Update on the Use of Dexamethasone Injection After Third Molar Odontectomy: A Systematic Review

Andriansyah[1,2], Abul Fauzi[3,4], Eka Prasetiawaty[3,4]

[1]Resident of Oral and Maxillofacial Surgery, University Hasanuddin, Makassar, Indonesia
[2]Staff of Departement of Oral and Maxillofacial Surgery, Universitas Baiturrahmah, Padang, Indonesia
[3]Staff of Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Universitas Hasanuddin, Makassar, Indonesia
[4]Hasanuddin University Dental Hospital, Makassar, Indonesia
Email: abulfauzi@unhas.ac.id

Abstracts

Postoperative complications of extracting impacted third molar teeth often include pain, trismus, and facial swelling. Recent studies have explored the application of dexamethasone to lessen this inflammation following surgery. We used a systematic review and meta-analysis in this investigation to assess the efficacy of dexamethasone. in reducing postoperative complications. Article searches were conducted using PRISMA guidelines in four electronic databases: Web of Science, PubMed, Embase, and Google Scholar. The keywords were selected according to the data search strategy. The PICO framework (Population, Intervention, Comparison, Outcome) was used to organize this systematic review and using SIGN (Scottish Intercollegiate Guidelines Network) bias assessment. The study used a visual analog scale to assess postoperative pain. The dose of dexamethasone used varied between 8 mg, 1 ml intravenously and 0.3 mg/kg. The results showed variations in the duration of analgesic use and the number of analgesic tablets required. Overall, the use of dexamethasone after third molar surgery was shown to reduce edema and trismus. However, the response to pain reduction was variable. This study concludes that intramuscular, pterygomandibular injection, sublingual, and submucosal administration of dexamethasone can produce better therapeutic effects than conventional postoperative care for extraction of impacted third molar teeth. In particular, During the healing phase swelling, trismus and edema are significantly reduced

Keywords: Postoperative, Dexamethasone Injection, Molar Odontectomy.

Introduction

Commonly reported complications after surgical removal of impacted third molar teeth are pain, trismus and facial swelling. Pain is a common post-surgical complication. It can occur due to

inflammation and trauma to the tissues surrounding the removed tooth. The use of analgesics and anti-inflammatories are often used to reduce postoperative pain. Trismus may be caused by inflammation and swelling of the tissues around the operated area. Facial swelling usually occurs due to the body's inflammatory response to surgical trauma. Surgical approaches such as precision and minimally invasive surgical techniques, the use of medications (such as analgesics and antiinflammatories), and laser therapy have been investigated as methods to reduce the risk and severity of postoperative complications. These aim to improve patient recovery and reduce the discomfort experienced after odontectomy surgery.1,2,3

Prescribed medications such as corticosteroids and nonsteroidal antiinflammatory drugs (NSAIDs) are an integral part of the surgeon's armamentarium to relieve pain, trismus and swelling after third molar surgery. The use of injectable dexamethasone to reduce postoperative inflammation in third molar surgery has been the subject of recent research. However, there is no consensus regarding its use in clinical practice. The intramuscular formulation is considered better than the tablet formulation, as it achieves concentration.4,5

Due to its shown effectiveness as an anti-inflammatory, dexamethasone is typically used following both minor and large surgical procedures Advances global oral and maxillofacial surgery during the previous three to four decades. Large single doses of glucocorticoids or brief treatment courses (one to seven days) are probably safe as long as there are no systemic or local contraindications.6,7,8,9, Regarding the dosage, timing, mode of administration, and length of time after third molar extraction, there are no precise guidelines available. In this review of meta-analyses, we evaluated the effects and doses utilized in prior trials, as well as the effects of dexamethasone injection prior to and following third molar extraction.

Methods

The article search method was based on several reports that were systematic reviews and meta-analyses based on guidelines (PRISMA).10Using 4 (four) electronic databases, namely Web of Science, PubMed, Embase and Google Scholer. The keywords used were in accordance with the data search strategy analysis (table 1). Additionally, manual searches were carried out based on references chosen from many publications or on subjects associated with the designated theme. Themes were organized in this Systematic Review using PICO (Population, Intervention, Comparison and Outcome).11,12

Table 1. Search Methodology

Population	#1	(Third molar*[all fields] OR wisdom teeth*[all fields] OR wisdom tooth*[all fields] OR third molars*[all fields] OR impacted third molar*OR impacted tooth*[all fields] OR impacted teeth*[all fields])
Intervention	#2	The following options are available for third molar surgery: OR exodontia*[all fields] OR dexamethasone[MeSH] OR submucosal dexamethasone*[all fields] OR submucosal injection*[all fields] OR dexamethasone postoperative*[all fields] OR dexamethasone preoperative*[all fields] OR exodontia*[all fields] OR extract*[all fields]
Comparisons	#3	(control OR placebo effect [MeSH])
Outcomes	#4	(Pain*[all fields] OR trismus*[all fields] OR edema*])
Research methodology		Control trials that are quasi-randomized and randomized
Combination of searches		Order of #1, #2, #3, and #4

Electronic databases	The Cochrane Register of Controlled Trials (CENTRAL), MEDLINE (PubMed), EMBASE, Web of Science and Google Scholar

The framework according to the Objective is customized according to the following objectives.

Eligibility Criteria

Patients having their third molar teeth extracted made up the population, and the intervention was an injection of dexamethasone. Inclusion criteria were clinical trial study data of patients with third molar tooth extraction and clinical trial study data of Dexamethasone injection. Data used were clinical trial study designs, human studies, articles published in the last 10 years (2014 to 2024) and other supporting references.

Risk Assessment Bias Study

To ascertain the degree of evidence-based medicine and the caliber of articles to be examined, a risk of bias and quality evaluation was carried out for each chosen article. Articles were categorized using the SIGN (Scottish Intercollegiate Guidelines Network) based on the strength of the evidence criteria. 11,12 Classification of recommendation grades in medical or health guidelines. Below is the interpretation of each recommendation grade.

Table 2. Scottish Intercollegiate Guidelines Network (SIGN) criteria

Recommendation Value	Interpretation
A	A substantial body of scientific evidence comprising studies rated as 1++ and with excellent consistency amongst them, or at least one meta-analysis, randomized study, or clinical study classed as 1+++ and directly applicable to the target population in the guidelines.
B	The evidence collection consists of extrapolated data from studies classified as 1++ or 1++, or studies rated as 2++, which are highly consistent and directly applicable to the guidelines' target group.
C	Evidence pools consist of extrapolated evidence from studies rated as 2++ or studies rated 2+ that are directly applicable to the guidelines' target population and exhibit high consistency among them.
D	Evidence at Levels 3 or 4, or extrapolated data from research with a 2+ grade

Table 3. Levels of Scientific Evidence for SIGN (Scottish Intercollegiate Guidelines Network)

Level of Evidence	Assesment
1++	Higher randomized trial, higher meta-analysis, or higher clinical study with extremely low bias risk
1+	Well-executed randomized trials, clinical studies with minimal bias risk, or meta-analyses
1-	Randomized trials, meta-analyses, or clinical research having a significant bias risk
2++	Higher case control, cohort, or randomized studies. Cohort or case-control studies with a very low risk of bias and a high chance of proving a causal association
2+	Properly executed cohort or case-control research with minimal potential for bias and the potential for a causal connection
2-	Studies that are cohort or case-control have a substantial potential for bias and a sizable chance that the relationship is not causal
3	Studies that aren't analytical, such case series and case reports
4	Professional judgment

Studies with a 1- or 2-score should not be included in the process of developing recommendations because of the significant bias risk associated with them

Results and Discussion

After 374 articles were located by the article identification search procedure and 3 articles were found through human searches, a total of 7 articles were screened by taking the inclusion and exclusion criteria for each article found. There were 7 articles that met the eligibility criteria. The articles used study designs including observational, case-control, cohort, and cross-sectional. Table 3 presents and arranges the data and details from every article. Name of the author, year, nation, study design, scopus index, population and sample, mean age, methods employed in the investigation, and findings are presented.

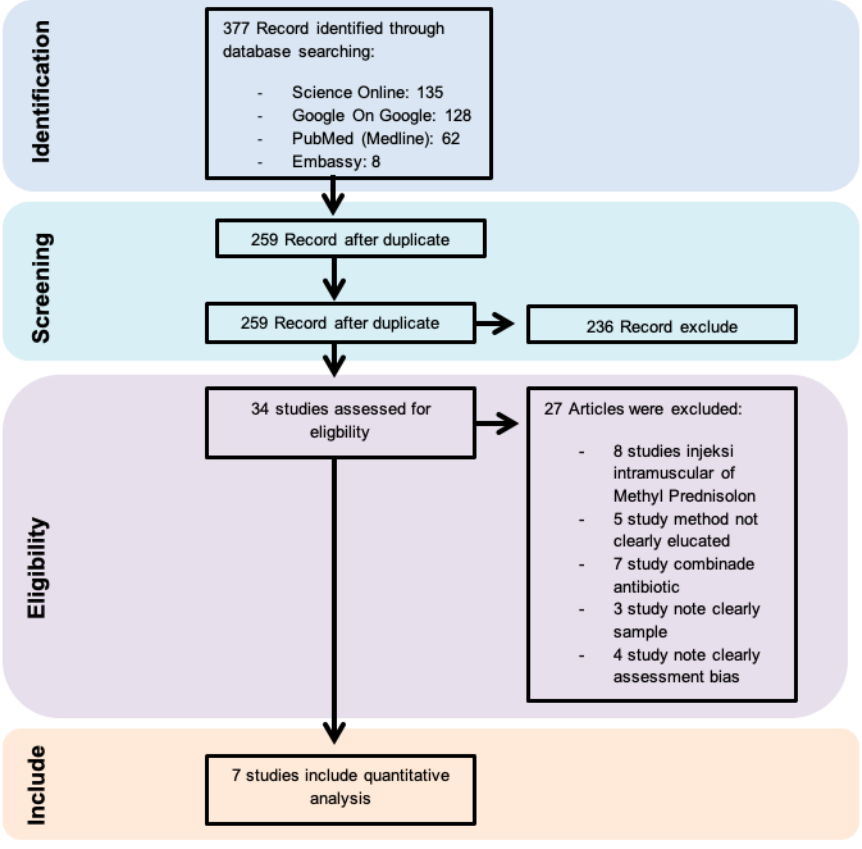

Figure. Diagram showing the flow of the study's methodology. Source: Moher and associates

Table 4. Bias Analysis Assessment

Author	The Evidence Value of Bias Analysis							
	1++	1+	1-	2++	2+	2-	3	4
Pimrampai Moranon et al (2019)				√				

Khurram Latif Shah et al (2018)				√				
Salvador Reyes-Fern´ andez et al (2021)				√				
I.M. Mojsa et al (2016)				√				
Pradeep D. Chaudhary et al (2015)				√				
Burcu Gursoytrak et al (2019)				√				
Maung Maung Latt et al (2016)				√				

Table 5. Risk Of Bias Included Studies

Author/SIGN	Random creation of sequences (bias in selection)	Appearance of allocation	Binding of the individual and	Binding of result assesment	Inadequate results information	Reporting that is selective	Other bias	Score	Quantity
Pimrampai Moranon et al (2019) / 2++	+ (High)	+ (High)	+ (High)	+ (High)	- (High)	+ (High)	- High)	11	High
Khurram Latif Shah et al (2018) / 2++	+ (High)	+ (High)	+ (High)	+ (High)	- (High)	+ (High)	- High)	11	High
Salvador Reyes-Fern´ andez et al (2021) / 2++	+(High)	+ (High)	- Low)	+ (High)	+ (Low)	+ (High)	- High)	9	High
I.M. Mojsa et al (2016) / 2++	+(High)	? (unclear)	- Low)	+ (High)	+ (Low)	? (unclear)	+ (Low)	7	Medium
Pradeep D. Chaudhary et al (2015) / 2++	+ (High)	+ (High)	+ (High)	+ (High)	- (High)	+ (High)	- High)	11	High
Burcu Gursoytrak et al (2019) / 2++	+ (High)	+ (High)	+ (High)	+ (High)	- (High)	+ (High)	- High)	11	High
Maung Maung Latt et al (2016) / 2++	+(High)	+ (High)	+ (High)	+ (High)	- (High)	+ (High)	- High)	11	High

Score : Low indicates a score of 2; unclear, a score of 1; and high, a score of 0.
Quality was categorized as low (score 1-4), medium (score 5-8), or high (score 9-12).

Based on the explanation of tables 4, 5, 6 and 7, the value of evidence of bias from this literature is that there are 7 studies with high quality studies having a strong chance of evidence of a causal connection. The importance of a carefully designed study with little bias risk and the potential for a causal relationship. It can be concluded that the journals that were screened late have a quality that is worthy of further review. An overview of the features of the research activities carried out in the meta-analysis or systematic review, in addition to as a summary of the tables that present important information from the selected articles. Examine the Population Every trial that was part of the systematic review was carried out on adult subjects. This suggests that this review is concerned with the use of Dexamethasone in the adult population.

The dose and timing of Dexamethasone administration varied among the included studies. Some studies administered Dexamethasone before third molar extraction, while others administered it after surgery. This highlights the variation in treatment protocols between the included studies. Some studies reported all three outcome measures under study, namely edema, trismus, and pain,

while others reported only two measures, namely edema and trismus. This shows the variation in the observed variables among the included studies. Table 6 provides a summary of selected article characteristics relevant to the review, such as study design, sample size, intervention details, and reported outcomes. This is an important source of information that can help readers understand the context and details of each article included in the review.

The effects dexamethasone on pain, trismus, and edema following surgery to remove a third molar were evaluated in this study. The following are the main findings of the study. Edema occurred in all patients after surgery. Meta-analysis of 7 studies showed that the group receiving dexamethasone had significantly lower edema on postoperative days 2 and 3 compared to the control group. Late edema was also reported in most studies. Trismus occurred in all participants after surgery. Metaanalysis of 7 studies showed that the group receiving submucosal injection of dexamethasone had significantly lower trismus on postoperative days 2 and 3 compared to the control group. Late trismus was also reported in most studies, shows notable variations between the dexamethasone group and the control group.

Pain after surgery was reported in all studies, but the scale of pain measurement varied. Regarding the length of time spent using analgesics and the quantity of tablets consumed, the results varied throughout the groups. Overall, this study suggests that dexamethasone administration, especially via submucosal injection, has a beneficial effect in reducing edema and trismus after third molar surgery. In addition, dexamethasone may also help relieve postoperative pain, although the response is variable.

Table 6. Outline Characteristics of Included Studies

Author	Study Design	Years	Sex	Impaction Type	Measuring Instrument	Dose	Intervention
Pimrampai Moranon et al (2019)	RCT	16-32	13M, 17F	Not Report	VAS	8 mg dexamethasone	Pterygomandibular space injection, Sublingual space injection
Khurram Latif Shah et al (2018)	RCT	18-40	81M, 69F	Disto-Angular (21,3%); Horizontal (18%); Mesio-Angular (42%); Vertical (18,7%)	1. Measurement of three areas of the face (cm) 2. Preoperatively, the maximum interincisal opening was measured in centimeters. 3. VAS	8 mg dexamethasone	Intra-muscular injection
Salvador Reyes-Fern´andez et al (2021)	RCT	Mean 23 ± 4.8 (17-44) (P 0,8)	16M, 35F (P 0,3)	Not Report	VAS	Dexamethasone was used in an 8 mg ampoule in 2 ml of solution	Submucosal and intramuscular injection
I.M. Mojsa et al (2016)	RCT	Not Report (Total : 30 Patient)	Not Report (Total : 30 Patient)	Not Report	VAS	1 ml dexamethasone (4 mg/ml)	Submucosal Injection

Pradeep D. Chaudhary et al (2015)	Double Blind and RCT	Not Report	Not Report	Horizontal (104); Mesio-Angular (66); Mesio-Angular (30) (P 0,3)	VAS	4 mg IV injection and 8 mg Tablet oral dexamethasone	Submucosal Injection
Burcu Gursoytrak et al (2019)	RCT	23.40± 3.87	9F, 11M	Not Report	VAS	0.3 mg/kg dexamethasone	Submucosal Injection
Maung Maung Latt et al (2016)	RCT	mean age 22 (age range 16 ± 32)	11M, 20F	Class I, II and III	1. Gn-Lc = goial angle-lateral canthal of eye 2. Tr-Com = tragus-commissure of mouth 3. Tr-Pog = Tragus-Pogonion 4. VAS	A single 8 mg/2 ml dosage of dexamethasone	Space pterygomandibular Injection
VAS : Visual Analogue Scale; RCT : randomized controlled trial							

Table 7. Results For Outcome

Author	EARLY OBSERVATION DAY	LATE OBSERVATION DAY	RESULTS	
			Statistic	P Value
Pimrampai Moranon et al (2019)	2	7	2^{nd} : 21.57 ± (15.76); 20.90 ± (15.14); 7^{th}: 3.67 ± (10.15); 3.60 ± (8.25)	2^{nd}: (P 0.840); 7^{th}: (P 0.971)
Khurram Latif Shah et al (2018)	2	7	Sweling : Post-operative 1^{st} Day Swelling (cm) : Equal Variance 1.39; Post-operative 7^{th} Day Swelling (cm) : Equal Variance 1.520 Mouth Opening : Post-operative 1^{st} Day Swelling (cm) : Equal Variance 0.036; Post-operative 7^{th} Day Swelling (cm) : Equal Variance 0.560 VAS : Post-operative 1^{st} Day Swelling (cm) : Equal Variance 0.572; Post-operative 7^{th} Day Swelling (cm) : Equal Variance 6.422	Sweling : 2^{nd} : t-test -1.091; (P 0.27); 7^{th} : t-test -0.869; (P 0.386) Mouth Opening : 2^{nd} : t-test 12.642; (P .000); 7^{th} : t-test -1.072; (P 0.285) VAS : 2^{nd} : t-test -0.014; (P 0.679); 7^{th} : t-test -1.282; (P 0.202)
Salvador Reyes-Fern´ andez et al (2021)	2	7	Trismus Aa: (G1 4.3 (0.6)); (G2 3.9 (0.6)); (G3 4.2 (0.7)); Trismus Ba: (G1 3.4 (0.9)); (G2 2.7 (1.2)); (G3 2.7 (0.8)); Trismus Ca: (G1 4.1 (0.6)); (G2 3.5 (1.0)); (G3 3.8 (0.7)). Pain 1a: (G1 2.8 (1.6)); (G2 3 (2.0)); (G3 3.3 (2.6)); Pain 2b:	Trismus Aa: (P 0.39); Trismus Ba: (P 0.12); Trismus Ca: (P 0.20) Pain 1a: (P 0.82); Pain 2b: (P 0.76) Edema Ab: (P 0.37) ; Edema Bb (P 0.58); Edema Cb: (P 0.36)

			(G1 1 (1–2)); (G2 1 (1–4)); (G3 2 (1–4)) Edema Ab: (G1 9.8 (9.5–10.5)); (G2 9.5 (9.5–10.2)); (G3 9.6 (9.03–10.0)); Edema Bb: (G1 10.6 (10.2–10.8)); (G2 10.3 (10.2–10.8)); (G3 10.3 (9.9–10.8)); Edema Cb: (G1 9.9 (9.5–10.5)); (G1 10 (9.5–10.2)); (G3 9.8 (9.1–10.2))	
I.M. Mojsa et al (2016)	2	7	Authors reported data in graphs	Authors reported data in graphs
Pradeep D. Chaudhary et al (2015)	2	7	Traguse Mentalis: Pre-operative (4 mg IV 87.63 (4.89)); (8 mg Oral 90.19 (4.62)); 24 Hours post-operative (4 mg IV 89.26 (4.90)); (8 mg Oral 90.85 (4.56)) ; 48 Hours post-operative (4 mg IV 90.19 (4.28)); (8 mg Oral 92.52 (5.11)) ; 7th Post-operative day (4 mg IV 87.78 (4.86)); (8 mg Oral 90.37 (4.61). Anglee Outer canthus of the nose : Pre-operative (4 mg IV 77.63 (5.02)); (8 mg Oral 79.67 (7.74)); 24 Hours post-operative (4 mg IV 81.07 (4.27)); (8 mg Oral 81.19 (8.01)); 48 Hours post-operative (4 mg IV 83.30 (4.61)); (8 mg Oral 81.30 (8.47)) ; 7th Post-operative day (4 mg IV 77.68 (5.02)); (8 mg Oral 79.73 (7.74)). VAS: Preop-pain : Group A 1.24 ± 1.12; Group B 1.28 ± 1.39; IPO-pain : Group A 1.54 ± 1.23; Group B 1.46 ± 1.31 ; 2nd Day-pain : Group A 1.7 ± 1.42; Group B 1.5 ± 1.6 ; 7th Day-pain: Group A 1.7 ± 1.17; Group B 1.4 ± 1.5	Traguse Mentalis: Pre-operative (P 0.083); 24 Hours post-operative (P 0.502); 48 Hours post-operative (P 0.631); 7th Post-operative day (P 0.004). Anglee Outer canthus of the nose : Pre-operative (P 0.093); 24 Hours post-operative (P 0.867); 48 Hours post-operative (0.376); 7th Post-operative day (P 0.003). VAS : Preop-pain (P 0.874); IPO-pain (P 0.754); 2nd Day-pain (P 0.0012); 7th Day-pain (P 0.000).
Burcu Gursoytrak et al (2019)	2	7	Preoperatively 12.11 ± 0.62; 2nd postoperatively 12.24 ± 0.55; 7th postoperatively 12.12 ± 0.61.	P (0.01)
Maung Maung Latt et al (2016)	3	7	3rd (SG 14.2 (17.3)); (C 23.3 (24.6)); 7th (SG 4.71 (11.43)); (C 11.47 (17.20))	3rd (P 0.1 7th (P 0.07)

Table 8. Comparison of Preoperative and Postoperative

Author	Preoperative			Postoperative		
	Trismus, P	Pain VAS scale, P	Inflammation VAS, P	Trismus, P	Pain VAS scale, P	Inflammation VAS, P
Pimrampai Moranon et al (2019)	1	0.954	0.954	0.004*	0.004*	0.004*
Khurram Latif Shah et al (2018)	0.600	0.679	0.277	0.000*	0.202	0.386
Salvador Reyes-Fern´ andez et al (2021)	Not Report	Not Report	Not Report	0.39	0.82	0.37
I.M. Mojsa et al (2016)	Authors reported data in graphs	Authors reported data in graphs	Authors reported data in graphs	Authors reported data in graphs	Authors reported data in graphs	Authors reported data in graphs
Pradeep D. Chaudhary et al (2015)	0.089	0.874	0.083	0.002*	0.000*	0.003*
Burcu Gursoytrak et al (2019)	0,943	0,161	0.887	< 0,001*	< 0,001*	0,223
Maung Maung Latt et al (2016)	0,70	0,000	Not Report	0,42	0,007*	Not Report

Table 8 explains that the comparison of preoperation and post operation results in these studies has different results. Research conducted by Pimrampai Moranon et al and Pradeep D. Chaudhary et al that the difference in dexamethasone injection in postopoeration greatly affects the impact of pain, swelling and trismus. Different things in research conducted by Salvador Reyes-Fern´ andez et al that postopoeration Dexamethasone injection does not really affect the impact of pain, swelling and trismus.

Evidence regarding the effectiveness of submucosal dexamethasone injections in reducing pain after surgery was compared with other groups, so it can be concluded that several factors are directly attributed, including variations in the use of scales and measures in different studies, the subjective nature of pain measurement, differences in study quality, and different methods between studies. Although some studies included in this meta-analysis showed significant differences between the dexamethasone group and the control group in terms of decreased pain and trismus, These results were contested by other research that was left out of the meta-analysis. Differences in research methods, such as lack of blinding, variation in the type of impacted teeth, and timing of dexamethasone administration.4,7,9,13,14

The present evidence does not totally rule out other causes, but it also does not conclusively establish the efficacy of submucosal dexamethasone injections in decreasing trismus, it also does not completely rule out some other possibilities. Further studies with surgical procedures are needed to reach a more accurate conclusion. With several advantages, such as following standardized standards, subgroup analysis, and inclusion of more comprehensive trials, this systematic review emphasizes the need for further research to definitively verify the effect of dexamethasone injections after third molar extraction.2,15,16,17

For many years, the usage of corticosteroids, such as dexamethasone, has been a popular method of relieving pain following the extraction of the third molar. While the research in this evaluation did not expressly address the safety of dexamethasone, was not expressly addressed in the studies

that made up this review, and none of those studies documented any serious side effects.6 Based on the results of this review, there is clinical potential for the application of dexamethasone in relieving postoperative discomfort.3,8

Considering the need to reduce the frequency of drug injections, the use of dexamethasone may be more desirable due to its longer half-life. To achieve optimal control of postoperative discomfort, dexamethasone injection may be an appropriate choice. Although dexamethasone injection offers benefits in relieving postoperative discomfort, it is important to strictly control the indications and contraindications of therapy to mitigate the risk of serious complications. Therefore, proper patient selection and careful medical supervision are important to ensure the safety and effectiveness of this corticosteroid therapy.3,14,15,18

Because of their strong anti-inflammatory properties, corticosteroids have been used to lessen the inflammatory effects after third molar extraction at different dosages and delivery methods. At every stage of the inflammatory process, glucocorticoids work to decrease the quantity of lymphocytes in circulation, prevent capillary dilatation and fibroblast growth, and modify the production of prostaglandins and leukotrienes. Corticosteroids are utilized in surgical procedures to lessen acute inflammatory problems that arise postoperatively because they have a powerful influence on tissue inflammation when these variables are suppressed. Acute inflammation resulting from tissue injury is a significant factor in the development of pain following surgery. Furthermore, ectopic neuroma production in damaged neurons and signal transmission in nociceptive C fibers are directly inhibited by locally applied glucocorticoids.2,3,9,13,19

Based on its potency in reducing inflammation, With a lengthy half-life, dexamethasone is currently the most potent anti-inflammatory medication and is helpful in lowering pain. It is thought that dexamethasone is safe for use over a period of less than two weeks even in doses above the physiologic dose. Previous studies have shown that perioperative corticosteroid use reduces postoperative discomfort after extraction of impacted mandibular third molars.2,6,9,13,16. It seems that dexamethasone's ability to reduce trismus, edema, and pain following surgery varies with dosage. Dionne et al. discovered that giving 4 mg of dexamethasone intravenously one hour prior to surgery, in addition to taking the medication orally (4 mg) After third molar surgery, twelve hours gave enough prostaglandin E2 (PGE2) inhibition following third molar surgery, and it could lessen the induction of analgesia. According to the study, preoperative dexamethasone injection is advised for challenging situations but may not be required for all lower third molar procedures. Longer procedures typically result in more pain, and the difficulty of the procedure may enhance how bad the pain the difficulty of the procedure may lead to an increase in pain severity.1,4,7,8,18,19

The degree of surgical stress, the requirement for bone tissue removal, and the periosteum's growth all affect how painful postoperative recovery is. There is debate over corticosteroids' ability to reduce postoperative pain. After surgery, corticosteroids are mainly used to prevent the build-up of inflammatory mediators and to lessen edema and fluid transudation. According to earlier research, dexamethasone helps to lessen facial swelling since it relaxes the tissues and lessens excruciating discomfort. Trismus has also been described in other investigations as a direct consequence of surgical edema compressing brain regions. Blood flow at the place of administration plays a major role in a drug's rate of absorption. Adjacent to the surgery site, the pterygomandibular space is a

loose, highly vascularized region of areolar tissue. For the purpose of higher absorption, we decided to use this area for drug injection.4,9,16,17,20

Conclusion

This study explains that intramuscular administration of dexamethasone 8 mg injectio n, pterygomandibular injection, sublingual injection and submucosal injection produces better postoperative therapeutic effects compared with postoperative analgesic administration in cases of impacted third molar extraction. Specifically, there was a significant reduction in postoperative swelling and trismus during the initial period after surgery.

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