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Evaluation of Dexamethasone Injection into the Pterygomandibular Space in Impacted Lower Third Molar Surgery

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ABSTRACT

Aim: It was to evaluate the efficacy of dexamethasone (Dx) of a single dose of 8 mg dexamethasone injected pre-operatively into the pterygomandibular space in reducing post-operative pain, swelling, and limited mouth opening following lower third molar surgery. **Subjects and Methods:** A prospective, randomized, split mouth study involving 62 surgical extractions of lower third molars in 31 patients. range (20 – 35 years) with similar bilaterally impacted lower third molars. Sites from the study group (SG) received single dose of 2ml of 4mg Dx preoperatively, while those in the control group (CG) received a placebo (the same volume of sterile saline solution). Previous history of significant medical condition, drug allergy, or infection that may contraindicates the use of Dx was excluded. **Results:** Significant reduction in swelling, pain and total postoperative analgesic consumption was observed in SG than CG on the 2nd day. Also, there were differences between both groups regarding to the interincisal distance (IID) measurements on the 7th day. **Conclusion:** Both groups showed acceptable results, however, Dx injection seems to be the appropriate treatment for rapid recovery of range of IID, reduction of swelling, and relief of pain following impacted lower 3rd molar extraction.

KEYWORDS

Keywords: Dexamethasone, Pterygomandibular, Impacted Lower 3rd molar Surgery, Interincisal Distance, VAS.

INTRODUCTION

Surgical extraction of the lower 3rd molar is one of the most performed procedures. It may occur unilateral or bilateral.(1) Postoperative trismus, swelling, and pain are related to that procedure. They vary according to the degree of tissue trauma, and the extent of bone manipulation.(2) Numerous strategies arouse to limit the postoperative sequelae in order to increase the patient's comfort, by inhibiting the synthesis or the release of the inflammatory mediators, including different closure techniques, drains, physical methods as cryotherapy and laser application, and drugs comprising analgesics and corticosteroids (CS).(3,4)

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CS are potent inhibitors of inflammation, used in different regimens.[5] The start of CS in dental field began in 1950s, when Spies et al.[6] administered hydrocortisone to prevent inflammation in oral surgery. Today, there is consensus that regaining pain free function after lower 3rd molar surgery is an essential element, so Dx has been introduced due to its pure glucocorticoid effects, no mineralocorticoid effects, and the least effects on leukocyte chemotaxis.[7] Many studies,[8-13] reported submucosal, intraalveolar, intravenous, intramuscular and oral use of CS. Injection of CS into Pm is preferred in decreasing trismus, swelling, and pain at the operative site, reducing the postoperative discomfort, and confirm the effectiveness of locally administered CS in 3rd molar surgery.[14]

The aim of this study was to evaluate the clinical results and to examine prospectively if there is an improved outcome in patients injected with a single dose of 8 mg Dx into the Pm. To receive comparable results, classification of impacted molars and inclusion criteria were defined.

PATIENTS AND METHODS

Eligibility Criteria

The study design involved healthy patients (20-35 years) with bilateral lower 3rd molars with similar degree of impaction, indicated for surgical extraction, and good oral hygiene. All patients were analyzed with orthopantomograms (OPGs).

Patients were not admitted into the study if any of the following exclusion criteria were present: Previous significant medical history, infection, drug allergy, chronic use of medication that may contraindicate the use of Dx, pregnant or medically compromised, unlikely to attend all the visits, mental incapacity that prevented obtaining informed consent, and legal incompetence.

Settings, Interventions, Follow up

The patients were selected from the Outpatient Clinic of the Departments of Oral and Maxillofacial Surgery at Faculty of Dental Medicine, Al-Azhar University (Boys' branch), Cairo and El-Sayed Jalal Hospital, Cairo, Egypt, during the period from May 2016 to December 2018. It is a double blinded split mouth study where operative sites were divided randomly and equally into SG and CG. In order to reduce postoperative sequlae after surgery, SG was injected preoperatively by a single dose of 2ml of 4 mg (8 mg) Dx into Pm (Figure 1), after inferior alveolar, lingual and long buccal nerve block, while CG was injected by a placebo (sterile saline solution of the same volume) with the same technique.

Altogether, 62 extraction sites in this study, of which 31 were assigned to SG and 31 to CG, were actively under FU 2 and 7 days after surgery. The subjective assessment of complaints was collected which included personal history, medical and dental history, and clinical investigation of the surgical area. An informed consent was obtained before commencement of the treatment after explaining the study design and procedures. The local ethics review committee of the Faculty of Dental Medicine for Boys at Al-Azhar University approved the study.

Study measurements

They include the IID by vernier caliper , the facial swelling by flexible tape, the pain by using VAS, and the amount of analgesics consumed postoperatively.

Operative Phase

The same surgeon performed all the operations under aseptic standard technique, disinfection of the operation field was achieved with Betadine, under local anathesia via standard inferior alveolar, lingual, and long buccal nerve block using a solution of 4% articaine hydrochloride with 1:100,000 epinephrine, then 2ml of Dx (4 mg/ml, total 8 mg) was injected into the Pm by the same technique

of inferior alveolar nerve block using a 3ml Luer-tip syringe (22-gauge), a standard pyramidal flap was performed to access the site via blade no.15, mounted on B.P scalpel handle no.3. Buccal and distal guttering was done to facilitate delivery of the third molar using a surgical round bur. If necessary, sectioning of crown and roots was done with a fissure bur and tooth delivery. The socket was irrigated with copious sterile saline solution, hemostasis was achieved and the flap was sutured by interrupted sutures with (3-0) vicryl.

Postoperative Phase:

After surgery, a small gauze pack was applied to the surgical site, and the patient was requested to hold it firmly for about 1 hour. Patients received instructions regarding local haemostatic measures, feeding, cleaning of the operated region, restriction of physical exertion, and other routine postoperative recommendations. The patients were noted to take antibiotics (amoxicillin with clavulanic acid, 1gm oral tablets twice for five days or for patients allergic to penicillin, erythromycin 500 mg 3 times), and analgesics as (voltaren 50mg tablets), immediately following surgery and twice for a maximum of 3 days, and chlorhexidine mouthwash were prescribed for 5 days. Patients were advised to record pain intensity and amount of analgesic tablets consumed. The intraoral sutures were removed after 7 days.

Statistical Analysis

Data were tabulated and the statistical measurements were obtained using statistical software IBM SPSS 22.0 for Windows software.

RESULTS

Demographic Data:

There were no clinically differences between the 2 groups. The mean patient age was 27 ±7 years in both groups. 11 male and 20 female (P=1).

Outcomes: In regard to the IID, there were no significant differences between the 2 groups at baseline (pre), however, at 2nd day; there was a statistically significant difference (P=0.007), on the 7th day, there was no statistically significant difference between IID measurements in the 2 groups, but SG showed a higher mean of IID (Table1).

Table(1): *Comparison between the two groups according to the interincisal distance.*

	Study		Control		t	p
	Mean	±SD	Mean	±SD		
Maximum mouth opening (mm)						
Pre	44.61	9.93	42.80	9.50	0.417	0.682
2nd day	38.28	10.24	30.67	8.48	1.810	0.007*
7th day	42.63	9.62	37.05	9.48	1.306	0.208

t: Student t-test

p: p value for comparing between two studied groups

At base line (pre) and at 7th day; there was no statistically significant difference between maximum mouth opening measurements in the two groups.

In relation to facial swelling, at base line (pre) and at 7th day; there was no statistically significant difference between facial swelling measurements in the 2 groups. While, at 2nd day; there was a statistically significant difference (P<0.05). SG showed reduction in the mean of facial swelling measurements (Table 2).

Table(2): *Comparison between the two groups according to facial swelling measurements.*

Assessment of facial swelling (edema) (cm)	Study		Control		t	p
	Mean	±SD	Mean	±SD		
Eye angle of mandible						
Pre	10.50	1.84	10.65	1.70	0.189	0.852
2nd day	12.45	1.86	14.30	1.99	2.147*	0.046*
7th day	10.65	1.80	12.15	1.72	1.909	0.072

Assessment of facial swelling (edema) (cm)	Study		Control		t	p
	Mean	±SD	Mean	±SD		
Tragus –corner of mouth						
Pre	12.20	1.89	12.80	2.04	0.682	0.504
2nd day	14.0	2.36	16.45	3.02	2.021*	0.048*
7th day	12.25	1.78	14.10	2.46	1.926	0.070
Tragus –soft tissue pogonion						
Pre	15.40	2.22	15.45	2.31	0.049	0.961
2nd day	17.45	2.54	19.95	3.24	1.921*	0.041*
7th day	15.30	1.93	16.60	2.34	1.354	0.193

t: Student t-test

p: p value for comparing between two studied groups

**: Statistically significant at p ≤ 0.05*

After revising the amount of analgesics consumed within the first 3 consecutive days, it was observed that, at all periods; there was a statistically significant difference between the amounts of analgesic measurements in the 2 groups. In addition SG showed a lower mean of analgesic consumption (Table 3).

Table(3): *Comparison between the two groups according to amount of analgesics consumed.*

	Study		Control		U	p
	Mean	±SD	Mean	±SD		
Number of analgesic						
Day1	1.70	0.48	2.70	0.48	10.5*	0.002*
Day2	2.10	0.32	3.10	0.88	18.0*	0.015*
Day3	1.30	0.48	2.40	0.52	9.0*	0.001*

U: Mann Whitney test

p: p value for comparing between two studied groups

**: Statistically significant at p ≤ 0.05*

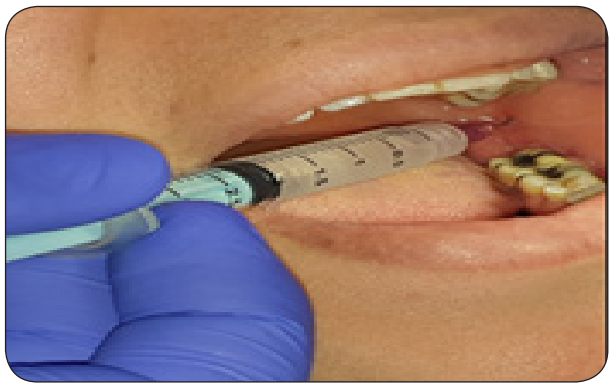

Fig. (1) Photographs showing Preoperative Injection of 2ml Dx in Pm (SG).

DISCUSSION

Lower 3rd molars are of clinical concern, from the moment they are formed until they are removed. They account for 98% of all impactions, as they are the last teeth to erupt. Their management is a complicated operation involving soft tissue, muscle and bone. The access site is highly vascular and constantly flooded with saliva. Trismus, edema, and pain are normal sequlae of third molar surgery; Therefore CS was used for their anti-inflammatory, and analgesic effects to reduce these consequences.[15,16] The main results of this study supported this suggestion, were the injection of a single dose of 8 mg Dx into Pm, immediately before surgical removal of lower 3rd molar in SG enabled them to regain IID, prevent edema, and reduce pain in agreement with Boonsiriseth.[14]

Dx is an ideal synthetic glucocorticoid drug with biological half-life from 36–54 h, 20–30 times more potent than cortisol, it has no mineralocorticoid activity, it maintains a high therapeutic plasma level through the early postoperative period, and it shows a faster cell membrane penetration.[17] The PtS was chosen for Dx injection as it is adjacent to the surgical site, and contains mostly loose areolar tissue with a rich vascular supply, which helps in faster drug absorption. The injection technique was similar to inferior alveolar nerve block, which is familiar to dental practitioners.[18] A dose of 8 mg Dx

was administered preoperatively to obtain the best results, to achieve adequate tissue level, and less systemic absorption as recommended by other studies.[17,19] On the contrary, other authors advocated postoperative administration.[20,21]

The ID was regained in SG at the 2nd day, who also attained better results on the 7th day in consistent with different studies.[22,23] The facial swelling was measured by flexible tape to achieve accurate measurements to the convex profile of the face as it is valid, easy to use, and cheap method.[24] The SG showed a lower mean facial swelling at the 2nd day as reported by Filho et al.[25] The mean of VAS pain scores was lower in the SG at postoperative evaluation that lead to less consumption of amount of analgesics in agreement with multiple studies.[23,26]

The key findings of this study are that injection of a single dose of 8 mg Dx into the Pm is a convenient method with high successful rate and low cost. Also, Dx provided a shortened period of discomfort, when compared to placebo. The clinical importance is that Dx prevents the risk of trismus.

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تقييم حقن عقار الديكساميثازون في منطقه الحيز الجناحي الفكي في الخلع الجراحى لضرس العقل السفلى المدفون

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الملخص :

الهدف: أجريت هذة الدراسة بهدف تقييم حقن 8 ملغ من عقار الديكساميثازون في منطقه الحيز الجناحي الفكي علي تبعيات الخلع الجراحى ع لضرس العقل السفلى المدفون والتي تشتمل علي الألم وتورم الوجه ومحدوديه فتحم الفم وقد أشتملت هذه الدراسة على 62 موقعا لضرس العقل السفلى المدفون مع توافر الأتى: ضرس العقل السفلى المدفون فى كلتا الناحيتين وتتراوح اعمار الأشخاص من (35-20)سنه أشخاص أصحاء من دون أمراض جهازيه او موانع لعقار الديكساميثازون .

المواد والأساليب: تم عمل الدراسه كالاتي : المجموعة الأولى: خضعت مواقع الإختبار لحقن عقار الديكساميثازون في منطقه الحيز الجناحي الفكي اما المجموعة الثانية(المجموعة الضابطة) خضعت مواقع الإختبار لحقن محلول الملح في منطقه الحيز الجناحي الفكي.

النتائج: وقد أظهرت الدراسة النتائج التالية: انه في اليوم الثاني كان هناك فرق ذو دلالة إحصائية بين قياسات فتح الفم الأقصى في المجموعتين. أظهرت مجموعة الدراسة أعلى متوسط فتح الفم من مجموعة التحكم.ايضا كان هناك فرق ذو دلالة إحصائية بين قياسات تورم الوجه في المجموعتين. وأظهرت مجموعة الدراسة انخفاض تورم في الوجه اقل من المجموعة الضابطة في جميع الفترات ما عدا اليوم 3 ؛ كان هناك فرق ذو دلالة إحصائية بين قياسات فاز في المجموعتين. أظهرت مجموعة الدراسة أقل فاز من مجموعة التحكم.وفي جميع الفترات كان هناك فرق ذو دلالة إحصائية بين عدد المسكنات في المجموعتين.

الخلاصه: وفى ضوء هذه النتائج يمكن إستنتاج ان جرعة واحدة من 8 ملغ من ديكساميثازون في الحيز الجناحي الفكي فعالة في الحد من تبعيات ما بعد الخلع الجراحي لضرس العقل السفلي المدفون والتي تشمل الالم وتورم الوجه ومحدوديه فتحم الفم.

الكلمات المفتاحيه: ديكساميثازون, حيز الجناحي الفكي, تثبيت, الخلع الجراحي لضرس العقل السفلي المدفون, المسافه بين الاسنان الاماميه, مقياس فاز.