Original Research Paper

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Effect of Perioperative Steroid, Bupivacaine and Tetracycline on Post Operative Sequelaeof Impacted Mandibular Third Molar Surgery

Abstract:

Aim: To study the effectiveness of perioperative steroids, bupivacaineandintra-socket tetracycline on post-operative sequelae after impacted mandibular third molar surgery.

Materials and Methods: Twenty patients of age group 20-40 years were randomly selected who underwent extraction of non-carious impactedmandibular third molars. In group I (10 Patients):Dexamethasone 8 mg intravenously 1 hour before surgery was given and then intraoperative nerve block was given with 0.5% bupivacaine plus placementof tetracycline gel in the socketand post operatively NSAIDafter surgery was prescribed. Group II served as control (10 Patients) wherein intraoperative nerve block was given with 2% lignocaine with 1:80,000 adrenaline andpost operatively antibiotics (Cap. Amoxicillin)along withNSAIDs(non-steroidal anti-inflammatory drugs) but no steroid and tetracycline were given.

Visual analogue scale (VAS) for Pain, swelling and mouth openingwas assessed post- operatively onfirst, third andseventh day. Any other post-operative complications like alveolar osteitis and wound dehiscence were determined on seventh day. The data obtained were examined usingMaan-Whitney U-test andWilcoxon testfor pain and independent t-test was applied for evaluating mouth opening and swelling via SPSS, version 20.

Results: Twenty patients were analyzed out of which each group included ten patients. Thepost-operativemean VAS score of group I at first post-surgery day was low as compared to group II, which was statistically highly significant (P= 0.001). Swelling and mouth opening were comparatively same in both groups which was not significant statistically (P> 0.005). There were nopost-operative complications occurred in both groups.

Conclusion: The modified protocol for third molar surgery is as equally effective as standard method with an added advantages of: (1) no fear of antibiotic resistance development, (2) no excessive use of antibiotics and NSAIDS, (3) less patient discomfort both in terms of pain, swelling, trismus and in remembering large number of medicine that he/she has to take after surgery. Multicenter studies with more sample size are required to confirm its efficacy.

Key-words: Third molar, steroids, tetracycline

Introduction:

Mandibular third molar removal is frequently performed operation in oral and maxillofacialsurgery. These should be considered for removal when there is clinical, radiographic, or evidence of acute/chronic periodontitis, caries, deleterious effects on second molars, or pathology.[1] Complications after third molar surgery include dry socket, pain, swelling, trismus, sensory nerve damage, infection and hemorrhage.[2]

Although this surgical procedure requires good surgical skills of operator and accurate pre-operative evaluation, still

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complications arise often inspite of surgical competence on the part of surgeon. Pain, trismus, post-operative swelling is almost universal after third molar surgery and lead to significant deterioration of quality of life in immediatepost-operative period. Joseph F. Piecuch did aliterature review on various topics to identify the methods of improving outcomes after third molar removal[3].

Based on his recommendations, we have proposed a modified protocol for third molar surgery. The aim of this study was to investigate whether the use ofperi-operative steroids, bupivacaine andintra-socket tetracycline has any beneficialoutcome on post-operative sequelae of impacted mandibular third molar surgerywhen compared to the standard protocol.

Materials And Methods:

A total of 20 patients were randomly selected for prophylactic removal of impacted mandibular third molars and randomly divided into two groups: group I (Test) and group II (Control) with 10 patients randomly selected in each group. Randomization was performed using sealed opaque envelopes to prevent selection bias.

Inclusion criteria consisted of patients with no medical history of any illness or prolonged medication that could influence the course of post-operative wound healing, patients with healthy dental and periodontal status with no evidence of local inflammation or pathology at the time of removal of impacted tooth were selected. Pre-operatively, intraoral periapical, and panoramic radiographs were obtained. An informed consent was duly signed by the participants. Ethical grant for the study was provided by the Institutional Ethical Committee (Ethical Committee Approval Number was ITSCDSR/L/2018/150).Post-operative sequelae of surgical removal of impacted molars are influenced by the level of difficulty of the impacted tooth, amount of bone guttered and operatory time of the procedure, hence these were standardized (by taking Pell & Gregory's Position B & Class II cases)during selection of cases and during the procedure.

In the group I, Dexamethasone 8 mg intravenously 1 hour before surgery was given. After that local anaesthesia was administered at the site with 0.5% Bupivacaine (Inj. Anawain 0.5%). A ward's incision was made starting about 6 mm inferiorly in the buccal sulcus at a point corresponding to the junction of anterior 2/3rd and distal 1/3rd of mandibular second molar. The cut was then taken vertically upwards to the neck of the second molar, passing around the gingival margin of posterior 1/3rd of the tooth and continuing cervically on the distal aspect upto approximately the midpoint of the tooth. From this point, the incision was extended posteriorly and buccally along the line of external oblique ridge. Then a mucoperiosteal flap was elevated using molts periosteal elevator.

After exposing the surgical site, osteotomy was carried out using a bur technique and the tooth was sectioned as necessary and was removed. Tetracycline gel was placed in the extraction socket. The flap was approximated with interrupted 3-0 silk suture. NSAID (combination of ibuprofen and paracetamol) thrice daily was prescribed for 3 days.

In the group II, Lignocaine 2% with 1:80000adrenaline was used for inferior alveolar nerve block along with long buccal nerve block and lingual nerve block. Removal of tooth was done similarly as done in Group I and after the removal extraction socket was closed with 3-0 interrupted silk sutures without placing tetracycline gel in to the extraction socket. Post operatively cap. Amoxicillin 500mg and NSAID (combination of ibuprofen and paracetamol) thrice daily was prescribed for 3 days. No Steroid and intra-socket tetracycline used in this group.

The patients were recalled after first, third and seventh day postoperatively for follow up. For each patient, the operator obtained the visual analogue scales (VAS) for pain. Trismus was assessed by measuring the maximum inter-incisal opening- the distance between the incisal margin of the upper and lower central incisors- using a standard ruler.

For the objective evaluation of swelling, five distances were measured: (a) the distance from mandibular angle to lateral corner of mouth; (b) the distance from the mandibular angle to the nasal curvature; (c) the distance from the mandibular angle to the lateral canthus of eye; (d) the distance from the tragus to the lateral corner of the mouth. Any other post-operative complications like alveolar osteitis and wound dehiscence were determined on seventh day.

Results:

A total of 20 patients (12 Males and 8 Females), aged between 20-40 years (25.5± 2.72 years)with non-carious impacted mandibular third molars participated in this study. The average time taken to perform surgery was 20.41±3.97

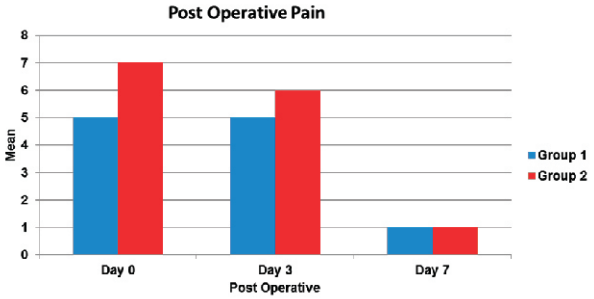
minutes for group I and 18.23 ±6.17 minutes for group II. (Table 1)

Table 1 Demographic data.

Variables	Data
Total Number of sample (N)	20
Gender	
Male	12
Female	8
Age (Years)	
Maximum age	40
Minimum age	20
Mean age	25.5± 2.72
Average Time taken for surgery (Minutes)	
Group 1	20.41±3.97
Group 2	18.23 ±6.17

Wilcoxon test and Maan-Whitney U-test was applied for statistical evaluation of pain and Independent t-test was applied for statistical evaluation of mouth opening and facial swelling.When compared to standard method (Group II) ,the modified method (group I) exhibited the following: (1) lower mean VAS score at first post-surgery day, which was statistically highly significant (P= 0.001); (2) lower mean VAS score at third post-surgery day, although this was not statistically significant (P= 0.178); (3) there was no statistically significant difference between pain on seventh post-surgery day (P= 0.744) (Table 2) (Graph 1); and maximal inter-incisal mouth opening in group I was slightly reduced by third day which was statistically not significant (P=0.360) which get stabilized by seventh day(Table 2) (Graph 2). Also, there is no statically difference between both the group for mouth opening and, in both group, means are comparably equal.

Graph 1: Graphical representation of post-operative pain.



Mean facial swelling was mild on first post-operative day (statistically not significant; P>0.005 in first post-operative day as compared to group II) followed by slight increase in swelling on third day then a reduction on seventh post-operativedaywhereas there was marked increase in swelling on first three days followed by decrease in swelling increase in group II which was statistically not significant (Table 2) (Graph 3).

Graph 2: Graphical representation of post-operative mouth opening.

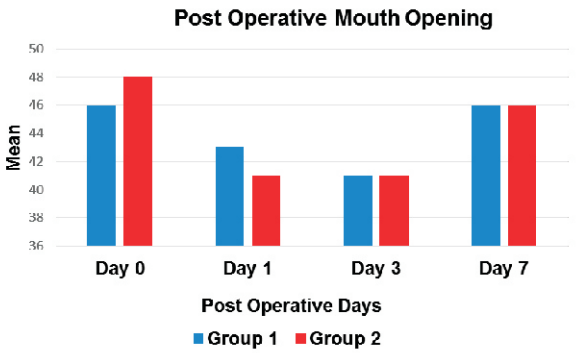
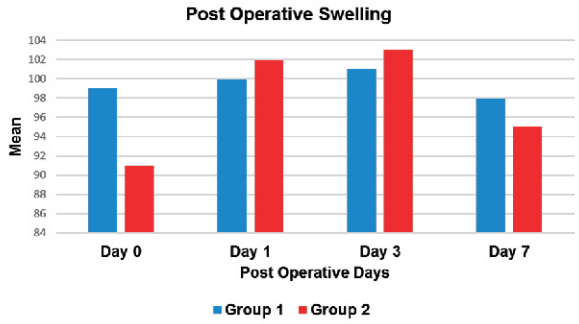


Table 2 Parameters and statistical analysis.

PARAMETERS	PRE-OPERATIVE	DAY 1	DAY 3	DAY 7
	Mean ± Std. Deviation (Std. Error Mean)	Mean ± Std. Deviation (Std.Error Mean)	Mean ± Std. Deviation (Std. Error Mean)	Mean ± Std. Deviation (Std. Error Mean)
PAIN				
Group 1	-	5.20 ± 0.63 (0.20)	5.20 ± 0.79 (0.24)	0.70 ± 0.82 (0.26)
Group 2	-	6.50 ± 0.70 (0.22)	5.80 ± 1.03 (0.32)	0.80 ± 0.78 (0.24)
P-value	-	**0.001 (Highly Significant)**	0.178	0.744
MOUTH OPENING				
Group 1	46.30 ± 6.67 (2.11)	43.10 ± 5.97 (1.89)	40.70 ± 5.83 (1.84)	45.50 ± 6.59 (2.08)
Group 2	48.30 ± 7.62 (2.41)	41.30 ± 7.60 (2.40)	41.40 ± 8.07 (2.55)	46.30 ± 9.46 (2.99)
P-value	0.694	0.374	0.360	0.311
FACIAL SWELLING				
Group 1	98.74 ± 5.08 (1.60)	100.04 ± 5.57 (1.76)	101.32 ± 4.75 (1.50)	98.16 ± 4.97 (1.57)
Group 2	90.52 ± 5.24 (1.66)	102.09 ± 2.52 (0.79)	103.06 ± 2.82 (0.89)	94.68 ± 5.61 (1.77)
P-value	0.673	0.143	0.637	0.407

Number of rescue NSAIDS required by the patient apart from the given medication in group I was 42 tablets average of 4.2 per patient where as in group II is 8 tablet, average 0.8 per patient.

Graph 3 : Representation of post-operative swelling.



Discussion:

The role of corticosteroids in preventing postoperative morbidity has been addressed in hundreds of articles, beginning in the 1950s. By the early 1950s, steroids were being used as adjuncts to surgical procedures, although concerns were raised as to potential problems with wound healing if steroids were administered.

Despite of the lack of knowledge of the methods of their action, in the 1950s dentists and oral & maxillofacial surgeons rapidly began to use steroids, initially in comparison with antihistamines to decrease edema and postoperative discomfort.[4-7] Some investigators noticed a degree of "rebound" swelling when the steroid was discontinued.[5]

Patients are usually afraid of having their wisdom teeth removed because of the fear of pain. Postoperative pain could be managed with analgesics, which reduce pain to a bearable level. Although the role of corticosteroids has mainly been of reducing postoperative swelling and limited mouth opening, corticosteroids also have analgesic properties if administered at the right time of the procedure and via an ideal route of drug administration.[27]

Corticosteroids act by suppressing each phase of the initial inflammatory response, thereby decreasing cellular permeability and capillary dilatation by inhibiting the production of vasoactive substances and diminishing the number of cytokines. Furthermore, the generation of prostaglandin is repressed by corticosteroids, resulting in an analgesic effect.[27]

Williamson et al. noted that the hypothalamic-pituitary-adrenal axis returned to normal in 7 days in 10 consecutive patients who received dexamethasone 8mg intravenously immediately after oral surgical procedures.[8] Hooley and Francis[9] used the dose recommendations of Nathanson and Seifert[10] for their prospective RCT of 476 patients who underwent surgical extraction of an impacted mandibular M3. For the experimental side, they received 2 tablets of betamethasone 0.6mg the evening before surgery and then 2 tablets 4 times/day the day of surgery and 2 tablets 4 times/day for the next 2 days. Tetracycline cones were placed into extraction socket. Their findings showed that the controls had 6 as much edema, 2 times as much trismus, and required 2 times as much pain medication as the controls.

In our study pre-operatively 5mg prednisolone was given 12 hours before surgery and Dexona(8 mg) intravenously 1 hour before surgery that result in less postoperative swelling although it was not statistically significant.

Nayyar and Yates[11] performed a randomized controlled trial (RCT) of the pre-emptive effects of bupivacaine on M3 (third molars) surgery. Bilateral M3 removal was performed under general anesthesia. Bupivacaine 0.5% with epinephrine 1:200000 was used on one side and nothing on the other side. This study found a significant decrease in pain at the bupivacaine surgical site at 6, 12,72 hours and 7 days. In our study 0.5% Bupivacaine was used and the post-operative pain was reduced which was statistically significant.

The role of antibiotics in the prevention of inflammatory complications after M3 surgery has long been debated.[12-13]The 1966 study by Kay[14] showed that the extraction of third molars in the presence of infection without antibiotics resulted in a 71% incidence of AO (alveolar osteitis) versus 8% when antibiotics were used. This study also reported on M3 extraction in 2,265 patients after infection was controlled. The 1341 patients treated without an antibiotic cover had an incidence of alveolar osteitis of 24%. The 924 other patients who underwent M3 extraction with an antibiotic cover (preoperatively) had an incidence of AO of 2.9%.

Curran et al[15], Happonen et al[16], Goldberg et al[17]and Capuzzi et al[18] each recommended against antibiotic prophylaxis. However, in the study by Curran et al, the antibiotic group actually had a higher incidence of postoperative infection than the non-antibiotic group. Happonen et al[16] and Capuzzi et al[18] saw no difference with or without antibiotics.

Mitchell[19] reported a 4% SSI incidence in the antibiotic group and a 45%SSI (surgical site infection) incidence in the

placebo group, and Mitchell and Morris[20] subsequently confirmed these results. In the 1995, there was strong support in the literature for the prevention of AO by the use of antibiotics placed directly into the socket during surgery. In our study we placed tetracycline (topically) in the socket and no systemic antibiotics were prescribed. It showed that the efficacy of topically placed antibiotic is similar to postoperatively prescribed antibiotics. Results of our study corroborated with previous studies[26] which stated that systemic antibiotics did not benefit patients undergoing maxillary third molar surgery alone. However, topical tetracycline significantly decreased the infection rate for erupted mandibular third molars. Systemic antibiotics and topical tetracycline reduced postoperative infections for mandibular partial and full bony third molars, but topical tetracycline was more effective.

In 1995, Joseph Pieuchet al[12] retrospectively analyzed 2134 patients who underwent extraction of 6713 M3s.In this study full bony impacted M3 extracted without antibiotic prophylaxis had 26.5% risk of postoperative infection; if topical tetracycline was used, the risk decreased to 6.6%. Hence showed that topical tetracycline was more effective than systemic antibiotics. Our study also confirms the same. Some investigations showed tetracycline induced neuritis[21-25], however no such incidence was seen in our study.

Conclusion:

The results of this study suggest that the modified protocol for third molar surgery i.e.,combination of corticosteroid, topical antibiotic and NSAID is as equally effective as standard method.The intra-socket placement of tetracycline eliminates the risk of antibiotic resistance and systemic toxicity. Thismodified protocol for third molar surgery could be considered a suitable approach in 3rd molar surgery as it leads to less patient discomfort both in terms of pain, swelling, and trismus; and hence improves patient's recovery. A split mouth prospective randomized control design with similar difficulty of impacted teeth bilaterally, assessed with a standard difficulty index in a significantly larger number of patients would have enhanced the level of evidence of the results.

Conflicts of interest: The authors have declared that no conflict of interest exist.

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