

An Institutional Audit of The Effect Of Oral Dexamethasone on Post Operative Inflammation, Following Mandibular Third Molar Surgery in Lagos, SW Nigeria.

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Abstract

Background: Surgical extraction of impacted mandibular third molar is one of the commonest oral surgical procedures. It is frequently associated with sequelae such as postoperative pain, swelling and trismus, which is known to have an impact on the quality of life of the patients. The aim of this study was to determine the effect of a single dose of pre-operative oral dexamethasone on postoperative pain, swelling and trismus in patients undergoing third molar surgery at the oral and maxillofacial surgery department, Lagos State University Teaching Hospital, Ikeja.

Materials and methods: This double-blinded randomized controlled trial was conducted at the Department of Oral/ Maxillofacial Surgery, LASUTH. Fifty patients each that required third molar surgery were randomly allocated into case and control groups. Subjects in case group received a single dose of oral dexamethasone 1 hour preoperatively while the control subjects received lactose tablets. All subjects had their volumetric facial measurements, maximum inter-incisal and pain experience measured pre-operatively and also immediately after surgery on first, second and seventh day post-operatively.

Results: There was a significant reduction in the post-operative facial swelling in the test group on the 2nd day. There was similarly a significant reduction in trismus in the test group compared with the control group immediately after surgery and on the 2nd and 7th days postoperatively. A significant reduction was also observed in the pain experienced by the subjects in the case group compared to the control group on the 2nd and 7th days post-operatively but not immediately after surgery.

Conclusion: In conclusion, a single 8mg dose of oral dexamethasone was effective in significantly reducing facial swelling, pain and trismus immediately after surgery and also on the 2nd and 7th days after mandibular third molar surgery. It can thus be recommended that oral dexamethasone be given 1 hour pre-operatively to provide early bioavailability of the medication.

Keywords: Third Molar Surgery; Dexamethasone; Impacted third molar.

I. Introduction

Surgical extraction of impacted mandibular third molar is one of the commonest oral surgical procedures.¹ It is frequently associated with sequelae such as postoperative pain, swelling and trismus² but less associated with complications such as severe infection, nerve damage, mandibular bone fracture, temporomandibular joint dysfunction and dry socket³. This sequelae and complications of third molar surgery have been known to have an impact on the quality of life of patients⁴. Some methods have been used in the management of inflammatory conditions after third molar surgery. These include surgical wound closure techniques (primary and secondary closures)⁵, use of single and multiple sutures⁶, cryosurgery, laser and the use of medication. The medication that are commonly used include analgesics and corticosteroids⁷.

Several studies have shown a positive effect in the control of post third molar surgery sequelae such as pain, swelling and trismus when steroidal anti-inflammatory drugs were used compared to non-steroidal anti-inflammatory drugs⁸⁻¹¹. Corticosteroids are effective in controlling acute and chronic inflammation by interfering with the pathways of inflammatory response. They have been used before or immediately after surgery to minimize inflammatory symptoms⁸. Some studies have reported that dexamethasone (a type of corticosteroid) reduces postoperative swelling and edema by reducing inflammatory mediators from injured tissues^{12,13}. The choice of dexamethasone being due to its advantages over other glucocorticoids.

There are a few reported cases of the use of single dose preoperative dexamethasone (regardless of the route of application) to minimize postoperative third molar surgery sequelae. Studies on the effect of

parenterally administered corticosteroids on third molar post-surgical sequelae show that there is an increase in the overall surgical trauma that the patient is subjected to since some patients have phobia for the needle. Orally administered dexamethasone is simple, painless, non-invasive and a cost effective approach to minimizing post-operative sequelae. However, studies on the effect of a preoperative single oral dose of dexamethasone are rare and there is little if any report of any such study conducted in Nigeria.

The aim of this study was to determine the effect of a single dose of pre-operative oral dexamethasone on postoperative pain, swelling and trismus in patients undergoing third molar surgery at the oral and maxillofacial surgery department, Lagos State University Teaching Hospital, Ikeja (LASUTH).

II. Material And Methods

This was a prospective double blind, randomized control study on the effect of a single (8mg) preoperative dose of oral dexamethasone on swelling, pain and trismus following mandibular third molar surgery.

This study was conducted at the Department of Oral and Maxillofacial Surgery of the Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos, Nigeria. The Lagos State University Teaching Hospital, Ikeja is a tertiary health facility situated in the capital of Lagos State. It is a multi-specialist hospital with a bed complement of over six hundred. The study population was made up of patients between the ages 18 to 45 years who required surgical extraction of impacted mandibular third molars. The duration of the study was February 2013 to August 2014. Ethical approval was obtained from the Health and Research Ethical Committee of LASUTH and written informed consent was obtained from the patients and they were assured of their confidentiality.

Eligible subjects were randomly allocated to receive either dexamethasone or a placebo, which were similar in colour, shape and size using a sachet with a code generated from a table of random numbers. The codes on each sachet were recorded as the patient's unique identification number and it determined which group the subjects belonged. Fifty sachets were prepared for each group making a total of 100. These sachets were shuffled and eligible subjects who met the inclusion criteria were asked to pick a sachet at the point of recruitment. Neither the subjects nor the person doing the assessment knew the subjects' group.

Basis for inclusion criteria comprised, subjects aged between 18-45 years and requiring mandibular third molar surgical extraction. Exclusion criteria basis comprised subjects requiring non-surgical extraction, history of lignocaine allergy, medical co-morbidities, on steroid medication and pregnant and lactating subjects.

Upon recruitment into the study, the degree of surgical difficulty was assessed using Winter's and Pell and Gregory criteria. 1 gram Amoxicillin capsule (Smithkline Beecham Pharmaceuticals) was given as prophylaxis about an hour before surgery to each subject. Dexamethasone (Alcon Laboratories UK) or the placebo, was taken orally by the patients after breakfast depending on the group, about an hour before surgery. Every patient was educated on the types of measurements to be taken and how it will be done. Measurement of pain was by Visual Analogue Scale (VAS), measurement of inter-incisal distance and facial swelling was by silk thread and centimeter tape rule. An average of three measurement ratings for each sequelea was recorded

Surgical procedure

All surgery was carried out in the morning by the author AA. Preoperative facial measurement, inter-incisal distance measurement and pre-surgical pain assessments were performed for all the patients. A local anesthesia, alphacaine, (2% lignocaine hydrochloride with adrenaline 1:100,000) (Henry Schein Inc) was administered to anaesthetize the lingual, inferior alveolar and buccal nerves of the patients. Surgical extraction was performed using the buccal guttering technique. Paracetamol (Aspar Pharmaceuticals UK) 1gm every 8 hours or was prescribed post operatively. Post-operative instructions were also given. Immediately after the surgery and on the 2nd and 7th days post operatively, facial swelling, pain intensity and inter-incisal distances were measured.

Facial length measurement (volumetric variation of the face) was carried out with silk thread and centimeter ruler. The linear measurement was taken between the angle of the mandible and the following reference points, tragus of ear, lateral cantus of the eye, alar of the nose, labial commissure and mentum of the surgical side. The measurement was transferred to the centimeter ruler. Three measurements were taken and the average value was recorded. These measurements were taken before surgery, immediately after surgery, 2nd day post operation and 7th day post operation and recorded in centimeters.

The maximum inter-incisal distance was measured with the aid of the spatula and millimeter tape rule. The difference between upper and lower limit at maximum mouth opening was recorded three times and the average found.

Data was entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 19 (IBM Corp Armonk NY). Percentages, mean and standard deviation of numerical variables were determined. Student's T test was used to compare mean and mean difference of numerical variables between the case and

control groups. Confidence interval for all statistical tests was set at 95%. Microsoft excel was used to draw charts.

III. Results

This study recruited 100 otherwise healthy patients from the department of Oral and Maxillofacial Surgery of Lagos State University Teaching Hospital, Ikeja. All the subjects were included in the final analysis. There were 51 males and 49 females among the study subjects and their ages ranged from 18 to 45 years. Majority (47%) of the subjects were below 30 years of age and the mean age was 30.5 ± 7.9 . The commonest type of impaction was mesio-angular and in the lower right quadrant. There was no significant difference between the patients in the case and control groups with regards to age, gender, tooth affected and types of impaction ($p > 0.05$) as shown in table 1. At follow-up, none of the patients developed wound infection or any significant postoperative complications.

Post-Operative Oedema

In the test and control groups, facial swelling was most severe on the second day after surgery and reduced significantly by the seventh day postoperatively. The differences in post-operative oedema between the 2 groups observed over time from different measurements taken to determine the volumetric proportions of the face at different days post-operatively are shown in table 2. Postoperative oedema was less severe in the test group receiving dexamethasone. On the second postoperative day, the postoperative oedema was a statistically significant less in the dexamethasone group compared with the control group. ($p = 0.008$) as shown in table 2. There was however no statistically significant decrease in post operative oedema between the two groups when it was evaluated at day 7 days. ($p > 0.50$).

Trismus

In the test and control groups, trismus was most severe on the second day after surgery and had reduced significantly by the seventh day postoperatively. There was a significant difference in the trismus observed between the case and control groups immediately after surgery ($p = 0.008$), on the second ($p = 0.000$) and on the seventh ($p = 0.001$) day post-operatively. (As shown in Table 3)

Pain

In both groups, pain, measured using VAS was most severe on the second day after surgery and had reduced significantly by the seventh day postoperatively. There was statistically significant in the mean VAS score between the case and control groups on the second day post-operation. ($p = 0.000$) (As shown in Table 4).

IV. Discussion

Surgical extraction of the mandibular impacted third molars is a very common procedure in dentistry with varied postoperative sequelae. Corticosteroids, one of the established anti-sequela medications act by inhibiting the activity of phospholipase A₂ that is needed to release arachidonic acid from membrane lipids. This result in a reduction in inflammatory mediators-prostaglandin, leukotrienes, cytokines-which in turn reduces endothelial damage, cellular permeability (edema) and pain.

The mean age as observed in this study was similar to that by Vyas et al¹⁹, who reported age 30 years as their mean age. Giognoi et al.²⁰ however had a lower meanage of 21 years. This present study observed that subjects in the test group had more impacted teeth on the right quadrant when compared with the control group, which recorded more impacted teeth on the left quadrant. No reason could be adduced for these findings. No reference could also be cited in the literature with respect to side of impaction. Additionally, this study also showed that the mesioangular type of lower impacted third molars accounted for a majority (45%) of the teeth extracted in both test and control groups. This observation was similar to that in other studies carried out by some Nigeria researchers^{21,22}. The reason adduced for this was the failure of mandibular third molars to undergo further eruption once it had reached the mesioangular position²³.

In the present study, facial swelling was measured on the external surface of the face because the standard three-dimensional measurement was not possible in our environment due to the non-availability and affordability of a 3D optical scanner. Warraich et al²⁴ stated that the one-dimensional method of facial swelling measurement seems to be a useful alternative for assessing facial edema.

Trismus, another postoperative sequel, was observed in this study. It arises from the release of inflammatory mediators, which affect the adjacent muscles of mastication. These inflammatory mediators cause muscle spasm and limitation in mouth opening. Similarly, pain following mandibular third molar surgery was acute in nature and gradually resolved as the injured tissue healed or the stimulus removed.

In this double-blind randomized controlled clinical trial, a single dose of 8mg oral dexamethasone given about 1hour before surgery was evaluated against a placebo for the control of postoperative sequelae

following the surgical extraction of mandibular third molars under local anesthesia. In continuum, other studies reported that administration of glucocorticoids, 1 to 2 hours before surgery might be beneficial; as the inflammatory response to surgery is activated immediately after the surgical incision is made^{25, 26}. It was therefore adjudged that administration of dexamethasone about 1 hour pre operatively may be ideal to moderate postoperative sequelae. Oral route of administration was employed because it does not require clinical expertise or additional armamentarium. This was considered an advantage over the parenteral route^{25,26}.

There was a significant reduction in the post-operative facial swelling in the test group on the 2nd day (24 hours after surgery). The effect of dexamethasone on facial swelling immediately after surgery and on the 7th day postoperatively was however insignificant. This finding was similar to that of previous studies^{27,28}. The deduction from this observation which was confirmed from previous studies is that facial swelling reached a maximum on the 2nd day post-operatively and generally resolved by the 7th day²⁹. Similarly, parenterally administered dexamethasone was observed by Seward et al.³⁰ and Peterson et al.²³ to have its major clinical effect on swelling in the early postoperative period. Slade et al.³⁰ had argued that intravenous dexamethasone enhances early bioavailability in comparison with oral administration. A similar benefit was however observed in our study that used an oral route of administration.

This study likewise showed a significant reduction in trismus in the test group compared with the control group immediately after surgery and on the 2nd and 7th days postoperatively. Opinion differs among different researchers on the efficacy of steroids in the improvement of mouth opening after third molar surgery³⁰. While the result of this study is similar to that of other researchers,^{31,32} it is in contrast to findings of some other authors who found that dexamethasone had no effect on trismus following third molar surgery^{33,34}. This significant effect of dexamethasone on inter-incisal distance may be due to its ability to minimize the release inflammatory mediators, tissue inflammation and eventual muscle spasm after surgery³³.

Additionally, VAS (Visual analogue scale) score was used to assess pain because previous studies found it to be a valid recording scale¹¹. The subjects in the test cases compared to those in the control group observed a significant reduction in pain on the 2nd and 7th days post-operatively but not immediately after surgery. This was also similar to that obtained in some previous studies^{35,36} but in contrast to that of some other authors who found that analgesic efficacy of dexamethasone was not significant in the reduction of postoperative pain³⁶. Oral dexamethasone may not exert a potent effect on pain reduction immediately after surgery due to its initial binding to plasma proteins. A reduction in the plasma protein binding of dexamethasone on the second day post operatively may have led to the pain reduction observed¹⁵.

A limitation of this study is the 2 dimensional nature of the measurements taken to assess the post-operative swelling of third molar. Lower impacted third molar surgery postoperative edema extends internally and externally in a three dimensional pattern. Accurate measurement of multidimensional structures requires a 3D optical scanner, which is not easily accessible and affordable in this part of the world.

V. Conclusion

A single 8mg dose of oral dexamethasone was effective in significantly reducing facial swelling on the 2nd day; pain on the 2nd and 7th day; and trismus immediately after surgery and also on the 2nd and 7th days after lower third molar surgery. It can thus be recommended that for facial swelling, trismus and pain moderation during the post-operative period, oral dexamethasone may be given 1 hour pre-operatively to provide early bioavailability of the medication prior to surgery. Further studies with a methodology of administration of oral dexamethasone 24 hours preoperatively, can also be done to determine its effect on facial swelling and pain immediately after surgery.

References

- [1]. Osunde OD, Adebola RA, Omeje UK. Management of Inflammatory complications in third molar surgery. African Health Sci. 11(3); 2011: 530 – 537.
- [2]. Costich ER, While Jr RP. Fundamentals of Oral Surgery: postoperative care in Philadelphia: W. B. Saunders Company: 1971. pg. 176 – 179.
- [3]. Messer EJ, Keller J J. The use of intramuscular dexamethasone after extraction of lower third molars. Oral surg Oral med oral Pathol 40(1); 1975:594-8.
- [4]. Saheed BD, Obiuekwe O N., An audit of mandibular third molar surgery, Nig. J. Research 32; 2001:66-74
- [5]. Zandi M. Comparison of corticosteroids and rubber drain for reduction of sequelae after third molar surgery. Oral Maxillofac. Surg. 2008; 12:29-33
- [6]. Berge TI, Boe OF. Evaluation of postoperative morbidity after surgical removal of mandibular third molars. Acta. Odontol. Scand. 52:1997;162-9
- [7]. Ruta DA, Bissias E, Ogeon S, Ogden GR. Assessing health outcomes after extraction of third molars: postoperative symptom severity (POSS) scale. Br. J Oral Maxillofac. Surg. 38;2000: 480-487.
- [8]. Markiewicz MR. Corticosteroids reduce postoperative morbidity after third molar surgery: A systematic review and meta-analysis. J Oral Maxillofac. Surg. 66;2008:188-191.
- [9]. Carriches LC, Gonzalez JM, Rodriguez DM. Analgesic efficacy of diclofenac versus methylprednisolone in the control of postoperative pain after surgical removal of lower third molars. Med. Oral Patol. Oral. Cir. Buccal. 10;2005:432-9.

[10]. Carriches LC, Gonzalez JM, Rodriguez DM. The use of methylprednisolone versus diclofenac in the treatment of inflammation and trismus after surgical removal of lower third molars. *Med. Oral Patol. Oral Cir.Buccal.* 2006; 11: 440- 5.

[11]. Dionne RA, Gordon SM, Rowan J, Kent A, Brahim JS. Dexamethasone suppresses peripheral prostanoid levels without analgesia in a clinical model of acute inflammation. *J Oral Maxillofac. Surg.* 61;2003:997-1003.

[12]. Alexander RE, Thronson RR. A review of perioperative corticosteroid use in dentoalveolar surgery. *Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod.* 90;2000:406-15

[13]. Anderson PO, Knoblen JE, Troutman WG. *Handbook of clinical drug data: hormonal drugs.* 10th edition. USA: The McGraw-Hill Companies Inc. 1;2002:632 -633.

[14]. Alexander R, Thronson R. A review of perioperative corticosteroid use in dentoalveolar surgery. *Oral Surg Oral Med Oral Pathol Oral RadiolEndod.* 90;2000:406-1

[15]. Kim K. The use of corticosteroids and non-steroidal anti-inflammatory medication for the management of pain and inflammation after third molar surgery. A review of the literature. *Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod.* 107;2009:630.

[16]. AL- KhateebTA ,Marouf H.A, Mahmoud M.A. Clinical evaluation of dexamethasone vs Methylprednisolone for reducing post operative inflammatory sequelae following third molar surgery. *Saudi Dent J.* 8;1996:131-35

[17]. Igbal MK KratchmanS.I , Guees G.M Karabucak B ; Microscopic periradicular surgery : perioperative predictors for post-operative clinical outcome and quality of life assessment. *J Endod.* 33;2007:239-44.

[18]. Tsesis I, Fuss Z LINN S, Tillinger G Peled Meta-analysis of postoperative symptoms following surgical endodontic treatment. *Quintessence Int.* 34;2003:755-60.

[19]. Vyas, Agarwal S, Shah N, Patel D, Aapaliya P. Effect of a single dose Intramuscular Methylprednisolone injection into the masseter muscle on the surgical extraction of impacted lower third molars: a randomized controlled trial. *Kathamandu Univ. Med J.* 45(1); 2013:4-8.

[20]. Glongnoi B, Kaewpradub P : Effect of a single dose of pre-operative intramuscular dexamethasone injection on lower impacted third molar surgery *Int .J oral maxillofac. Surg.* 41;2012:376-379

[21]. Obimakinde O S, Impacted mandibular third molar surgery; an overview. A publication by the dentiscope editorial board. 16;2009: 16-19

[22]. ObiechinaA E, Arotiba J T, Fasola AO. Third Molar Impaction: Evaluation of the symptoms and pattern of impaction of Mandibular third molar teeth in Nigerians. *Odonto-Stomatologie Tropicale*, 93;2001:22-24.

[23]. Peterson JJ, Ellis E, Hupp J, Tucker M. *Contemporary Oral and Maxillofacial Surgery* (2nd edition) Mosby 1993; pp. 225-260

[24]. Warraich R, Rana M, Shaheen A, Gaellrich N C. Evaluation of postoperative discomfort following third molar surgery using submucosa dexamethasone- a randomized observer blind randomized study. *Oral Surg Oral med Oral Pathol Oral Radiol.* 116(1);2013: 16-22

[25]. Holte K, Kehlet H. Perioperative single dose glucocorticoids administration: Pathophysiologic effect and clinical implications *J Am, coll Surg.* 195; 2002: 694- 7121

[26]. AL- KhateebTA ,Marouf H.A, Mahmoud M.A. Clinical evaluation of dexamethasone vs Methylprednisolone for reducing post-operative inflammatory sequelae following third molar surgery. *Saudi Dent J.* 8;1996:131-35

[27]. Dionne RA, Gordon SM, Rowan J, Kent A, Brahim JS. Dexamethasone suppresses peripheral prostanoid levels without analgesia in a clinical model of acute inflammation. *J Oral Maxillofac. Surg.* 61;2003:997-1003.

[28]. Filho JRL, Maurette PE, Allais M, Cotinho M, Fernandes C. Clinical comparative study of the effectiveness of two dosages of Dexamethasone to control postoperative swelling, trismus and pain after the surgical extraction of mandibular impacted third molars. *Oral Med. Oral Pathol. Oral Cir. Buccal.* 13;2008:129-32.

[29]. Conrad SM, Blakey GH, Shugars DA Maciani RD. Patient perception of recovery after third molar surgery. *J MaxillofacSurg*57;1999:1288-1294

[30]. Seward GR, Harris M, MGowan DA. *An outline of oral surgery part I* (2nd edition) Vargbese Publishing House, Bombay 1980; pp 52; 70

[31]. Slade GD, Foy SP, Shugars DA, Philips C, White RP. The impact of third molar symptoms,pain and swelling on oral health related quality of life. *J Oral MaxillofacSurg.* 62;2004:1118-2.

[32]. Beirne OR. Evaluation of dexamethasone for reduction of postsurgical sequele of third molar removal. *J Oral Maxillofac Surg.* 50;1992:1182-3

[33]. Saposky RM, Romero LM, Munck AU. How does glucocorticoid influence stress responses. Integrative, permissive, suppressive, stimulatory and reparative actions. *Endorc.* 21;2000:55-89

[34]. Ades AG, Joondeph D.R ,Little RM ,Chapco M.K. A long term study of the relationship Of third molars to changes in the mandibular dental arch. *Am J Orthord ento facial orthop.* 97;1990: 323-5

[35]. Samsudin AR, and Mason DA. Symptoms from Impacted Wisdom Teeth. *Br.J.Oral Maxillofac. Surg.* 32;1994: 380-3.

[36]. Conrad SM, Blakey GH, Shugars DA, Marciani RD, Phillips C, White RP Jr. Patients' perception of recovery after third molar surgery. *J Oral Maxillofac Surg.*35; 1991: 1288- 94

Table 1: Socio demographic and clinical characteristic of respondents

Variable	Test n = 50 (%)	Control n =50 (%)	χ²	p value
Age group				
Less than 20 years	1 (2.0)	4 (8.0)	2.372	0.499
20 – 29 years	25 (50.0)	22 (44.0)		
30 – 39 years	15 (30.0)	17 (34.0)		
40 years and above	9 (18.0)	7 (14.0)		
Mean	31.4±7.6	29.7±7.8		
Gender				

Male	27 (54.0)	24 (48.0)	0.360	0.548
Female	23 (46.0)	26 (52.0)		
Tooth affected				
8 th Left tooth	21 (42.0)	28 (56.0)	1.961	0.161
8 th Right tooth	29 (58.0)	22 (44.0)		
Types of impaction				
Mesioangular	22 (44.0)	23 (46.0)	0.251	0.882
Distoangular	17 (34.0)	18 (36.0)		
Horizontal&others	11 (22.0)	9 (12.0)		

Table 2: Mean length from the angle of the mandible to the buccal commissure between the test and control groups at different treatment milestones

<u>Treatment milestones</u>	<u>N</u>	<u>Mean</u>	<u>t-test</u>	<u>p value</u>
Before surgery				
Test	50	9.37±0.7	0.586	0.559
Control	50	9.29±0.7		
Immediately after surgery				
Test	50	9.47±0.7	1.080	0.283
Control	50	9.32±0.8		
2nd day post op				
Test	50	9.89±0.7	2.698	0.008*
Control	50	10.30±0.8		
7th day post op				
Test	50	9.55±0.8	0.126	0.900
Control	50	9.54±0.7		

*Significant

Table 3: Mean inter-incisal distance between the test and control groups at different treatment milestones

<u>Treatment milestones</u>	<u>N</u>	<u>Mean</u>	<u>t-test</u>	<u>p value</u>
Before surgery				
Test	50	4.54±0.6	0.445	0.657
Control	50	4.47±1.0		
Immediately after surgery				
Test	50	4.48±0.7	2.692	0.008
Control	50	4.09±0.8		
2nd day post op				
Test	50	3.76±1.0	4.946	0.000*
Control	50	2.86±0.8		
7th day post op				
Test	50	4.34±0.7	3.286	0.001
Control	50	3.86±0.7		

• Significant

Table 4: Mean difference in VAS between the test and control groups at different treatment milestones

<u>Variable</u>	<u>N</u>	<u>Mean</u>	<u>t-test</u>	<u>p value</u>
Pain before surgery				
Test	50	0.53±1.1	0.780	0.437
Control	50	0.38±0.8		
Pain immediately				

after surgery				
Test	50	0.97±1.4	1.977	0.051
Control	50	1.64±1.9		
Pain on 2nd day post op				
Test	50	1.22±1.6	4.110	0.000*
Control	50	2.6±1.9		
Pain on 7th day post op				
Test	50	0.36±1.1	2.030	0.045
Control	50	0.82±1.1		

*Significant