

Effect of Pre-Operative Use of Dexamethasone in Management of Inflammatory Complications in Surgical Removal of Third Molar – A Review Article

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Abstract

In the interest of reducing inflammatory sequelae following the removal of the mandibular third molar, a wide variety of corticosteroids are available. It is generally established that corticosteroids exert anti-inflammatory effects by restricting phospholipase-A2 activity and the generation of arachidonic acid, which suppresses vasoactive compounds such as leukotrienes and prostaglandins. Corticosteroids have a profound effect by dissuading vascular dilatation, limiting liquid transudation and edema development, decreasing cell exudates, and preventing fibrin accumulation around the inflamed tissue. Dexamethasone dosing accelerates surgical recovery for patients and dramatically improves inflammation and trismus. The corticosteroid appears to have greater effects when administered before surgery.

Keywords: Corticosteroids, Dexamethasone, Inflammation, Third molar surgery, Trismus

INTRODUCTION

Lower third molar surgical extractions are among the most frequent oral surgical procedures. A surgical trauma towards the tissue triggers vasodilation, leukocyte migration, and plasma transudation across endothelial gap junctions, which elicit inflammatory symptoms like pain, edema, and trismus, all of which have a negative effect on life quality. When the procedure is lengthy and substantial amounts of bone, gingiva, and oral mucosa are worked on, swelling may be noticeable.

Histamine, bradykinin, and prostaglandins, which are a class of physiologically active fatty acids, are among the biochemical intermediaries that are produced and released during third molar extraction along with the resulting tissue and cellular damage. The degree of post-operative oedema differs based on both local factors like the location of the impacted teeth, the way the bone was removed, haemostasis, excessive suturing of the wound, or aggressive tissue manipulation, as well as systemic factors like age, bleeding propensity, nutrition or drug usage [1].

Over the years, strategies for minimising discomfort or postoperative complications following third molar surgical extractions have developed. Since the 1950s, thousands of studies have examined the role of CSs in minimizing postoperative morbidity. There is proof from systematic reviews and meta-analyses that administering oral corticosteroids prior to surgery enhances the prognosis of lower third molar surgery.

Glucocorticosteroids are known to suppress inflammation and are used in oral procedures to alleviate symptoms of pain, and prevent trismus, and oedema. Dexamethasone, betamethasone, and methylprednisolone are the corticosteroids most frequently used since they possess the longest duration of action. In dentistry, third molar operations are frequently associated with dexamethasone.

Dexamethasone mechanism

Chemicals released from traumatized tissues and migratory cells lead to inflammation. The compounds that are strongly linked to this are prostaglandins (PGs),

leukotrienes (LTs), histamine, bradykinin, and, more recently, platelet-activating factor (PAF) and interleukin-1. Injuries lead to cell membrane malfunction that enables the enzyme phospholipase A (PLA2) to convert phospholipids to arachidonic acid, which then triggers the production of prostaglandins, thromboxane via cyclooxygenase (COX), and leukotrienes by lipoxygenase pathways; all of which initiate inflammatory reactions in the early stages. Following peripheral sensitization, these reactions cause central sensitization. The idea of pre-emptive analgesia is to minimize postoperative pain by obstructing central sensitization before surgery [2,3]. Preoperative analgesia prevents postoperative hyperesthesia by suppressing central sensitization before surgery.

Dexamethasone, a synthetic glucocorticosteroid, is one of the most efficient steroidal anti-inflammatory medications. It suppresses the earliest stages of inflammation by hindering the release of prostaglandin (PGE2) generated by bradykinin. NSAIDs only inhibit the lipoxygenase pathway, whereas corticosteroids function by inhibiting both the cyclooxygenase and lipoxygenase pathways. Pre-operative Dexamethasone is therefore excellent at mitigating the effects of chemical mediators and can reduce oedema, pain and trismus associated with 3rd molar extractions.

Dexamethasone in third molar surgeries

A crucial component of clinical practice is the elimination and control of postoperative comorbidities post third molar surgery. Unless Dexamethasone is contraindicated, all modalities of delivery of corticosteroids have remarkably reduced pain and oedema. Due to its greater efficacy, diminished ability to retain sodium, and longer half-life, dexamethasone becomes the preferred medication.

Dexamethasone has a biological half-life of 36 to 72h, a plasma half-life of 100 to 300 min, and a relative anti-inflammatory potency of 25. According to Spoorenberg, [4] peak serum levels of dexamethasone are typically observed two hours after administration. Dexamethasone

appears to be beneficial in suppressing postoperative oedema when administered preoperatively via local, oral, intramuscular, intravenous, or submucosal routes [5,6,7]. The impact of 8mg oral Dexamethasone administration before versus after third molar surgery on postoperative issues was examined by Hashem M. Al-Shamiri and Maha Shawky. The results conclusively proved that preoperative oral dexamethasone treatment was superior to postoperative administration of the same dose in terms of oedema following lower third molar surgery [8]. Research by Laureano Filho et al. discovered that Dexamethasone has been shown to have a significant impact on oedema and trismus but just a minor effect on pain following third molar extractions [9]. Furthermore, Gozali et al VAS's findings demonstrated that the sublingual route of dexamethasone was the only one that reduced pain [10]. As per Bamgbose et al., NSAIDs and corticosteroids like dexamethasone should be used in conjunction to effectively manage postoperative pain [11].

DISCUSSION

Injuries to the surrounding tissues brought about by third molar extraction culminate in discomfort, acute inflammation in the masseter and submaxillary area, and trismus. Oftentimes, fever develops in the first few days following surgery. Inflammatory mediators that elicit vascular exudate and oedema are hindered by corticosteroids. They additionally exhibit certain analgesic effects as a result of their capacity for suppressing prostaglandins and have anti-inflammatory properties. One of the finest models for acute postoperative pain and inflammation is third molar surgery, and corticosteroids seem to have a higher impact on their elimination when given prior to surgery as opposed to later.

In 50 patients, Baxendale et al. established the applicability of oral therapy of 8 mg dexamethasone prior to surgery. This considerably decreased pain and inflammation but however had no impact on trismus [12]. The correlative impacts of various dexamethasone routes and dosages on limiting postoperative sequelae after surgical removal of impacted mandibular third molars were reviewed by O'Hare in a systematic review and meta-analysis of 17 eligible trials. The aggregate findings indicate that submucosal dexamethasone administered pre-operatively reduced discomfort, trismus, and facial oedema following mandibular third molar surgery [13]. By administering a pre-operative dexamethasone/post-operative ketorolac combination following surgery, Dionne et al. explored and proved the promising synergistic effect of steroids combined with NSAID in reducing post-operative pain in a model of acute inflammation [14]. Although the administration of corticosteroids may ramp up the possibility of post-surgical wound infection, such occurrences are uncommon after the delivery of a single dose of corticosteroids, as recommended in oral surgery.

CONCLUSION

This review comes to the conclusion that a patient having a third molar surgically removed benefits from receiving dexamethasone pre-operatively. There is enough data to support the effectiveness of corticosteroids in alleviating

oedema and trismus. There does seem to be agreement that pre-emptive corticosteroids are beneficial for limiting complications and uplifting postoperative quality of life subsequent to third molar surgery. To determine the best protocol for reducing pain, trismus, and inflammation after extraction of the third molar, additional comparative studies with various corticosteroids, dosages, and administration strategies are required.

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