

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH



TO COMPARE THE EFFECTS OF SINGLE PREOPERATIVE DOSE OF DEXAMETHASONE VERSUS METHYLPREDNISOLONE VIA EITHER INTRAMUSCULAR OR SUBMUCOSAL ROUTE IN THE REMOVAL OF IMPACTED MANDIBULAR THIRD MOLARS-A COMPARATIVE CLINICAL STUDY

Dental Science

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ABSTRACT

Introduction: The surgical removal of impacted mandibular third molars is an invasive procedure that involves extensive tissue trauma and a considerable postoperative inflammatory response. Although the inflammatory process is necessary for healing when exacerbated it may cause pain, swelling and limited mouth opening. Corticosteroids are among the most widely employed pre-operative medication administered for the control of such complications. **Objective:** To compare the effects of single dose of pre-operative Injection Dexamethasone versus Injection Methylprednisolone via Intramuscular or Submucosal route for controlling the post-operative pain, swelling and limited mouth opening in the removal of impacted mandibular third molars. **Material and Method:** The present study was conducted on 40 healthy adult patients with bilaterally symmetrical impacted mandibular third molar, reporting to the Department of Oral and Maxillofacial Surgery of Guru Nanak Dev Dental College and Research Institute, Sunam. Clinically, pain, swelling, mouth-opening were evaluated pre-operatively as baseline and post-operatively on 1st, 3rd and 7th post-operative days. **Results:** The results of our study are summarized below: In Group A: Submucosal injection of dexamethasone gave better results in controlling pain, swelling and trismus in comparison to Intramuscular injection of dexamethasone. In Group B: Submucosal injection of methylprednisolone showed better results in terms of pain, swelling and trismus when compared with Intramuscular injection of methylprednisolone. In Group C: Intramuscular injection of dexamethasone gave better results in terms of pain and mouth opening but, swelling was reduced with Intramuscular methylprednisolone. In Group D: Submucosal injection of dexamethasone showed better results in terms of pain, but swelling and mouth opening was reduced when methylprednisolone was used submucosal. **Conclusion:** The results of our study concluded that Dexamethasone is better than Methylprednisolone in controlling post-operative sequelae after third molar surgery. This can attributed to the higher potency and longer half-life and less sodium retaining capacity of dexamethasone than methylprednisolone. The results of our study also concluded that submucosal route of administration of drug is better than Intramuscular route because of the repository effect of the submucosal route, also this route is beneficial to the patient as well to the surgeon because needle penetration is done in the pre-anesthetized area, also it is an easy technique to be mastered by the surgeon.

KEYWORDS

Dexamethasone, Methylprednisolone, Intramuscular, Submucosal, lower third molar surgery.

INTRODUCTION

The surgical extraction of impacted mandibular third molar is the most frequently performed procedure in Oral Surgical Unit. It is often associated with discomfort in post-operative period which is due to the inflammation in the surgical site. Inflammatory edema and pain is the normal phenomenon induced after surgical removal of impacted mandibular third molars.

Patient's quality of life gets affected as a result of the postoperative inflammatory response which is often associated with swelling, pain and trismus. The regional anatomy of the third molar region reveals it to be a highly vascularized area which is predominantly constituted by loose connective tissue which leads to a series of functional and structural alterations in the postoperative period including the liberation of exudate which results in subsequent swelling, trismus and pain (Majid et al 2011).¹⁵ The mechanism of the development of postoperative edema is the release of inflammatory mediators, like prostaglandins, leukotrienes, bradykinin and platelet activating factor which migrates towards surgical site. They help in inflammatory process by causing the dilatation of blood vessels (Araujo et al 2016).¹

Decreased vascular permeability leads to acute inflammation and for reducing fluid transfer between tissues various methods are employed such as the use of non-steroidal anti-inflammatory drugs (NSAIDs), various steroids, and antihistaminic drugs (Patwa et al 2016).¹⁷

Corticosteroids are amongst the most widely employed pre-operative medications which are administered for the control of such complications. In 1949 the first discovery of anti-inflammatory action of corticosteroids was given by Hench and Kendall. They used Cortisone in the treatment of Rheumatoid arthritis (Montgomery et al 1990).¹⁶

Corticosteroids act in the initial phase of the inflammatory process by suppressing the production of vasoactive substances, such as prostaglandins A₂ and leukotrienes, thereby reducing fluid transudation and consequent edema (Dhanavelu et al (2013) 7. This will decrease prostaglandins and leukotriene synthesis; therefore help in reducing the accumulation of neutrophils at the inflammatory site.

Corticosteroids that have been used in dental surgeries are dexamethasone and methylprednisolone, owing to their nearly pure glucocorticoid activity, virtually no mineralocorticoid activity, and the least adverse effects on leukocyte chemotaxis (Imran et al (2017).¹²

Although these drugs may help control pain, they should be used in combination with an analgesic with a clinically significant effect. The adverse effects of steroids depend on the dose and duration of administration. Prolonged use can delay healing and increase one's susceptibility to infection (Alcantara et al (2014).²

The aim of the present study was to find out which drug and the route.. and the route among the two is better.

MATERIAL AND METHODS

The present study was conducted on out patients requiring surgical extraction of bilaterally impacted mandibular third molars in the Department of Oral and Maxillofacial Surgery. Forty patients were included in this study who required surgical removal of impacted third molars bilaterally. The diagnosis was made on the basis of detailed history followed by clinical and radiological examination. Radiographic records were made using intra-oral periapical view and orthopantomogram. The complete hematological testing was done before proceeding further with the procedure. Surgical procedure was

performed by the same surgeon on both sides of the same patient. Standardization of the sample was made using the following inclusion and exclusion criteria.

INCLUSION CRITERIA:

- Forty healthy patients were selected in this study irrespective of the gender, socio- economic status, caste and religion.
- Patients who required surgical removal of mandibular third molars.
- Patients who agreed with the study protocol and gave the informed consent for the same.

EXCLUSION CRITERIA:

Patients who did not agree with the study protocol and refused to give consent for the surgery.

Patients with systemic problems in which the use of steroids is contraindicated, such as bleeding disorders, cardiovascular disease, peptic ulcers, diabetes mellitus etc.

Patients with known allergy to corticosteroids. Pregnant / lactating females.

Soft tissue impaction.

Patients with local infection or associated inflammation. PRE-OPERATIVE EVALUATION

All the selected patients were assessed for the following parameters: **Swelling** Facial swelling was evaluated by method described by Gabka and Matsumara. Three measurements were made between five reference points: tragus, soft tissue pogonion, lateral canthus, corner of mouth and angle of mandible, pre-operatively and on the 1st, 3rd and 7th day post-operatively.

Following measurements were made S1 - From tragus to corner of mouth S2 - From tragus to pogonion S3 - From lateral canthus of the eye to angle of mandible

PAIN

Severity of pain perception was assessed via a simplified visual analog scale (VAS). This scale was divided into 100mm lines. The patient was required to place a mark on the scale to indicate the pain intensity. These measurements were done on the 1st, 3rd and 7th post-operative days.

MOUTH OPENING

The mouth opening was recorded as inter-incisal distance at a maximum mouth opening between the incisal edges of the maxillary and mandibular central incisors with the help of divider pre-operatively and on post-operative days.

The impacted mandibular thirds molars were removed in two sessions at least 3 weeks apart. The selected patients were randomly classified in four groups. They were classified as follows:

GROUP A – Third molar site which would be preceded by Inj. dexamethasone I.M.(gluteal) will be categorized under sub group A1. The contralateral site in this group who will receive Dexamethasone Sub-Mucosal (S.M.) pre operatively will be categorized under sub group A2

GROUP B - Third molar site which would be preceded by Inj. Methylprednisolone I.M (gluteal) will be categorized under sub group B1. The contralateral site in this group who will receive Inj. Methylprednisolone S.M. pre-operative will be categorized under sub group B2

GROUP C – Third molar site which would be preceded by Inj. Dexamethasone I.M. (gluteal) will be categorized under sub group C1. The contralateral site in this group who will receive Inj. Methylprednisolone I.M.(gluteal) pre operatively will be categorized as sub group C2.

GROUP D – Third molar site which would be preceded by Inj. Dexamethasone Sub- Mucosal (S.M.) will be categorized under sub

group D1. The contralateral site in this group who will receive Inj. Methylprednisolone S.M. pre-operatively will be categorized as sub group D2.

SURGICAL PROCEDURE

After selection of the patients the blood pressure and pulse rate was monitored pre- operatively using a cardiac monitor. Surgical procedure was carried out by the same surgeon along with the assistant. The patient was prepared for the procedure. Surgical site was painted with the povidone iodine solution and patient was draped under aseptic conditions. Local anesthesia was obtained by inferior alveolar nerve block and a long buccal nerve block with 2% lidocaine hydrochloride with adrenaline 1:200000.

Surgical assess was made by Terrance Ward incision, mucoperiosteal flap was raised to expose the surgical site. The standard protocol of bone removal was carried by Moore- Gilby collar or guttering technique with the help of carbide burs. Constant copious irrigation of isotonic saline solution was done throughout the procedure. The odontotomy was performed too facilitate the tooth removal with the help of burs and osteotomes.

After the tooth was delivered out, the socket was thoroughly debrided. Sharp margins were smoothed with the help of bone file and then irrigated with normal saline. Complete hemostasis was achieved before the wound closure. The flaps were repositioned and the wounds were closed with 3-0 black braded silk sutures using interrupted sutures and pressure pack was placed at the surgical site. Post-operative instructions were given.

All patients were prescribed Cefadroxyl 500mg (12hourly) for 5 days and Dolo 650mg orally every 6 hourly after surgery. Rescue drug (keterolac 50mg) was used if necessary. POST-OPERATIVE ASSESSMENT:

The measurement and recordings for swelling mouth opening and pain were made on the 1st, 3rd and 7th day post-operatively. Post-operative complications such as nerve injury, wound dehiscence, alveolar osteitis etc. were recorded.

RESULTS

The present study was conducted to compare the efficacy of dexamethasone and methylprednisolone either by intramuscular or submucosal route. Forty patients with bilateral symmetrical impacted third molars participated in this study.

The result of the study can be summarized as follows:

GROUP A - Dexamethasone when given submucosally shows better results in controlling pain and mouth-opening, and Dexamethasone intramuscular was better in controlling swelling in S3.

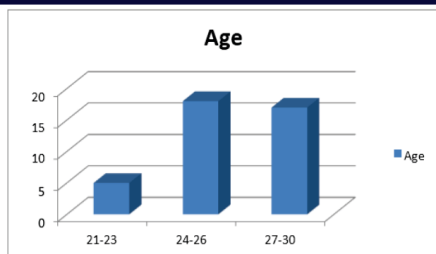
GROUP B – Methylprednisolone when given submucosally showed better results in controlling pain, swelling and trismus.

GROUP C – Dexamethasone when given Intramuscular showed better result in controlling pain and mouth-opening, but Methylprednisolone submucosally show better results in controlling swelling.

GROUP D – Pre-operative injection of 8mg Dexamethasone when given submucosally showed better reduction in pain and mouth-opening when compared with intramuscular dexamethasone, but Dexamethasone submucosal is better in controlling only pain when compared with submucosal Methylprednisolone. Methylprednisolone is better in controlling swelling and mouth-opening when compared with dexamethasone submucosal.

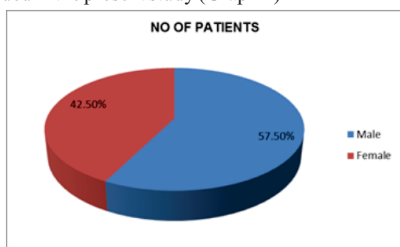
GRAPHS

The present study had 40 patients with bilateral impacted third molars for removal. The age of the selected patients ranged between 20-30 years. 5 out of 40 patients were in between 21-23 years old, 18 patients were in between 24-26 years, and 17 patients were in between 27-30 years old. (graph I)



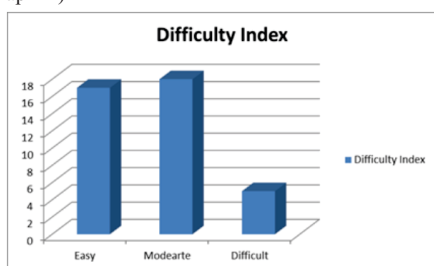
Graph I: Distribution Of Patients According To Age

There were 23 male (57.5%), and 17 females (42.5%) patients that were included in the present study (Graph ii)



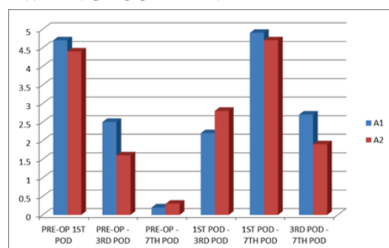
GRAPH II: DISTRIBUTION OF PATIENTS ACCORDING TO GENDER

There were 17 patients (42.5) with easy difficulty index (3-4), whereas 18 (45%) with moderate index (5-6) and only 5 (12.5%) with difficulty index (7-8), (Graph iii)



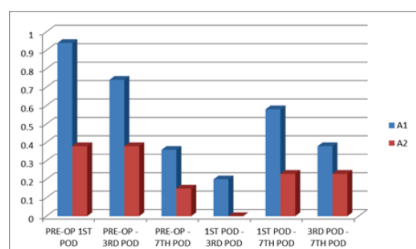
GRAPH III: DISTRIBUTION OFPATIENTS ACCORDING TO PEDERSON DIFFICULTY INDEX

GROUP A GRAPH IV: COMPARISON OF MEAN DIFFERENCE IN PAIN BETWEEN GROUPA1 ANDA2



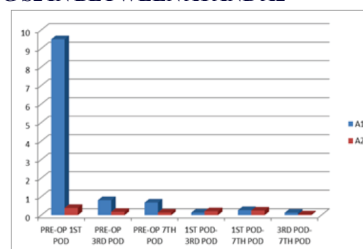
In group A, A2 shows less pain as compared to A1 which was significant in between 3rd post-operative- 7th post-operative day.

GRAPH V- COMPARISON OF MEAN DIFFERENCE IN SWELLING AT S1 IN BETWEEN A1 AND A2 IN GROUP A



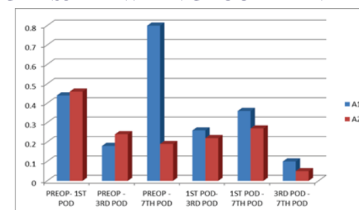
On comparison between A1 (dexamethasone intramuscular) and A2 (dexamethasone submucosal), swelling was less in A2 as compared to A1, but results were statically non-significant.

GRAPH VI - COMPARISON OF MEAN DIFFERENCE IN SWELLING S2 IN BETWEEN A1 AND A2



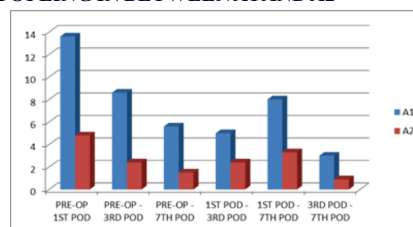
On comparison, swelling (S2) there was less swelling in A2 (dexamethasone submucosal) as compared to A1 (dexamethasone intramuscular) on all post-operative day when compared with baseline readings (pre-operative), but results were statistically non-significant.

GRAPH VII -COMPARISON OF MEAN DIFFERENCE IN SWELLING AT S3 BETWEEN GROUP A1 AND A2



On comparison the swelling(S3) was less in A1(dexamethasone intramuscular) as compared to A2 (dexamethasone submucosal) in all post-operative days when compared with baseline readings (pre-operative), but results were statistically non-significant.

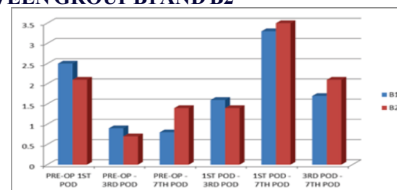
Graph VIII COMPARISON OF CHANGE IN MAXIMUM MOUTH OPEING IN BETWEEN A1 AND A2



On comparison between the mouth reduction, A1(dexamethasone intramuscular) and A2 (dexamethasone submucosal), there was less reduction in mouth opening in A2(dexamethasone submucosal) as compared to A1(dexamethasone intramuscular) and the results were significant in pre-op - 1st post-operative day, pre-op - 3rd post-operative day and pre-op - 7th post-operative day.

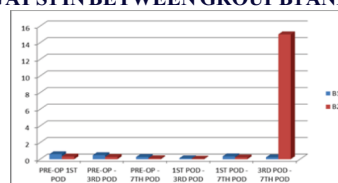
GROUP B

GRAPH IX: COMPARISON OF MEAN DIFFERENCE IN PAIN IN BETWEEN GROUP B1 AND B2



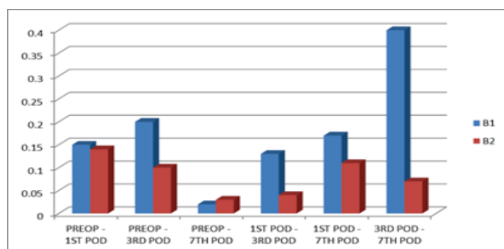
On comparison in group B, B2 (methylprednisolone submucosal) shows lesser pain as compared to B1(methylprednisolone intramuscular), but was higher in between pre-operative – 7th post-operative day and was non-significant.

GRAPH X: COMPARISON OF MEAN DIFFERENCE IN SWELLING AT S1 IN BETWEEN GROUP B1 AND B2.



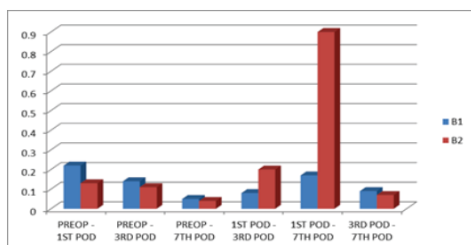
On comparison, swelling (S1) was less in B2 (methylprednisolone submucosal) than B1 (methylprednisolone intramuscular) in all post-operative days when compared with baseline readings (pre-operative), and results were statistically significant between pre-op and 1st post-operative day.

GRAPH XI: COMPARISON OF MEAN DIFFERENCE IN SWELLING AT S2 IN GROUP B1 AND B2.



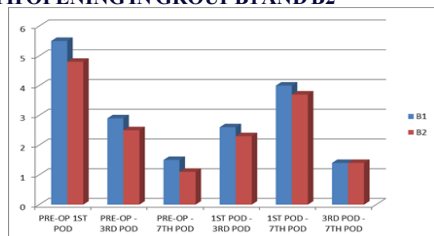
On comparison, the swelling (S2) was less in B2 (methylprednisolone submucosal) than B1 (methylprednisolone intramuscular) in all post-operative days when compared with baseline reading (pre-operative), higher on 7th post-operative day, but results were statistically non-significant.

GRAPH XII: COMPARISON OF MEAN DIFFERENCE IN SWELLING AT S3 IN GROUP B1 AND B2



On comparison the swelling (S3) was less in B2 (methylprednisolone submucosal) than B1 (methylprednisolone intramuscular) on all post-operative days when compared with baseline readings (pre-operative), and results were statically non-significant.

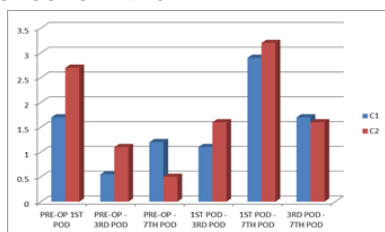
GRAPH XIII: COMPARISON OF CHANGE IN MAXIMUM I MOUTH OPENING IN GROUP B1 AND B2



There was less reduction in mouth-opening in B2 (methylprednisolone submucosal) as compared to B1 (methylprednisolone intramuscular) and the results were statistically non-significant in all post-operative days.

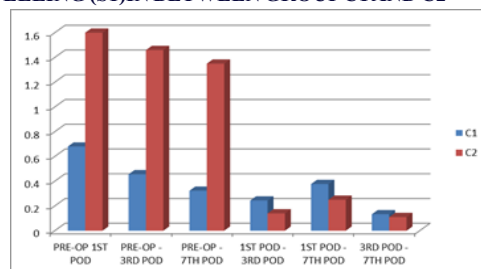
GROUP C

GRAPH XIV: COMPARISON OF MEAN DIFFERENCE OF PAIN IN GROUP C1 AND C2



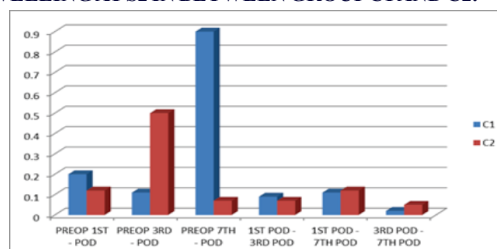
In group C, C1 (dexamethasone intramuscular) shows lesser pain than C2 (methylprednisolone intramuscular) on all post-operative days when compare with baseline readings (pre-operative), except pre-operative – 7th post-operative day, and the result were statically non-significant.

GRAPH XV: COMPARISON OF MEAN DIFFERENCE OF SWELLING (S1) IN BETWEEN GROUP C1 AND C2



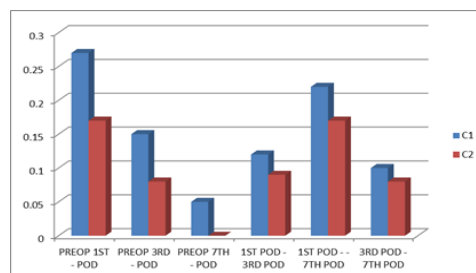
On comparison the swelling (S1) was significantly less in C1 (dexamethasone intramuscular) than C2 (methylprednisolone intramuscular) in all post-operative days when compared with baseline readings (pre-operative), but the results were statistically non-significant.

GRAPH XVI: COMPARISON OF MEAN DIFFERENCE IN SWELLING AT S2 IN BETWEEN GROUP C1 AND C2.



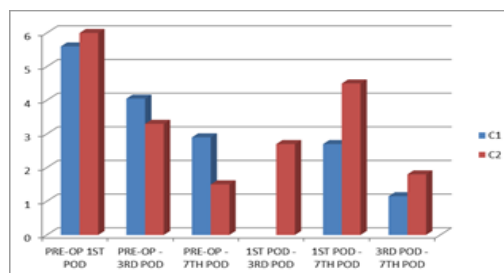
On comparison, swelling was less in C2 (methylprednisolone intramuscular) as compared to C1 (dexamethasone intramuscular) on all post-operative days when compared with baseline reading (pre-operative), but the results were statistically non-significant

GRAPH XVII: COMPARISON OF MEAN DIFFERENCE IN BETWEEN SWELLING AT S3 IN GROUP C1 AND C2n-significant.

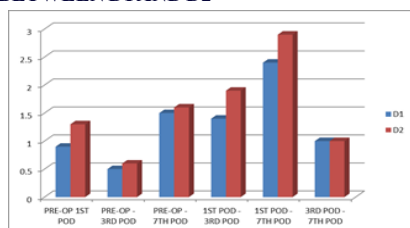


On comparison the swelling (S3) was less in C2 (methylprednisolone intramuscular) than C1 (dexamethasone intramuscular) on all post-operative days when compared with baseline reading (pre-operative), but the results were statistically non-significant.

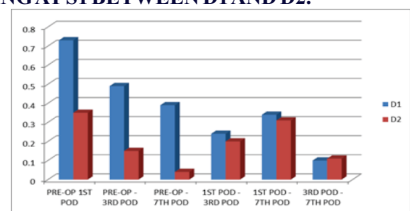
GRAPH XVIII: COMPARISON OF MEAN DIFFERENCE IN MOUT-OPENING IN GROUP C1 AND C2



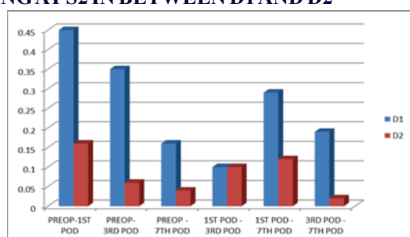
There was less reduction in C1 (methylprednisolone intramuscular) as compared to C2 (dexamethasone intramuscular) in between pre-operative and 1st post-operative day, but this reduction in mouth-opening was more in C1 on 3rd and 7th post-operative days, and the results were statistically significant only on 1st post-operative day - 7th post-operative day.

GROUP D**GRAPH XIX: COMPARISON OF MEAN DIFFERENCE IN PAIN IN BETWEEN D1 AND D2**

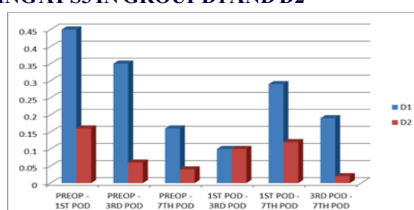
In group D, D1 (dexamethasone submucosal) showed lesser pain as compared to D2 (methylprednisolone submucosal) on all post-operative days when compared to baseline (pre-operative), but the results were statistically non-significant.

GRAPH XX: COMPARISON OF MEAN DIFFERENCE IN SWELLING AT S1 BETWEEN D1 AND D2.

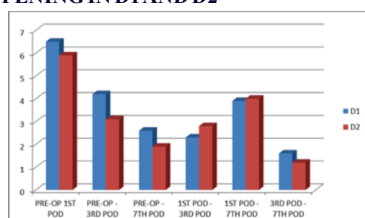
On comparison, the swelling (S1) was less in D2 (methylprednisolone submucosal) than D1 (dexamethasone submucosal), but the results were statistically non-significant.

GRAPH XXI - COMPARISON OF MEAN DIFFERENCE IN SWELLING AT S2 IN BETWEEN D1 AND D2

On comparison the swelling (S2) was less in D2 (methylprednisolone submucosal) than D1 (dexamethasone submucosal), but the results were statistically significant between 3rd post-operative day - 7th post-operative day.

GRAPH XXII -COMPARISON OF MEAN DIFFERENCE IN SWELLING AT S3 IN GROUP D1 AND D2

On comparison the swelling (S3) was less in D2 (methylprednisolone submucosal) than D1 (Dexamethasone submucosal), and the results were statistically significant on pre-operative - 3rd post-operative day and 3rd post-operative day - 7th post-operative day.

GRAPH XXIII-COMPARISON OF MEAN DIFFERENCE IN MOUTH-OPENING IN D1 AND D2

On comparison, there was lesser reduction in D2 (methylprednisolone submucosal) as compared to D1 (dexamethasone submucosal), on all post-operative days when compared with baseline (pre-operative) reading, but the results were statistically non-significant.

DISCUSSION

Surgical extraction/ removal of impacted mandibular third molar is one of the most common oral surgical procedure carried out in Oral and Maxillofacial Surgery. This surgical procedure results in severe inflammatory response which is characterized by pain, trismus and edema. The inflammatory process which occurs after any oral surgical procedure is necessary for the initiation of healing process.

Damage to the surrounding tissue in relation to the surgical site results in intense inflammatory reactions which suggests that inflammatory process which is initiated in the body is directly proportional to the tissue damage. At the surgical site, clot formation occurs which is the first step in the healing process which is responsible for the liberation of two substances i.e. leukotaxine and leukocytosis-promoting factor. Leukotaxine helps in increasing the permeability of the blood vessels and results in migration of polymorphonuclear leucocytes to the site of injury. Leukocytosis-promoting factor as the name suggests helps in the production of leukocytes which takes place in bone marrow. [Linenberg, Westfield 1965]¹⁴

After the initiation of the inflammation, many inflammatory mediators are released in the circulation which includes prostaglandins, histamine, bradykinin and serotonin. Levels of prostaglandins and histamine are increased in the inflammation. [Kim et al 2009] Prostaglandins are obtained from arachidonic acid. This is released through the action of phospholipase A2 which in turn is activated by chemical or physical stimuli. Also, the injured tissue surrounding the surgical site releases chemical substances which are responsible for giving the classical signs of inflammation i.e. pain, erythema, trismus, rise in temperature and loss of function. [Araujo et al 2016]¹

This inflammatory process sometimes causes discomfort to the patient in post-operative periods. In order to reduce the post-operative complications following surgical removal of third molars, corticosteroids have been used because of their anti-inflammatory properties. They help in reduction of inflammation by causing the inhibition of phospholipase A2. It is the first enzyme which is involved in the conversion of phospholipids into arachidonic acid. The inhibition of this enzyme leads to decreased or no production of arachidonic acid. In the absence of arachidonic acid, formation of inflammatory mediators i.e. prostaglandins, bradykinin and serotonin can't be produced, this results in less inflammation which ultimately causes less discomfort to the patient in post-operative period after surgical extraction of the lower third molar. [Krishnan, Kumar 2018]¹³

The natural glucocorticoid of the body is hydrocortisone which is also called as cortisol, the normal output on daily basis by adrenal gland is 15- 30 mg, but in the time of crisis it can reach up to 300 mg. Since it is the body's own anti-inflammatory agent, glucocorticoids are the most effective and appropriate anti-inflammatory drugs to use. [Vyas 2014]²⁰

The glucocorticoids which are most widely used in oral surgical procedures are Dexamethasone sodium phosphate, Dexamethasone acetate, Methylprednisolone, Methylprednisolone acetate and Methylprednisolone succinate. The biological half-life of Dexamethasone is 36-72 hours and that of Methylprednisolone is 18-36 hours. The potency of Dexamethasone is 20-30 times more than the natural corticosteroid. The onset of biological action of most of the glucocorticoids takes 1-2 hours, therefore the administration of glucocorticoid 1-2 hours prior to surgery is beneficial as the inflammatory response of the body to the surgery is activated immediately after the incision. [Vyas 2014].²⁰

In our present study forty patients participated with bilateral symmetrical impacted mandibular third molar. Patients were divided into four groups, each group consist of ten patients and each group was further divided into two sub-groups depending upon the drug given and route of administration pre-operatively. Group A and B were divided by keeping the drug same and by changing the routes of administration in their respective sub-groups. On the other hand group C and group D were divided by keepings the routes of administration constant and changing or altering the drug to be given in their

respective sub-groups. In each group, the three parameters were evaluated that is pain, swelling and trismus. In order to achieve adequate anti-inflammatory effects of corticosteroids they must be administered at the higher dose than their physiological concentration in the body,

i.e. 15-30mg daily output, and 300 mg at the time of crisis. The corticosteroid should possess relative potency and minimum mineralocorticoid activity.

Dexamethasone and Methylprednisolone which are most commonly used have relatively high potency along with longer half-life and minimum mineralocorticoid activity, also they possess greater anti-inflammatory effects.

PAIN

Pain is defined as the unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (IASP 1979).

The sensation of pain is subjective and there are no uniform criteria for the measurement. Diverse procedure and scale has been used for the pain evaluation including the semi-quantitative verbal scale of Ohnhaus and Adler, the McGill pain questionnaire of Melzack, the Visual Analog scale of Scott and Huskinson and Analgesic used and 7 - point Likert type scale. In the present study the VAS scale is selected which has been established as an accurate and sensitive aid in assessment of pain.

After third molar extraction, post-operative pain is the result of acute inflammation which occurs after the soft tissue injury at the surgical site. The role of corticosteroids in preventing post-operative pain is controversial as corticosteroids do possess anti-inflammatory and immunosuppressive effect but they do not have significant analgesic effect. But the injection of glucocorticoids pre-operatively helps in reducing the no. of analgesics to be taken in post-operative period. This is attributed to the role of glucocorticoids in inhibiting the formation of pro-inflammatory mediators. They stimulate the formation of proteins which inhibits the formation of prostaglandins and leukotrienes. Since, these products require enough time to be formed in the presence of dexamethasone this process is also delayed thus helping in reducing the no. Of analgesics to be consumed in post-operative period. (Schmelzeisen, Frolich, 1993)

INGROUP A

In our study Dexamethasone submucosally showed better results in terms of pain when compared with dexamethasone intramuscular in group A, it was significant between 3rd post-operative - 7th post-operative day.

Graziani et al (2006) and Grossi et al (2007) also suggested that dexamethasone when given submucosally was effective in reducing post-operative sequelae after third molar surgery.

INGROUP B

Methylprednisolone when given submucosally showed better results in reducing pain when compared with intramuscular injection of methylprednisolone in group B, and was non-significant.

Bustamante et al (2008) Chaurand - lara, Facio- umana (2013) showed that methylprednisolone when given submucosally was effective in reducing post-operative sequelae after third molar surgery.

INGROUP C

Intramuscular injection of dexamethasone shows better results in controlling pain when compared with methylprednisolone intramuscular injection, but was non-significant in all post-operative days.

Boonsiriseth et al (2012) Klongnoi et al (2012) and stated that injection of dexamethasone after third molar surgery was effective in reducing facial swelling, pain and trismus.

INGROUP D

Dexamethasone submucosal is better in controlling pain when compared with submucosal injection of methylprednisolone submucosally.

Graziani et al (2006) Grossi et al (2007) also suggested that dexamethasone when given submucosally was effective in reducing post-operative sequelae after third molar surgery.

SWELLING

Surgical extraction of lower third molar results in intense inflammatory response which is marked by the post-operative complications i.e. edema, trismus and discomfort. Corticosteroids have anti-inflammatory effect as they decrease the formation of bradykinin which is a potent vasodilating substance thereby inhibiting the vasodilatation and helps in reducing edema.

Corticosteroids also reduce the release of inflammation causing lysozyme by stabilizing the membrane of lysozyme. They also decrease the permeability of capillaries thus helps in reducing the transudation and fibrin deposit around the surgical site. (Krishnan, Kumar, 2018).

In the present study the facial study was measured by tape method of Gabka - Matsumara (ustun et al 2010). Facial swelling was measured by considering five reference points

Pogonion Tragus

Lateral canthus Angle of mandible Corner of mouth And we measured the reading using three line drawn from Pogonion to tragus Tragus to corner of mouth Lateral canthus to angle of mandible

INGROUP A

Submucosal injection of dexamethasone is better than intramuscular dexamethasone in controlling swelling and was non-significant on all post-operative days when compared to baseline (pre-operative) in S1 and S2 and S3.

Graziani et al (2006) also suggested that dexamethasone when given submucosally was effective in reducing post-operative sequelae after third molar surgery.

INGROUP B Methylprednisolone submucosal showed better results in reducing facial swelling when compared to intramuscular injection of methylprednisolone, and was significant in pre-operative - 1st post-operative days in S1, and it was non-significant in S2 and S3.

Methylprednisolone sub-mucosal is better in controlling swelling when compared with intramuscular injection of methylprednisolone as it has great biological activity since it has half-life of 18 - 36 hrs and it is found to be 5 times more potent than hydrocortisone.

Bustamante et al (2008) Vyas et al (2013) showed that methylprednisolone single dose of 40mg, when given submucosally was effective in reducing post-operative sequelae after third molar surgery.

INGROUP C

Intramuscular injection of Methylprednisolone gave better results in controlling facial swelling when compared with intramuscular injection of Dexamethasone, but was non-significant in all post-operative days when compared with baseline (pre-operative) in S1, S2 and S3.

Llorens et al (2006) stated that intramuscular injection of methylprednisolone showed better results in controlling swelling after third molar surgery.

INGROUP D

Submucosal injection of methylprednisolone was effective in reducing facial swelling when compared with submucosal injection dexamethasone, but was non-significant in S1 and in S2 it was significant in between 3rd post-operative day - 7th post-operative day, and in S3 it was significant in between pre-operative - 3rd post-operative day and 3rd post-operative - 7th post-operative day.

Bustamante et al (2008) and Chaurand - Lara, Facio- Umana (2013) showed that methylprednisolone when given submucosally was effective in reducing post-operative sequelae after third molar surgery.

TRISMUS

In oral surgical procedure soft tissue adjacent to the surgical site get injured, in response to which inflammation process starts. This is

attributed as normal physiological response of the body but it is in direct relation to the soft tissue damaged. The important component of inflammation is vasodilatation which ultimately leads to migration of inflammatory cells and inflammatory mediators to the affected area hence resulting in edema and trismus. The migration of cells and mediators is necessary for neutralizing and removing the antigens from the surgical site but corticosteroids like dexamethasone and methylprednisolone being pure glucocorticoids in nature exhibits anti-inflammatory and immunosuppressive effects, thus helps in reducing post-operative complications. (Sabhlok et al 2015).¹⁸

Adequate mouth opening and reversal towards normal functioning are the two most important factors to be considered after third molar surgery. They can be affected due to hematoma formation and edema. In the present study, mouth opening was recorded between inter-incisal edges of maxillary and mandibular central incisors with the help of divider and scale.

INGROUP A

Submucosal injection of dexamethasone gave better results for mouth-opening in post-operative period when compared with intramuscular injection of dexamethasone.

Boonsiriseth et al (2012) Klongnoi et al (2012) and stated that injection of dexamethasone after third molar surgery was effective in reducing facial swelling, pain and trismus.

INGROUP B

Intramuscular Injection of methylprednisolone is better in controlling mouth opening when compared with submucosal injection of methylprednisolone.

Llorens et al (2006) stated that intramuscular injection of methylprednisolone showed better mouth -opening after third molar surgery.

INGROUP C

Intramuscular injection of dexamethasone showed better results in mouth - opening when compared with intramuscular injection of methylprednisolone.

Administration of drug by intramuscular route provides number of advantages. Adequate levels of drug is achieved in plasma and therefore provides persistent anti-inflammatory action. Administration of drug by this route is independent of patient compliance. [Llorens et al]

Channar et al (2013) Klongnoi et al (2012) stated that intramuscular injection of dexamethasone showed better results in reducing swelling and pain after third molar surgery.

INGROUP D

Methylprednisolone when given submucosally showed better mouth-opening when compared with submucosal dexamethasone.

Hafez et al. (2014) stated that submucosal methylprednisolone was better in controlling trismus when given pre-operative.

CONCLUSION

The result of our study concluded that Dexamethasone is better than Methylprednisolone in controlling post-operative sequelae after 3rd molar surgery. This can be attributed to the higher- potency and longer half life and less sodium retaining capacity of dexamethasone than methylprednisolone. The result of our study also concluded that submucosal route of administration of drugs is better than intramuscular route because of repository effect of the submucosal route, also the route is beneficial to the patient as well to the surgeon because needle penetration is done in pre- anesthetized area. easy technique to be mastered by the surgeon.

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