



# African Journal of Biological Sciences



## CORTICOSTEROIDS IN ORAL AND MAXILLOFACIAL SURGERY – TWO SIDES OF A COIN

### AUTHORS:

Dr.NANDHINI SIVAMANI(2nd year postgraduate), Dr.SARAVANA KUMAR MDS,Phd.,(Professor)

Department of Oral and Maxillofacial,Balaji Dental College and Hospital,Chennai,Tamil Nadu.

Mail ID: nansiv7@gmail.com

### ABSTRACT

Hormones, which are secreted by endocrine glands, regulate body functions and maintain homeostasis. Corticosteroidal hormones like glucocorticoids and mineralocorticoids are secreted by the adrenal gland. The zona fasciculata of the cortex in the adrenal gland naturally produces the steroidal hormone cortisol. Reducing inflammation is one of its primary effects, especially in situations where an inflammatory response is not required. Steroids are frequently prescribed for oral surgery due to their higher efficacy and ability to provide greater comfort for the patient during the recovery phase. While corticosteroids can be beneficial during surgery, they can also have negative side effects. Numerous scholarly articles illustrate that the safest use of steroids is when they are used with caution and have more significance.

**Key words-** corticosteroids, oral surgery, anti-inflammatory, dosage, post-operative period.

### INTRODUCTION :

Glucocorticoids are medications made from cholesterol. They are also referred to as corticosteroids or steroids. The adrenal cortex produces them in addition to other hormones like cortisol and aldosterone. Glucocorticoids are very effective against immune and inflammatory processes, which makes them a recommended medication for patients having surgery on the oral cavity, facial skeleton, and related cervical structures.

[1] Small amounts of the steroid hormone cortisol are secreted by the body naturally. [2]

Article History

Volume 6, Issue 5, 2024

Received: 25 May 2024

Accepted: 02 Jun 2024

doi: 10.33472/AFJBS.6.5.2024.6358-6363

Due to their great effectiveness in treating inflammatory and immunological disorders, pain, edema, and lockjaw, steroids are the most widely used drug. A [3]. These three hormones' actions—cortisol, hydrocortisone, and glucocorticoids—describe how the body's metabolism is regulated and how they are released by circadian rhythm. The glucocorticoid receptor (GR or type II in the previous nomenclature) and the mineralocorticoid receptor (MR or type I) are the two types of nuclear receptors that these steroid hormones bind to in order to carry out their mineralocorticoid or glucocorticoid function[1,3]. Hooley and Hohl (1974) were the first to investigate the use of cortisol for reducing postoperative edema. They found that topical steroids used after lip and oral commissure surgery greatly decreased ulcers and excoriation, which in turn decreased postoperative tissue retraction[4]. While there are many advantages to using steroids, there are also drawbacks to starting a steroid regimen. As a result, before starting a steroid regimen, patients must be thoroughly evaluated.

### **PHYSIOLOGY OF CORTICOSTEROIDS:**

The adrenal gland serves as the hub for the vascular system's and the body's stress response to tissue damage [6]. The adrenal cortex secretes three different types of hormones: mineralocorticoids, androgens, and glucocorticoids. In addition to secreting trace amounts of adrenal androgens and estrogens, the zona fasciculata within it secretes the glucocorticoids cortisol and corticosterone[1, 5]. In healthy adults, the adrenal gland secretes 24–30 mg of cortisol daily[7]. On the other hand, this secretion level can spike to 300 mg/day during stressful times. The daily secretion level of cortisol is largely regulated by the hypothalamus, pituitary gland, and adrenal glands; other key players include variations in the body's natural rhythms and how people react to stress.[2]

### **ACTION OF CORTICOSTEROIDS :**

The most commonly prescribed steroids are those that can be taken orally, intramuscularly, intravenously, or intramuscularly, such as dexamethasone, methylprednisolone, dexamethasone acetate, dexamethasone sodium phosphate, methylprednisolone acetate, and methylprednisolone sodium succinate[4]. Classical signs of inflammation, such as tumor, functio laesa, calore, dolore, and rubor, can be seen both during and after any surgical procedure[8].

By blocking the enzyme phospholipase A2, which changes phospholipids into arachidonic acid, cortisol plays a crucial part in lowering the indications and symptoms of inflammation. Consequently, other products like prostaglandins, leukotrienes, and thromboxane A2 are prevented from forming. Cortisol is therefore essential for preventing the production of inflammatory mediators, which are primarily in charge of the negative consequences connected to the body's inflammatory

response[7].Additionally, cortisol stabilizes lysosomal membranes, which minimizes the release of lysozymes, which spread inflammation at the site of injury. Moreover, cortisol decreases diapedesis and inflammatory fluid extravasation by decreasing capillary permeability.[2]

### **ROLE OF CORTICOSTEROIDS IN OMFS:**

The most frequent oral surgical procedure is thought to be the extraction of mandibular third molars [9]. Following extraction, patients may have a variety of unfavorable signs and symptoms, such as pain, facial edema, and trismus from inflamed masticatory muscles[10]. Corticosteroids can have a significant anti-inflammatory effect in these patients by lowering cell exudates, preventing vascular dilatation, decreasing fluid transudation and edema formation, and lowering fibrin deposition surrounding the inflammatory area. These effects are caused by mechanisms that include suppression of the production of multiple chemical mediators of inflammation, inhibition of fibroblast and endothelial cell function, and restriction of leukocyte chemotaxis to the inflammatory focus. Patients who received methylprednisolone 48 hours post-surgery showed a 42% reduction in the degree of facial swelling[11,12,13].It has been demonstrated that oral dexamethasone administration of 8 mg either before or after surgery reduces postoperative complications [14]. Diclofenac plus prednisolone have been shown to be a highly effective combination in reducing postoperative pain and swelling because of their analgesic and anti-inflammatory properties.[15]

### **ADVERSE EFFECTS OF CORTISOL – TWO SIDES OF A COIN:**

Patients with primary bacterial infections, hypersensitivity reactions, gastric ulcers, elevated blood pressure and glucose, osteoporosis, herpes simplex infection, epilepsy, mental illnesses (including psychosis), congestive heart failure, or renal failure should not use cortisol.[2, 16] Topical cortisol use during pregnancy is not advised since it can result in orofacial clefts, low birth weight, and congenital anomalies.

Cortisol side effects include excessive weight gain, retardation of growth, adrenal insufficiency, infections, osteoporosis, osteonecrosis, gastric ulcers, changes in glucose metabolism and sugar regulation, myopathy, glaucoma, development of cataracts and sleep deprivation.[17]Additionally, some patients may experience steroid withdrawal syndrome, which is defined as an objective syndrome with symptoms that mimic actual adrenal insufficiency.Weight loss, malaise,weakness,fever,fatigue,loss of appetite are commonly encountered symptoms.These symptoms can occur in patients undergoing steroid withdrawal, with varying degrees of severity, due to biochemical evidence of suppressed hypothalamus-pituitary-adrenal (HPA) system integrity[2,18].

## CONCLUSION

The majority of the studies that were evaluated for cases involving oral and maxillofacial surgeries used dexamethasone (4-6 mg) as the primary medication of choice. This suggests that the intramuscular route is more successful in reducing undesirable clinical manifestations, such as pain, inflammation, lockjaw, and facial edema, that arise from the intervention.

High intravenous dosages of corticosteroids (hydrocortisone, 200–1050 mg), dexamethasone, (8–10 mg), and methylprednisolone, (1–3 mg/kg), given in a brief period of time concurrently with antibiotic therapy may be advantageous for patients with cervicofacial infections. [1] Aldosterone has been appropriately labelled as a life-saving medication, whereas cortisol has been described as a life-protecting medication. It should be mentioned that side effects from cortisol and related medications can be extremely harmful to the patient and occasionally fatal. When using cortisol for clinical purposes, it is crucial to evaluate and examine the risks and benefits of each individual.[2]

## REFERENCES:

1. Nils HJ, Arce Recatala C, Castano A, Ribas D, Flores-Fraile J. Efficacy/Safety of the Use of Glucocorticoids in Oral and Maxillofacial Surgery. *Dentistry Journal*. 2023; 11(10):239.
2. Bin Rubaia'an MA, Alotaibi MK, Alotaibi NM, Alqhtani NR. Cortisol in Oral and Maxillofacial Surgery: A Double-Edged Sword. *Int J Dent*. 2021 Sep 2;2021:7642875. doi: 10.1155/2021/7642875. PMID: 34545286; PMCID: PMC8448991.
3. Barnes PJ. Glucocorticosteroids: current and future directions. *Br J Pharmacol*. 2011 May;163(1):29-43. doi: 10.1111/j.1476-5381.2010.01199.x. PMID: 21198556; PMCID: PMC3085866.
4. Hooley J. R., Hohl T. H. Use of steroids in the prevention of some complications after traumatic oral surgery. *Journal of Oral Surgery*. 1974;32:864–866
5. Moss G. P. Nomenclature of tetrapyrroles. Recommendations 1986. *European Journal of Biochemistry*. 1988;178(2):277–328. doi: 10.1111/j.1432-1033.1988.tb14453.x.
6. Malamed S. *Medical Emergencies in the Dental Office*. 6th. St. Louis, MO, USA: Mosby; 1993. Acute adrenal insufficiency; pp. 155–165

7. Glick M. Glucocorticosteroid replacement therapy: a literature review and suggested replacement therapy. *Oral Surgery, Oral Medicine, Oral Pathology*. 1989;67(5):614–620. doi: 10.1016/0030-4220(89)90285-5.
8. Freire M. O., Van Dyke T. E. Natural resolution of inflammation. *Periodontology 2000*. 2013;63(1):149–164. doi: 10.1111/prd.12034
9. Al-Shamiri H. M., Shawky M., Hassanein N. Comparative assessment of preoperative versus postoperative dexamethasone on postoperative complications following lower third molar surgical extraction. *International journal of dentistry*. 2017;2017 doi: 10.1155/2017/1350375.1350375
10. Sbricoli L., Cerrato A., Frigo A. C., Zanette G., Bacci C. Third molar extraction: Irrigation and cooling with water or sterile physiological solution: a double-blind randomized study. *Dentistry Journal*. 2021;9(4):p. 40. doi: 10.3390/dj9040040
11. Tiwana P. S., Foy S. P., Shugars D. A., et al. The impact of intravenous corticosteroids with third molar surgery in patients at high risk for delayed health-related quality of life and clinical recovery. *Journal of Oral and Maxillofacial Surgery*. 2005;63(1):55–62. doi: 10.1016/j.joms.2004.01.029.
12. Schultze-Mosgau S., Schmelzeisen R., Frölich J. C., Schmele H. Use of ibuprofen and methylprednisolone for the prevention of pain and swelling after removal of impacted third molars. *Journal of Oral and Maxillofacial Surgery*. 1995;53(1):2–7. doi: 10.1016/0278-2391(95)90486-7
- 13/. Buyukkurt M. C., Gungormus M., Kaya O. The effect of a single dose prednisolone with and without diclofenac on pain, trismus, and swelling after removal of mandibular third molars. *Journal of Oral and Maxillofacial Surgery*. 2006;64(12):1761–1766. doi: 10.1016/j.joms.2005.11.107
14. Al-Shamiri H. M., Shawky M., Hassanein N. Comparative assessment of preoperative versus postoperative dexamethasone on postoperative complications following lower third molar surgical extraction. *International journal of dentistry*. 2017;2017 doi: 10.1155/2017/1350375.1350375
15. Buyukkurt M. C., Gungormus M., Kaya O. The effect of a single dose prednisolone with and without diclofenac on pain, trismus, and swelling after removal of mandibular third molars. *Journal of Oral and Maxillofacial Surgery*. 2006;64(12):1761–1766. doi: 10.1016/j.joms.2005.11.107.

16. Zandi M. *Glucocorticoids-New Recognition of Our Familiar Friend*. London, UK: IntechOpen; 2012. The role of corticosteroids in today's oral and maxillofacial surgery
17. Thongprasom K., Dhanuthai K. Steroids in the treatment of lichen planus: a review. *Journal of Oral Science*. 2008;50(4):377–385. doi: 10.2334/josnusd.50.377
18. Saracco P., Bertorello N., Farinasso L., et al. Steroid withdrawal syndrome during steroid tapering in childhood acute lymphoblastic leukemia. *Journal of pediatric hematology/oncology*. 2005;27(3):141–144. doi: 10.1097/01.mph.0000155870.38794.e7.