

Clinical Evaluation of Corticosteroid on Post Operative Morbidity in Impacted Lower Third Molar Surgery

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Abstract

Introduction: Mandibular third molar is most commonly dental impacted and its removal is not without morbidity. Post operative pain, swelling and trismus are universal. This study was carried out to compare the effect of co-administered corticosteroid and diclofenac Na⁺/K⁺ with diclofenac Na⁺/K⁺ alone on the post operative morbidity like pain, swelling and trismus after surgical removal of impacted lower third molars. **Materials and Methods:** The study was a prospective study done over a period of 01.01.13 to 30.06.14 in Department of Oral & Maxillofacial Surgery (OMS), Military Dental Center, Combined Military Hospital, Dhaka and the department of OMS Dhaka Dental College and Hospital, Dhaka. Sixty patients were included in the study and were randomly divided into two study groups: Control group received only diclofenac Na⁺/K⁺, Experimental group received corticosteroid and diclofenac Na⁺/K⁺. Pain, swelling and trismus were evaluated before, 1st, 2nd and 7th POD after surgery. **Results:** Among the 60 cases common type of impaction was horizontal and vertical type (30%) followed by Mesioangular (23%) and Distoangular (17%). All corticosteroid groups showed statistically significant ($p < 0.01$) improvement in pain and trismus at 1st and 2nd pod, but statistically significant ($p < 0.01$) improvement of swelling occur only on 2nd pod as compared to control group. **Conclusion:** Corticosteroid and diclofenac Na⁺/K⁺ combination was found effective for early recovery and the patients who used this combination suffered less pain, swelling and trismus after impacted mandibular third molar surgery.

Keywords: Impaction, Corticosteroid, Diclofenac.

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Introduction:

Surgical removal of third molars is one of the most frequently performed surgical procedures to treat pathose originated by impacted teeth¹. An impacted tooth causes infection in the gum surrounding the tooth leading to pain and swelling. Sometimes cyst also forms due to impacted wisdom tooth. To overcome this problem offended tooth should be extracted. But surgical extraction of impacted third molar almost always cause some post operative sequelae like pain and swelling. The management of pain and other problems consequent to tooth extraction is always a major concern for the individual^{2,3}.

Pain is the most common complain of human being. Postoperative pain especially after third molar surgery is said to be one of the most acute post surgical painful condition. Proper management of post extraction pain relieves patient suffering and leads to early mobilization, shortened hospital stay, reduce hospital costs and increased patient satisfaction^{5,6,7}.

Preliminary observations of various types of post operative pain indicate that the biological and psychological foundation for long-term persistent pain is in place within hours of injury⁸. Even brief painful stimulus can produce lasting changes in cells within the spinal cord⁹. Tissue injury causes a cascade of events (including peripheral inflammation) that release various mediators into the local environment¹⁰. These mediators activate the primary afferent nerves that sensitize local nerve receptors, which, in turn, can evoke changes at the level of the spinal cord, process referred to as "peripheral sensitization"¹¹. This process is responsible for the development of hyperalgesia beyond the damaged site. If acute pain is not properly treated, prolonged activation of the pain pathways can lead to further neurophysiologic changes collectively called "central sensitization," which may prolong recovery and convert acute pain to a chronic condition¹².

Proper analgesic treatment can reduce this risk⁸. The primary obligation and ultimate responsibility of oral health care providers is not only to restore function, but also to relieve pain. The NSAID diclofenac sodium claimed to be among the most successful aids in post operative pain control¹³.

Many surgical procedures result in certain amount of oedema or swelling after surgery. Routine extraction of a single tooth will probably not result in that the patient can see, whereas the extraction of multiple impacted teeth with reflection of soft tissue and removal of bone may result in moderately large amounts of swelling. Swelling usually reaches its maximum 24 to 48 hours after surgical procedure. Swelling begins to subside on the third or fourth day and usually resolves by the end of first week. Increased swelling after the third day may be an indication of infection rather than continued post surgical oedema¹⁴.

Surgical extraction of impacted third molars usually results in some degree of trismus because the inflammatory response to the surgical procedure is sufficiently widespread to involve several muscles of mastication. The trismus may also results from multiple injection of local anaesthetics specially if the injections have penetrated muscles¹⁴.

The introduction of non steroidal anti-inflammatory drug (NSAIDs- Diclofenac Potassium, Sodium) has significantly improve the management of post operative pain in dentistry and surgery. There are two possible mechanisms form the efficacy of NSAIDs when administered prior to surgical trauma. The first may simply be a pharmacokinetic advantage. By administering the NSAIDs prior to pain onset, drug absorption would have begun and therapeutic blood level will be present at the time of pain onset. Second, the presence of a cyclo-oxygenase inhibitor at the surgical site may limit the prostaglandins and prostacyclins associated with hyperalgesia and oedema. The use of corticosteroids has another preventive strategy for limiting post operative sequelae following impacted lower wisdom teeth extraction. Post operative swelling and oedema may be due in part to the conversion of phospholipids to the arachidonic acid by phospholipase A₂ and the resultant production of leukotrienes, prostacyclins, prostaglandins and thromboxane A₂ acting as mediators of the inflammatory response. The use of steroids may inhibit the initial step in this process⁴.

The many factors that contribute to postoperative complications are complex. But they originate from an inflammatory process initiated by surgical trauma. The adverse effects of the wisdom tooth surgery on the quality of life has been reported to show a three fold increase in patients who experienced pain, swelling and trismus alone or in combinations compared to those who are asymptomatic. Many clinicians have thus emphasized the necessity for better management of pain, swelling and trismus in patient who undergo impacted third molar surgery⁴.

The use of synthetic glucocorticoids in reducing such postoperative sequelae has been investigated extensively,

where studies demonstrated statistically significant improvement in postoperative sequelae when corticosteroids are administered. Currently, various forms of corticosteroids with different potencies and effects have been made available to choose form¹⁵.

Clinical trials in oral surgery have also supported the hypothesis that preemptive NSAIDs and corticosteroids are effective in delaying and preventing many post operative sequelae. The apparent interactions between the mechanisms of action of NSAIDs and steroid suggests that co-therapy may provide beneficial inflammatory and pain relief in absence of side effects⁴.

The purpose of this study was to compare the effects of coadministered Dexamethasone and diclofenac potassium/sodium with diclofenac potassium/sodium alone on the post operative management of pain, swelling and trismus following surgical removal of impacted lower third molar.

The apparent interactions between the mechanism of action of Non Steroidal Anti Inflammatory Drugs (NSAIDs) and steroid suggests that co therapy may provide beneficial inflammatory and pain relief in absence of side effects. The study was conducted keeping in view to compare the effect of co administered steroid-diclofenac potassium with diclofenac potassium alone, on the post operative management of morbidity specifically pain, swelling and trismus following removal of impacted lower third molars. The present study was contemplated to compare the effect of co-administered steroid and diclofenac Na⁺/K⁺ with diclofenac Na⁺/K⁺ alone on the postoperative morbidity like pain, swelling and trismus after surgical removal of impacted lower third molars.

Materials and Methods:

This study was a Prospective study. Conducted at Oral & Maxillofacial department, Military Dental Center, Combined Military Hospital, Dhaka cantonment, Dhaka, Bangladesh & Oral & Maxillofacial department, Dhaka Dental College and Hospital, Dhaka. The duration of the study was 01/01/2013 to 30/06/2014. Study population were the patients reported to Military Dental Center, Combined Military Hospital Dhaka and Oral & Maxillofacial department, Dhaka Dental College and Hospital, Dhaka and with impacted lower third molar teeth. Total 60 patients were randomly selected into two groups - Group A (Control group) -- NSAID alone post operatively - 30, Group B (Experimental group) --Taking Dexamethasone along with NSAID post operatively -30.

Pain measurement

In the evaluation of postoperative pain, visual analogue scale (VAS) were given to patients. To indicate the intensity of pain, the following categorization was used: 0 = no pain, 2 = mild pain, 4 = moderate pain, 6 = severe pain, 8 = very severe pain and 10 =unbearable pain. The patients were asked to mark pain level hourly during waking hours starting from the first hours of the operation. By use of these forms, the severities of pain were evaluated for the first 48 hours.

Measurement of facial width

As no published method satisfies all criteria for assessing facial swelling, It was decided to use a measuring tape in this study to measure facial width and swelling in one-dimension only. Facial width (swelling) was measured using a measuring tape. The reference points used were the tip of tragus of left and right ears, with the gonion in between. A single operator, repeating the procedure three times on each patient, made the measurements. The average of measurements was then taken (in cm) and recorded. The measurements were carried out just before the surgery and at post-operative days 1, 2 and 7. Postoperative swelling was expressed as a percentage increase in facial width.

Measurement of mouth-opening ability

A vernier-calibrated sliding calipers was used to measure maximum interincisal mouth-opening ability of the patient at the commencement of the procedure. The reference point used was incisal edge of the maxillary central incisor and incisal edge of mandibular central incisor at maximum opening available.

The measurements were made in triplicate and the average was recorded in millimetres (mm). The measurement was carried out just before the surgery and at post-operative days 1, 2 and 7. Postoperative trismus was measured as a percentage decrease in mouth opening.

Ethical consideration

Ethical clearance was obtained from the Research Committee of DGMS office. Permission to use the records will be obtained from Oral & Maxillofacial department, Military Dental Center, Combined Military Hospital, Dhaka cantonment, Dhaka, Bangladesh; Oral & Maxillofacial department, Dhaka Dental College and Hospital, Dhaka. Written informed, consent will be obtained from the patient's or legal guardian for the use of any photographs. Patient confidentiality will be strictly maintained. No names, addresses or contact details of the patients will be divulged.

Method of data processing & statistical analysis

Data was analyzed using SPSS for windows (v11.5, SPSS Inc, Chicago, IL) statistical software package. One-way analysis of variance, student's t-test and χ^2 were used for repeated measures for category rating scale, interincisal opening and facial swelling. The level of significance was set at $P < 0.01$.

Results:

Out of 60 patients maximum patients fall in the age group of 26-35years (46.66%) followed by age group 15-25 years (38.33%). Horizontal and Vertical type of impaction (30%) were more common than other (figure 1). The measurement of pain status in 1st POD in Group-A was 5.467 ± 1.2243 and in Group-B was 3.333 ± 1.2130 , In 2nd POD in Group-A was 2.500 ± 0.9377 and in Group-B was 1.467 ± 0.7303 which was statistically significant (table I). Regarding the measurement of swelling before operation the mean value in Group-A was 15.237 ± 0.7863 cm and in Group-B was 15.627 ± 0.9468 cm, In 1st POD in Group-A

was 15.787 ± 0.7687 cm and in Group-B was 15.789 ± 0.9193 cm, In 2nd POD in Group-A was 16.263 ± 0.7069 cm and in Group-B was 15.910 ± 0.8934 cm which was statistically significant (table II). The measurement of inter incisal opening before operation the mean value in Group-A was 46.267 ± 2.572 cm and in Group-B was 46.033 ± 3.872 cm, In 1st POD in Group-A was 40.267 ± 2.625 cm and in Group-B was 43.833 ± 3.992 cm, In 2nd POD in Group-A was 34.967 ± 2.809 cm and in Group-B was 42.567 ± 4.040 cm. In 1st and 2nd POD the change in inter incisal opening was statistically significant (table III).

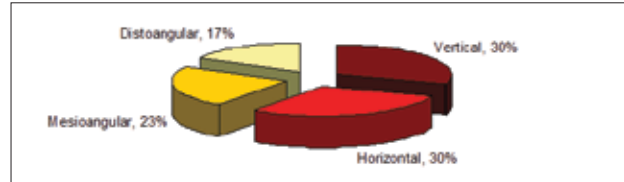


Figure- 1: Type of impaction.

Time	Group-A (Control group) Mean \pm SD	Group-B (Experimental group) Mean \pm SD	p value
1 st POD	5.467 \pm 1.2243	3.333 \pm 1.2130	0.000 [#]
2 nd POD	2.500 \pm 0.9377	1.467 \pm 0.7303	0.000 [#]
7 th POD	0.2000 \pm 0.40684	0.067 \pm 0.2537	0.133

Time	Group-A (Control group) Mean \pm SD	Group-B (Experimental group) Mean \pm SD	p value
Before	15.237 \pm 0.7863	15.627 \pm 0.9468	0.880
1 st POD	15.787 \pm 0.7687	15.789 \pm 0.9193	0.992
2 nd POD	16.263 \pm 0.7069	15.910 \pm 0.8934	0.095 [#]
7 th POD	15.2533 \pm 0.8080	15.6267 \pm 0.9468	0.106

Time	Group-A (Control group) Mean \pm SD	Group-B (Experimental group) Mean \pm SD	p value
Before	46.267 \pm 2.572	46.033 \pm 3.872	0.784
1 st POD	40.267 \pm 2.625	43.833 \pm 3.992	0.000 [#]
2 nd POD	34.967 \pm 2.809	42.567 \pm 4.040	0.000 [#]
7 th POD	45.800 \pm 3.305	45.966 \pm 3.890	0.859

Discussion:

Surgical removal of impacted lower third molar tooth is usually Associated with post operative complications like pain, swelling and trismus as direct and immediate consequences of the surgical procedure. By pharmacologically controlling the extent of the inflammatory process, the intensity or severity of postoperative sequelae may be reduced⁴.

One technique that has been proposed for reduction of postoperative inflammation is the administration of corticosteroids. Cortisol and the synthetic analogue of cortisol like dexamethasone have the capacity to interfere with the physiologic processes of inflammation and thus, suppress the development of local fever, redness, swelling and

tenderness by which inflammation is recognized⁴.

Another technique is to control the synthesis of prostaglandins. Prostaglandins play a major role in the induction of pain, inflammation and fever. The reduction of biosynthesis of prostaglandins by inhibition of the cyclo-oxygenase enzyme system is considered an important mechanism of action of NSAIDs. When administered preoperatively, NSAIDs have been shown to be particularly effective in combating postoperative pain⁴.

Preventive strategies for postoperative management of pain and inflammation are based on the known ability of NSAIDs to block the arachidonic acid cascade. When NSAIDs are administered preoperatively, absorption and distribution of the medication may occur before the initiation of tissue trauma, the ensuing synthesis of prostaglandins and the subsequent inflammatory response. Prevention of the inflammatory response may decrease the sequelae of tissue trauma; especially the accompanying pain⁴.

Diclofenac Na⁺/K⁺ has been shown to be useful in controlling postoperative pain after removal of third molars. Diclofenac Na⁺/K⁺ is known to possess both analgesic and anti-inflammatory effect. Due to its anti-inflammatory effects, the administration of dexamethasone may synergize the anti-inflammatory effect of Diclofenac Na⁺/K⁺ and contribute to the reduction of inflammatory exudates as well as oedema and pain. Therefore the co-administration of diclofenac Na⁺/K⁺ and dexamethasone may be expected to reduce post-operative pain more than that achieved with diclofenac Na⁺/K⁺ alone⁴.

The present study assessed the clinical effect of corticosteroid that is dexamethasone-diclofenac Na⁺/K⁺ combination and diclofenac Na⁺/K⁺ alone on pain, facial swelling and trismus. A study by Chiapasco M, Crescentin Metal on the complications after removal of impacted third molars that compared adults with patients aged 16-19 years showed that such complications were more frequent in patient 24 years of age and older¹⁶. The patients in this study had a mean age of 28 years and older which is very much close to that study.

The radiographic analysis of the type of impaction of lower third molar showed that maximum patient fall in horizontal and vertical type of impaction (30%) followed by Mesioangular (23%) and Distoangular (17%). In a study held in CMH Dhaka by Lt Col Golam Mohiuddin Chowdhury et al¹⁷. It was found that Mesioangular type of impaction was higher than other variety.

Regardless of the drug combination used, the pattern of postoperative pain has been reported to increase between the post-operative days 1 and 2, after which the symptoms subside gradually within one week⁴.

Corticosteroids are employed particularly after surgery to reduce the presence of inflammatory mediators and thus lessen fluid transudation and edema. Although many studies have reported statistically significant analgesic action with corticosteroid use others have found the analgesic efficacy of corticosteroid to lack statistical significance ($p > 0.05$), despite a lessening of postoperative pain. One

study surprisingly suggests the possibility that corticosteroid treatment can increase patient reaction to pain secondary to a suppression of endorphin β levels¹⁸.

In present study shows the comparison of pain intensity between Group-A and Group-B in different ages of patients after impacted lower third molar surgery. In Group-A and Group-B on 1st POD the Mean \pm SD of pain severity on VAS is 5.467 \pm 1.224 and 3.333 \pm 1.213 respectively. The difference is statistically significant. In Group-A and Group-B on 2nd POD the Mean \pm SD of pain severity on VAS is 2.500 \pm 0.9377 and 1.467 \pm 0.7303 respectively. The difference is also statistically significant. Among the age group of 15-25 yrs in control group the intensity of pain is higher than experimental group on 1st and 2nd POD and after 7th POD it not come to basal state. Some amount of pain persist even after 7th POD need additional dosage of medication. But among the age group of 26-35 yrs in control group the intensity of pain is significantly higher than experimental group and both come to basal state after completion of treatment.

Post-surgical facial edema is difficult to quantify accurately, since it requires a three-dimensional measurement with an irregular, convex surface and can manifest itself internally as well as externally. In the present study, a single measurement from the tip of tragus to going on to the tip of contralateral tragus was taken. In a study by Schultze-Mosgau Setal, comparing the use of NSAID (Ibuprofen) and steroid (methylprednisolone) concluded that the combination of both medications was well suited for treating these effects and should be used when extensive postoperative swelling of soft tissue is expected¹⁹.

In present study showed that before surgery there was no significant difference of swelling between 2 groups. On 1st POD there was also no significant difference two group as ($p > 0.10$). But on 2nd POD swelling reduced significantly in Group-B in comparison to Group-A as ($p < 0.01$). On 7th POD both group returned to basal state as ($p > 0.10$). This result shows that co-administration of dexamethasone and diclofenac Na⁺/K⁺ also enhances the control of postoperative facial swelling which supports study done by Babatunde Olamide Bamgbose et al.

Many studies have used corticosteroid in combination with other drugs to evaluate their effect upon pain, swelling and trismus. Statistically significant findings have been reported when corticosteroid are used in combination with drugs such as diclofenac in application to pain and swelling, but not in reference to trismus¹⁸.

In present study the measurement of inter incisal distance before operation the mean value in Group-A was 46.267 \pm 2.572 cm and in Group-B was 46.033 \pm 3.872 cm, In 1st POD in Group-A was 40.267 \pm 2.625 cm and in Group-B was 43.833 \pm 3.992 cm, In 2nd POD in Group-A was 34.967 \pm 2.809 cm and in Group-B was 42.567 \pm 4.040 cm. In 1st and 2nd POD the change in inter incisal opening was statistically significant. These results indicate a positive clinical association between the adjunct use of dexamethasone and postoperative recovery of trismus in impacted lower third molar surgery. Similarly, the study

done by Bamgbose et al. ⁴ found that the combination therapy was more effective in controlling pain, swelling, and trismus following third molar surgery.

Conclusion:

The use of corticosteroid with NSAID appears to be a safe and effective method to reduce postoperative clinical symptoms like pain, trismus, and swelling after impacted lower third molar surgery and can be used when extensive postoperative swelling of the soft tissue is anticipated.

Conflict of Interest: None.

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