywords: Corticosteroid, Dentistry, Steroid.

INTRODUCTION

Corticosteroids (CS) are an important class of naturally occurring and synthetic steroid hormones that affect virtually every aspect of human physiology.¹ Two major types of adrenocortical hormones, the mineralocorticoids and the glucocorticoids, are secreted by the adrenal cortex.² Corticosteroids affect all of the major systems of the body, including the cardiovascular, musculoskeletal, nervous, and immune systems and play critical roles in foetal development, including the maturation of the foetal lung.³

The most common indications of corticosteroids are perioperative replacement therapy, anti-inflammatory uses and hyper-reactive airway, post operative nausea and vomiting (PONV), analgesia adjunct, day care surgery, anaphylaxis, septic shock,

edema, spinal cord injury, bacterial meningitis, tuberculosis meningitis, pneumocystis jirovecii pneumonia, lupus nephritis, severe COPD exacerbation, severe asthma exacerbation, brain edema, anaphylaxis, thyroid storm, myxedema.⁴

In dentistry, they are used primarily to decrease post-operative edema, which may cause post-operative pain. Also they are used to manage oral inflammatory diseases like oral lichen planus, pemphigus, pemphigoid, erythema multiforme, recurrent aphthous stomatitis, and allergic reactions. Some studies have shown steroid use in trismus, mucocele, post-operative neuralgia, temporomandibular joint disorders and Bell's palsy.⁵

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Side effects are dependent on type and dosage of drug and length of treatment. It includes weight gain, impaired growth, adrenal insufficiency, increased susceptibility to infection, myopathy, osteoporosis, osteonecrosis, cataract, glaucoma, fractures, hypertension, insomnia, diabetes mellitus and peptic ulcer.

Topical treatment causes adverse effects, such as skin atrophy, hypopigmentation contact dermatitis, oral thrush, subcutaneous fat wasting, and cushingoid effect from systemic absorption. Inhaled corticosteroid-induced side effects are oropharyngeal candidiasis, dysphonia, reflex cough, bronchospasm, pharyngitis.⁶

INDICATIONS:

I. Oral Potentially Malignant Disorders:

1. Oral Submucous fibrosis -

Steroids reduces inflammation, prevents fibrosis by decreasing the proliferation of fibroblasts and laying down collagen and help in OSMF treatment to open the mouth.⁷

Local injections consisting of a combination of Dexamethasone, Hyaluronidase and Chymotrypsin biweekly for 2-3 weeks is used depending on the severity of the condition. Significant relief of burning sensation and improvement of trismus is seen in most patients.⁸

Ameer NT et al. (2019) conducted study on intralesional triamcinolone in OSMF by giving biweekly sub mucosal injections of 40 mg triamcinolone for 12 weeks and followed up for 1 year. Hyaluronidase by breaking down hyaluronic acid (the ground substance in connective tissue) lowers the viscosity of intercellular cement substance.⁹

2. Oral Lichen Planus -

Systemic corticosteroids are used in refractory cases of erosive lichen planus [Prednisolone with its lowest effective dose - 40 to 80mg/ 6-7 days]], withdrawal must be tapered by diminishing 5 mg per week to avoid triggering any adrenal crisis. Intra- and sublesional injections of steroids have been described to provide faster relief than topical application.⁷

A gingival tray can also be used to deliver 0.05% clobetasol propionate with 100,000 IU/ml of nystatin in orabase. Around 3-5 min application of this mixture daily appears to be effective in controlling erosive lichen planus.¹⁰

Lee et al. conducted a randomized controlled trial comparing triamcinolone acetate (TA) intralesional injections and TA mouthrinse in patients with OLP. Intralesional injection of TA was found better.¹¹

Topical steroids appear to be the most economical and efficacious option followed by topical calcineurin inhibitors.¹²

II. Vesiculobullous, Ulcerative and Erosive Lesions -

1. Erythema Multiforme -

A course of 40 mg Prednisolone daily for 1-4 weeks is given and reduced over the next few weeks. To reduce the side effects of prednisolone, Azathioprine is added in 25mg daily and then tapered to 5mg.⁸

Suwaras et al. (2022) reported a case of REM in a 49-year-old male. This case report demonstrated the efficacy of combined treatment of dexamethasone and azathioprine for REM cases unresponsive to systemic corticosteroid.¹³ Authors recommend systemic glucocorticoid therapy may be used, most commonly, prednisone 40-60 mg/d, tapered over 2-4 weeks.¹⁴

2. Steven-Johnson Syndrome (SJS) And Toxic Epidermal Necrolysis (TEN)

Ao et al. (2022) found that combination therapy with etanercept and corticosteroids significantly shortened the duration of acute phase, hospital stay, and skin re-epithelialization in comparison to a corticosteroid monotherapy group.¹⁵

Tran et al. (2022) prescribed, Systemic corticosteroid (methylprednisolone) was intravenously from the 1st day of hospitalization with the dose of 0.5-2.5 mg/kg/day, once daily. It was continued until the patients got re-epithelialization. No other immunosuppressant was administered.¹⁶

3. Pemphigus -

Fantozzi et al. (2019) conducted study on Intralesional steroid therapy (IST) where they prescribed at least 1 intralesional injection of triamcinolone acetonide (TA) 40 mg/mL using a disposable 1-cc syringe at the periphery of the ulcer and returned for at least 1 follow-up visit.¹⁷

Some authors recommend Pulse therapy where methylprednisolone 1g/day IV and dexamethasone 300mg/day IV are used, both for 3 consecutive days. Topical treatment includes potent corticoid gels (clobetasol dipropionate) can be applied to the oral mucosa. Triamcinolone acetonide (10 mg/ml) can be administered as an intralesional injection.¹⁸

Pasricha et al. recommended Dexamethasone cyclophosphamide pulse (DCP) therapy -

The DCP therapy is divided in four phases.

Phase I therapy includes administration of 100 mg of dexamethasone dissolved in 500 ml of 5% glucose as a slow intravenous drip over 2 hours repeated on 3 consecutive days. On the 2nd day, the patient is also given 500 mg of Inj. Cyclophosphamide in 500 ml of 5% Dextrose. This constitutes 1 DCP. Such DCPs are repeated at exactly 28-day intervals counted from the 1st day of the pulse. In between the DCPs the patient receives only 50 mg of Cyclophosphamide orally/day. The DCP regimen is administered in four phases. During the phase I period in addition with DCP therapy 40-60 mg of prednisolone/day orally is given to achieve remission which is defined as complete healing of the existing lesions and absence of new lesions.

Phase II therapy, the patient remains completely alright clinically but receives 9 more DCPs at exactly 28-day cycles along with 50 mg Cyclophosphamide orally.

Phase III therapy is composed of complete withdrawal of DCP. During this phase patient receives only 50 mg Cyclophosphamide orally/day for the next 9 months.

Phase IV therapy includes stoppage of all treatment of pemphigus and the patient is followed up for the next 10 years to look for a relapse, if any.

The various Pulse Therapies includes:

1. Dexamethasone Azathioprine Pulse (DAP): Here, cyclophosphamide is replaced with 50 mg of Azathioprine daily during the 1st 3 phases. No bolus dose of Azathioprine is given during the pulse.

2. Dexamethasone Methotrexate Pulse (DMP): Here Cyclophosphamide is replaced by 7.5 mg of Methotrexate (3 doses of Methotrexate 2.5 mg at 12 hourly intervals) weekly given orally during the 1st 3 phases of pulse therapy.

3. According to rheumatoid arthritis Rituximab is also given for pemphigus as two doses of 1 g, 2 weeks apart.¹⁹

4. Mucous Membrane Pemphigoid -

In multiple oral lesions, prednisone of 1-2 mg/kg/day is administered, with steady decreased dose, and immune-suppressors like cyclophosphamide (0.5-2 mg/kg/day), azathioprine 1-2 mg/kg/day, or mycophenolate mofetil 2-2.5 g/day have presented positive results.⁷

If dose above 100 mg/day is required, pulsed intravenous corticosteroids are recommended.⁸

Fantozzi et al (2019) conducted study on Intralesional steroid therapy (IST) where they prescribed at least 1 intralesional injection of triamcinolone acetonide (TA) 40 mg/mL using a disposable 1-cc syringe at the periphery of the ulcer and returned for at least 1 follow-up visit.¹⁷

5. Bullous Pemphigoid -

Persson et al. (2021) conducted a study where they concluded that initial maximum doses (≥ 60 mg/day in some) and lower maintenance doses (median daily doses < 10 mg/day) potentially reflect tapering regimens.²⁰

6. Systemic lupus erythematosus (SLE) -

The combination of methylprednisolone (MP) pulses followed by doses of prednisone up to 30mg/day, depending on severity, is more effective, more rapid, and safer than the use of the "classical" 1 mg/kg/day. Immunosuppressive agents should be introduced early in the treatment of moderate-severe SLE to spare glucocorticoids. Prednisone maintenance doses 5mg/day should be ideally achieved in no more than 12 weeks. Hydroxychloroquine is mandatory in SLE treatment,

except in the exceptional cases with contraindications.¹⁹

7. Recurrent Aphthous Stomatitis (RAS) –

Lucinda et al. (2022) reported a case where they treated major complex recurrent aphthous stomatitis and repeated courses of oral prednisolone (0.5–1 mg/kg/day), together with potent topical steroids and 0.1% tacrolimus. Intralesional triamcinolone (Kenalog®) injections were painful and did not aid in controlling the disease. Triamcinolone acetonide was embedded into the distal 50% of 600 µm long hyaluronic acid microneedles organised onto patches of one cm diameter. The patch was self-applied by the patient over the lower lip ulcer region for two minutes daily over 30 days (total dosage of 6 mg).²¹

8. Chronic Ulcerative Stomatitis –

Al Na'mah et al. have concluded that the novel dexamucobase was found to be equally effective in treating oral aphthous ulceration, with some advantages, as the widely used preparation Kenalog in Orabase.²²

9. Pyostomatitis Vegetans –

Gholizadeh et al. (2021) reported a case where they prescribed intralesional injection of triamcinolone in 3 consecutive sessions at intervals of 2 weeks (in 4 areas of lesion/each of them, 0.1–0.2 ml) and first of all, on various areas of the lips. The treatment was associated with a significant improvement after the second session. In addition, mucous-adhesive triamcinolone paste was applied 3 times a day for the attached gingiva lesions. Within 3 days of beginning the treatment, all oral lesions improved.²³

10. Medication Induced Ulcers –

Srivastava et al. (2015) conducted a study where they prescribed prednisolone 10 mg PO thrice daily for 3 days, followed by one tablet twice daily for 3 days, followed by one tablet once daily for 3 days, along with levocetirizine 5 mg once daily for 7 days. The management of FDE depends on the severity of the reaction. For mild to moderate, topical corticosteroids and systemic antihistamines are usually sufficient. In severe reactions, the management is similar to other cases of severe allergic reactions, including intensive supportive,

maintaining fluid and electrolyte balance, infection control, systemic corticosteroids and systemic antihistamines.²⁴

III. Vascular Disorders –

1. Haemangioma –

Bhatia et al. (2018) conducted a study where they prescribed Pulse steroid therapy.²⁵

IV. Neurological Disorders –

1. Bell's Palsy –

Alansari et al. (2020) conducted a study on pediatric patients diagnosed with Bell's palsy where they prescribed prednisolone syrup, dosage ranged from 0.5 mg/kg per day to 2 mg/kg/day for 3 to 14 days.

2. Melkersson Rosenthal Syndrome –

Mohammed et al. (2023) reported a case of Melkersson-Rosenthal Syndrome (MRS), Oral corticosteroid therapy was prescribed to him for a total 4 weeks with tapered doses. The author's concluded that oral corticosteroids are the mainstay in the treatment of MRS. Intralesional triamcinolone acetonide used in oro-facial edema.²⁶

3. Ramsay Hunt Syndrome (RHS) –

Jong et al. (2018) reported a case of RHS where they prescribed intravenous acyclovir 1500mg (25mg/kg/day) and intravenous dexamethasone disodium phosphate 5mg daily for nine days. After nine days, oral prednisolone 15mg (0.25mg/kg/day) for 5 days.²⁷

V. Salivary Gland Disease –

1. Mucocele –

Keisuke et al. (2021) conducted a study where they prescribed 0.1% dexamethasone ointment to be applied on the affected area at least three times a day.²⁸ Wilcox JX and Hickory JE conducted a study where they treated mucocele of lip with steroids.²⁹

VI. OROFACIAL PAIN –

1. Post Herpetic Neuralgia (PHN) –

Zheng et al. (2019) prescribed standard antiviral treatment (famciclovir 250 mg 3 times daily for 7

days) plus ultrasound-guided CRB (cervical nerve root block) with mixed drug liquid (lidocaine 4 mg/mL + triamcinolone 1 mg/mL + cobamamide 0.5 mg/mL + normal saline).³⁰

VII. TMD Disorders –

Kroese et al. (2021) conducted a study to evaluate the effect of corticosteroid injections in the painful temporomandibular joint (TMJ) of patients with rheumatoid arthritis (RA) in relation to systemic inflammatory activity. An injection with glucocorticoid methylprednisolone (40 mg/mL) with lidocaine (10 mg/mL) added. It thus seems useful for the short-term management of TMJ involvement in RA.³¹

VIII. Benign Tumours –

1. Giant Cell Granuloma –

Mukdad et al. (2022) reported a case where they followed the protocol by Jacoway et al. injected solution was prepared by mixing triamcinolone acetate (Kenacort®-T 40 mg/mL; Bristol-Myers Squibb) with levobupivacaine hydrochloride (7.5 mg/mL; AbbVie) in a 1:4 ratio. Direct management with intralesional steroid injection can be considered as a first treatment option to reduce morbidity, particularly in cases with a non-aggressive subtype of giant cell lesion of the jaw.³²

2. Traumatic Neuroma –

Hau et al. (2020) conducted a study where they prescribed corticosteroid injections & found that corticosteroid injection is well accepted as a first-line treatment for Morton's neuroma.³³

IX. Pigmented lesions (Hyper and hypopigmented) –

1. Vitiligo –

Ghazaly et al. (2021) conducted a study of treatments for vitiligo, including topical corticosteroids (TCS) as monotherapy (as for vitiligo local therapy) or in conjunction with phototherapy or other topical medications in generalized vitiligo. Dexamethasone oral mini pulse (OMP) treatment can reduce disease progression and promote repigmentation and in some cases total repigmentation.³⁴

X. Miscellaneous –

1. Endodontics –

2. Orthodontics –

3. Oral surgery –

Contraindications: Systemic corticosteroids should be prescribed cautiously in patients with diabetes, active peptic ulcer, uncontrolled diabetes, heart diseases, psychiatric disorders, osteoporosis, cataract, infections, glaucoma, tuberculosis, mycobacterial diseases, pregnancy, herpes simplex infection, varicella zoster infection, underactive thyroid, mental disorders and immune deficiency.⁷

Steroids may exacerbate the response in the following conditions. Therefore, these are contraindicated. In patients with:

- Primary bacterial infection
- Hypersensitivity
- Peptic ulcer
- Diabetes mellitus
- Hypertension
- Pregnancy
- Osteoporosis
- Herpes simplex infections
- Psychosis
- Epilepsy
- Congestive heart failure
- Renal failure.¹⁰

Treatment Consideration: To prevent the long term side effects of corticosteroids, authors recommend tapering dose, pulse therapy.

1. TAPERING DOSE: Since full HPA axis recovery may take as long as one year or even longer, abrupt cessation of glucocorticoid treatment or quick tapering can precipitate an acute AI crisis. Reduce oral prednisone dose by 10 mg every 3 to 7 days until the dose is 10 mg/day, then reduce dose by 5 mg every 3 to 7 days. Consider more prolonged

tapering for patients who received several weeks of corticosteroids; longer tapering may be required for complete resolution or to avoid adverse reaction rebound.³⁵

2. PULSE THERAPY: Oral pulse dose corticosteroid therapy which is defined as corticosteroid therapy given for 2 days a week to reduce the systemic corticosteroid side effects, whereas oral pulse dose therapy with a low dose is the smallest corticosteroid dose that can be given in pulse therapy. Pulse dose corticosteroid administration - The purpose of this therapy is to provide a high dose of oral corticosteroid with minimal side effects.

Pulse dose therapy with a low dose - high dose corticosteroid therapy with intermittent administration and a long-term maintenance therapy for 6 months by giving corticosteroid 2 consecutive days for a week followed by five days free of therapy.³⁶

Intravenous pulse dose therapy - Intravenous pulse dose therapy is generally given using methylprednisolone 8 mg/kg body weight intravenously for three consecutive days in one month.

Pulse therapy were methylprednisolone 1g/day IV and dexamethasone 300mg/day IV are used, both for 3 consecutive days. The advantage of pulse therapy is that it allows for a faster reduction in the prednisone dose, minimizing its side effects. It is recommended that the daily dosage of prednisone does not exceed 1.5mg/kg/ day—above this value.¹⁸

3. RULE OF 2-

The Rule of Twos states that adrenal suppression may occur if a patient is taking 20 mg of cortisone or its equivalent daily, for 2 weeks within 2 years of dental treatment. In the past, the "Rule of Twos" was used as a management tool for dental health care providers as the steroid cover protocol for patients who were receiving replacement glucocorticosteroids.

Adrenocortical suppression should be suspected if a patient has received Glucocorticoid therapy through two of the following methods:

In a dose of 20mg or more of cortisone or its equivalent

Via oral or parenteral route or a continuous period of 2 weeks or longer

Within 6 months-2 years of therapy.³⁷

SUMMARY & CONCLUSION

The extensive application of corticosteroids renders it as the "life-protecting hormone" and aldosterone is referred to as the "life-saving hormone." It can thus be concluded that corticosteroids play a significant role in the of lesions affecting the oral mucosa and skin. In addition, its importance in medical emergencies cannot be neglected.⁷

Steroids provide the quintessential "Magic Bullet," a one stop panacea for almost all diseases. With judicious use, steroids will continue to help in relieving human suffering safely.³⁸

Thus we as oral diagnosticians should weigh the advantages and disadvantages prior to prescription of corticosteroids.¹⁰

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