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A CLINICAL COMPARATIVE STUDY OF DICLOFENAC SODIUM TRANSDERMAL PATCH VS ORAL DICLOFENAC SODIUM TABLET AS AN ANALGESIC AND ANTI-INFLIMMATORY FOLLOWING REMOVAL OF MANDIBULAR IMPACTED THIRD MOLARS

Dental Science

Dr. Prajakta Wankhade* Consultant Oral & Maxillofacial Surgeon at Vaishnavi Dental,Oral & Maxillofacial Surgery Clinic, Colaba, Mumbai. *Corresponding Author

Dr. Geetanjali Mandlik Oral & Maxillofacial Surgeon, Professor at Dept Oral & Maxillofacial Surgery ,D Y Patil School Of Dentistry, Nerul, Navi Mumbai.

ABSTRACT

AIMS: The aim of the study is to compare the efficacy of transdermal diclofenac patch with oral diclofenac tablet in management of pain after surgical removal of impacted mandibular third molars.

MATERIALS & METHODS: Patients who reported to the Department of Oral and Maxillofacial surgery, D Y Patil School Of Dentistry, Navi Mumbai were included in the study.Forty patients who fulfilled the inclusion criteria formed the study sample.

Group A – patients who received diclofenac tablet for post operative pain during surgical removal of impacted mandibular third molar in one side of the jaw. Group B – patients who received transdermal diclofenac patch for post operative pain during surgical removal of impacted mandibular third molar in one side of the jaw. Total sample size of the study was 40 patients.

RESULTS: In this study both diclofenac tablet and transdermal diclofenac reduces the pain score in all the three days without letting the patient to go for an emergency pain medication. But one patient out of twenty required emergency paracetamol tablet as an emergency medication inspite of transdermal patch.

CONCLUSION: From this study we can arrive at a conclusion that both diclofenac tablet and diclofenac transdermal patch are equally effective in management of post extraction pain.

KEYWORDS

INTRODUCTION:

Pain is a complex, multifaceted experience which is defined as "an unpleasant sensory and emotional experience associated with either actual or potential tissue damage, or described in terms of such damage" by the International Association for the Study of Pain.[7]

Diclofenac is the commonly prescribed NSAIDS which exhibit anti-inflammatory, analgesic and anti-pyretic action. When used by oral route, however only 50% of absorbed dose of diclofenac becomes available in the systemic circulation after first pass metabolism and also to the high plasma concentration attained, oral diclofenac caries the potential for significant adverse reactions particularly involving gastrointestinal tract.[7]

In 1970s transdermal patches were developed and the first was approved by the FDA in 1979 for the treatment of motion sickness. It was a three-day patch that delivered scopolamine.Transdermal drug delivery can closely mimic the slow intravenous infusion without its potential hazards and also offer another most important advantage in allowing the patient to terminate the drug therapy by simply removing the patch at desired time if toxicity develops.[5]

MATERIALS & METHODS:

Study Design:

This is a comparative interventional study for comparing the efficacy of transdermal diclofenac and oral diclofenac in management of post-operative pain after removal of impacted mandibular third molars.

Study Setting:

Patients who reported to the Department of Oral and Maxillofacial surgery, D Y Patil School Of Dentistry, Navi Mumbai were included in the study.

Description Of Group:

Group A – patients who received diclofenac tablet for post operative pain during surgical removal of impacted mandibular third molar in one side of the jaw.

Group B – patients who received transdermal diclofenac patch for post operative pain during surgical removal of impacted mandibular third molar in one side of the jaw.

Sample Size Of Each Group: 20 patients

Total Sample Size Of The Study: 40 (20 patients)

Sampling Technique

Convenient sampling technique is used.

Inclusion Criteria:

- Patient in the age group of 18-40 years will be selected irrespective of sex, caste, religion and socio-economic status.
- Patients with bilaterally impacted mandibular third molars with same difficulty index.
- Medically fit patients.
- Patients who agreed to follow the study protocol.

Exclusion Criteria:

- Unilaterally impacted mandibular third molars.
- Pregnant and lactating women.
- Patients with blood coagulation disorders.
- Patients allergic to diclofenac or any other NSAIDs.
- Patients who are mentally retarded or unable to communicate.
- Patients with known skin disorders.
- Patient with anti-coagulant therapy
- Patient under medication of NSAIDS or corticosteroids for any other illness.
- Patient with history of peptic ulcer.
- Uncooperative patients not willing to commit to an appropriate post procedure follow-up.

Drugs Used

- Formulation of the drug: Diclofenac diethylamine - Transdermal patch, diclofenac sodium - tablets
- Name of the drug: Diclofenac diethylamine, diclofenac sodium tablets
- Dosage of the drug used: diclofenac diethylamine - 100mg, diclofenac sodium – 50mg
- Frequency of the drug used: diclofenac diethylamine – once a day,diclofenac sodium tablets – thrice a day
- Route of the drug used: diclofenac diethylamine – transdermal patch applied over upper arm, diclofenac sodium – oral.
- Duration of drug: Diclofenac patch - Twice a day for three days,
- Diclofenac tablet – Thrice a day for three days.
- Steps taken to prevent adverse drug reaction: Rescue Drug-Tablet Avil 25mg Tablet Paracetamol 650mg.

Allocation Ratio Of Different Groups :

Parameters To Be Studied

Post-operative Pain

- After 12 hours
- After 24 hours
- After 48 hours
- After 72 hours

In three consecutive days
Subjective scale of pain used in the study
Visual analog scale (0-10)

Procedure In Detail:
After proper case recording and selecting the patients,the procedure is thoroughly explained to the patient about the use of transdermal diclofenac patch as an alternative for oral diclofenac tablets. Patient is asked to take the preoperative Augmentin 625mg prior to the procedure

Standard Protocol For Scrubbing, painting And Draping Was Followed In Each Case:

Application Of The Patch:
Forearm is cleaned with spirit,dried and then Diclofenac transdermal patch is applied on the arm 30mins prior to the procedure.

Anesthesia:
Classical inferior alveolar and long buccal nerve block given by Halstead technique. All the patients were treated using 2% Lignocaine Hydrochloride with Adrenaline in 1:80000 concentrations.

Incision
Standard Ward's incision was used.

Reflection Of Mucoperiosteal Flap

Bone Removal:
Bone removal was done by buccal guttering using Toller's technique and was performed using straight handpiece & HP 8 with proper cooling with normal saline

Sectioning Of Tooth
Sectioning of tooth was done depending upon type and difficulty index of impaction and whenever it is indicated.

Extraction Of Tooth
Tooth was luxated with the help of an elevator and luxator and extracted with a molar forceps.

Debridement Of Socket

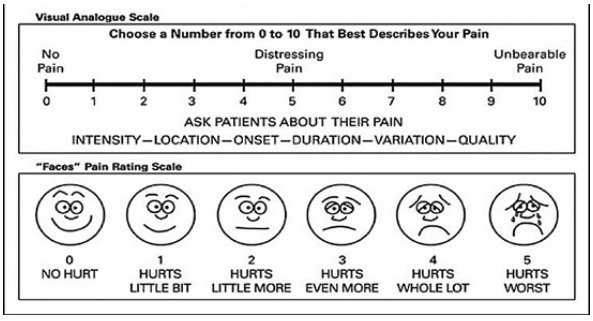
Suturing
Sutures were given with round body needle 3-0 braided black silk after delivery of the tooth.

Toilet and Closure of wound :
Following delivery of the tooth a thorough toileting of the surgical wound was done and hemostasis was achieved. A primary soft tissue closure was achieved with 3-0 braided black silk sutures. Pressure pack was given with sterile gauze.

Tablet diclofenac sodium 50mg (FENAC 50) tds for three days, Tablet Ranitidine 150mg (PAN 40 bid for three days and **Tablet Augmentin 625mg) tds for five days** are prescribed. **Tablet Paracetamol 650mg** given to the patients as a rescue medication which can be taken in case of increase in pain. Patient are assigned to score the post-operative pain three times in a three consecutive days in VAS – Visual analog scale, after 12hours, 24hours, 48hours and 72 hrs and to stop the scoring, if they required the tab paracetamol 500mg for pain control and from then the number of paracetamol tablet required is calculated. The VAS consists of a l0 cm horizontal or vertical line with the two endpoints labeled 'no pain' and 'worst pain ever.' The patient is required to mark the l0 cm line at a point that corresponds to the level of pain intensity he or she presently feels, The distance in centimeters from the low end of the VAS and the patient's mark is used as a numerical index of the severity of pain. Patient is recalled for the next extraction one week later. Patient is instructed to apply the **diclofenac patch over right upper arm one hour before** procedure and the extraction of tooth in opposite side of the jaw is carried out under under local anesthesia 2% with adrenaline 1:80000 (Lignox 2%). **Capsule Augmentin 625mg tds for five days** is prescribed to the patient. Patient is asked to change the patch and exactly 12 hours once exactly from the time of application for three days.

Post-operative Assessment:

PAIN
Pain was evaluated using visual analog scale of 10cm size, in which endpoints are indicated with "no pain" to "unbearable pain"



SWELLING
The facial swelling was determined by measuring Three facial measurements between five reference points: Mandibular angle (G), tragus (T), lateral canthus of the eye (L), outer corner of the mouth (A) and soft tissue pogonion (P).

TRISMUS
Interincisal distance after removal of impacted third molar will be evaluated by measuring the distance between incisal edges of upper and lower central incisors using scale.

• The patients were evaluated for pain, trismus & swelling on-
- 12 HOURS
- 24 HOURS
- 48 HOURS
- 72 HOURS

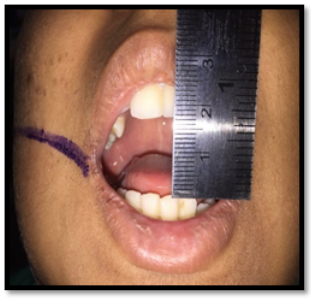
COLOUR PLATE

Colour Plate 1: Dicloplast Transermal Patch

Colour Plate 2: Site Of Application Of Patch

Colour Plate 3: Case Report

Colour Plate 6: Measurement Of Swelling
(Three facial measurements between five reference points: Mandibular angle (G), tragus (T), lateral canthus of the eye (L), outer corner of the mouth (A) and soft tissue pogonion (P))



Colour Plate 7: Mouth opening post-operatively

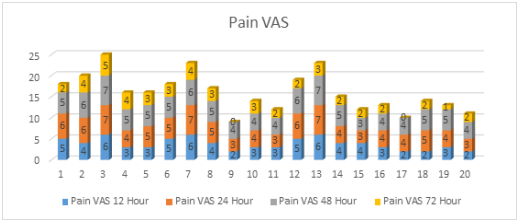
OBSERVATION AND RESULTS

Statistical Analysis:

The data was analyzed by Statistical Package for Social Sciences (SPSS 16.0) version. Unpaired t test applied to find the statistical significant between groups. ANOVA (Post hoc) followed by Dunnet t-test applied to find statistical significant between the groups. p value less than 0.05 ($p<0.05$) considered statistically significant at 95% confidence interval.

Table 1.1-Group A: Post Operative Pain (visual Analogue Scale)

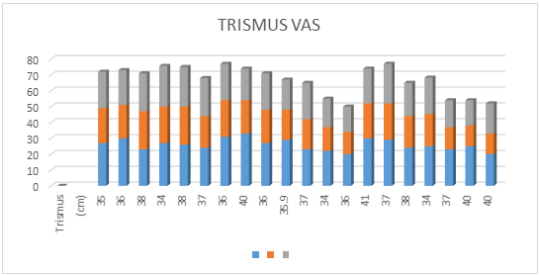
Pain VAS 12 Hour	Pain VAS 24 Hour	Pain VAS 48 Hour	Pain VAS 72 Hour
5	6	5	2
4	6	6	4
6	7	7	5
3	4	5	4
3	5	5	3
5	5	5	3
6	7	6	4
4	5	5	3
2	3	4	0
3	4	4	3
3	3	4	2
5	6	6	2
6	7	7	3
4	4	5	2
4	3	3	2
3	4	4	2
2	4	4	0
2	5	5	2
3	4	5	1
2	3	4	2



Graph 1.1

Table 2.1: Group A: Post Operative Trismus(MM)

Trismus mcm)	Trismus	Trismus	Trismus
35	27	22	23
36	30	21	22
38	23	24	24
34	27	23	25.7
38	26	24	25
37	24	20	24
36	31	23	23
40	33	21	20
36	27	21	23
35.9	29	19	19
37	23	19	23
34	22	15	18
36	20	14	16
41	30	22	22
37	29	23	25
38	24	20	21
34	25	20.3	23
37	23	14	17
40	25	13	16
40	20	13	19

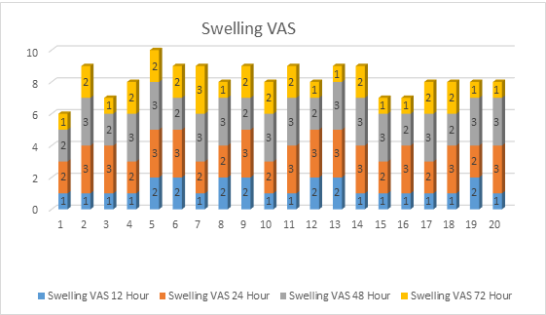


Graph 2.1

Table 3.1- Group A: Post Operative Swelling (Visual Analogue Scale)

Swelling VAS 12 Hour	Swelling VAS 24 Hour	Swelling VAS 48 Hour	Swelling VAS 72 Hour
1	2	2	1
1	3	3	2
1	3	2	1
1	2	3	2
2	3	3	2
2	3	2	2
1	2	3	3
2	2	3	1
2	3	2	2
1	2	3	2
1	3	3	2
2	3	2	1
2	3	3	1
1	3	3	2
1	2	3	1

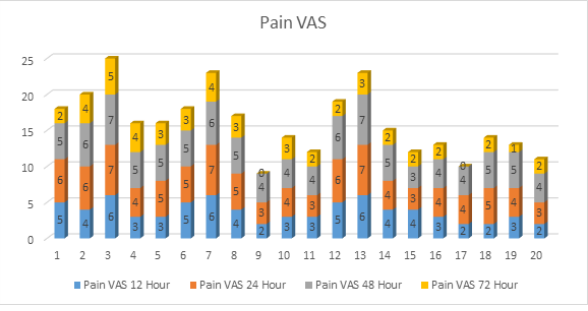
1	3	2	1
1	2	3	2
1	3	2	2
2	2	3	1
1	3	3	1



Graph 3.1.

Table 4.1- Group B: Post Operative Pain (visual Analogue Scale)

Pain VAS 12 Hour	Pain VAS 24 Hour	Pain VAS 48 Hour	Pain VAS 72 Hour
5	6	5	2
4	6	6	4
6	7	7	5
3	4	5	4
3	5	5	3
5	5	5	3
6	7	6	4
4	5	5	3
2	3	4	0
3	4	4	3
3	3	4	2
5	6	6	2
6	7	7	3
4	4	5	2
4	3	3	2
3	4	4	2
2	4	4	0
2	5	5	2
3	4	5	1

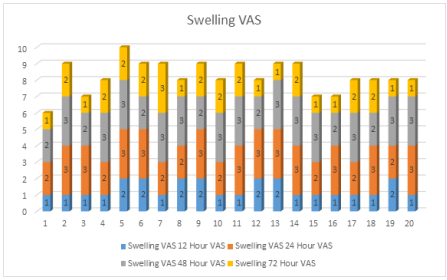


Graph 4.1

Table 5.1-Group B: Post Operative Swelling (visual Analogue Scale)

Swelling VAS 12 Hour	Swelling VAS 24 Hour	Swelling VAS 48 Hour	Swelling 72 Hour
VAS	VAS	VAS	VAS
1	2	2	1
1	3	3	2
1	3	2	1
1	2	3	2
2	3	3	2
2	3	2	2
1	2	3	3
2	2	3	1
2	3	2	2
1	2	3	2
1	3	3	2
2	3	2	1

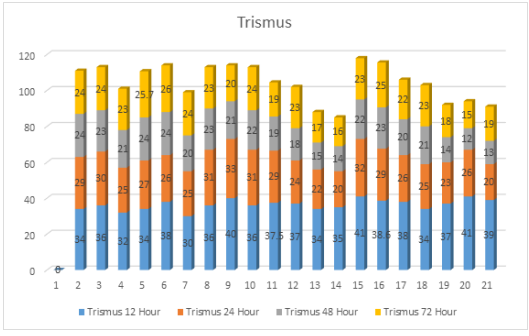
2	3	3	1
1	3	3	2
1	2	3	1
1	3	2	1
1	2	3	2
1	3	2	2
2	2	3	1
1	3	3	1



Graph 5.1

Table 6.1- Group B: Post Operative Trismus (MM)

Trismus 12 Hour	Trismus 24 Hour	Trismus 48 Hour	Trismus 72 Hour
(cm)			
34	29	24	24
36	30	23	24
32	25	21	23
34	27	24	25.7
38	26	24	26
30	25	20	24
36	31	23	23
40	33	21	20
36	31	22	24
37.5	29	19	19
37	24	18	23
34	22	15	17
35	20	14	16
41	32	22	23
38.6	29	23	25
38	26	20	22
34	25	21	23
37	23	14	18
41	26	12	15
39	20	13	19



Graph 6.

DISCUSSION

The word 'pain' is derived from the latin word 'peona' which means punishment. The management of post operative pain is a never ending field of research, which changes continuously. The pre emptive analgesia which prevents the central sensitization is an effective modality in managing the post operative pain.

In this comparative interventional study, the efficacy of Diclofenac tablet and Diclofenac transdermal patch in management of post operative pain is compared in patients with bilateral surgical extraction of impacted mandibular third molar. This study being a cross over study all the participants were exposed to both the form of drugs

(Diclofenac tablet and diclofenac patch) within the interval of one week.

Post Operative Pain:

In day one, the mean pain scores in all the pain scales like VAS, reduced with time in both the groups and the reduction were statistically significant in both groups (diclofenac tablet and diclofenac patch). This result was in accordance with **Bhaskar et al19**, where he showed that in comparing post operative pain, the mean pain score reduced with time in both the groups. In day one, though the mean 12 hour pain scores in all the scales seems to be lesser in group II (diclofenac patch) when compared to group I(diclofenac tablet) the p value was not statistically significant. Similarly , the mean 24 hour pain scores in all the scales seems to be lesser in group II (diclofenac patch) when compared to group I(diclofenac tablet) but the p value was not statistically significant. Similarly, the mean 24 hour pain scores in day one in all the scales seems to be lesser in group II (diclofenac patch) when compared to group I (diclofenac tablet) but the p value was not statistically significant. This result obtained in this study is in contradictory to the previous study by **Bachalli PS et al.7** who showed when comparing Diclofenac patch and Diclofenac tablet the diclofenac tablet was more effective in managing the post operative pain in first 24 hours. This contraindication can be explained with the fact that the analgesics in this study are given preemptively. The diclofenac transdermal patch is given 2 hours and diclofenac tablet is given one hour before the procedure. In day two, the mean pain score in all the pain scales like VAS, reduced with time in both the groups and the reduction of mean VAS score was significant in both groups (diclofenac tablet and diclofeanc patch).

In day two, though the mean 12 hour pain scores in all the scales seems to be lesser in group II (diclofenac patch) when compared to group I (diclofenac tablet) the p value was not statistically significant. Similarly, the mean 24 hour pain scores in day one in all the scales seems to be lesser in group II (diclofenac patch) when compared to group I (diclofenac tablet) but the p value was not statistically significant. Similarly, the mean 48 hour pain scores in day one in all the scales seems to be lesser in group II (diclofenac patch) when compared to group I (diclofenac tablet) but the p value was not statistically significant. This result was similar to the result obtained by . **Sen I et al.** which states that the transdermal diclofenac and Oral Diclofenac are equally efficient in managing the post operative pain in day two.

In day three, the mean pain scores in all the pain scales like VAS reduced with time in both the groups and the reduction were statistically significant in both groups (diclofenac tablet and diclofenac patch).

In this study no patients required an emergency medication in both Group I diclofenac tablet and Group II - diclofenac patch, but in a comparative interventional study of **Narzaree P et al.19** about one patient out of twenty required emergency paracetamol tablet as an emergency medication inspite of transdermal patch. This contradiction can be explained by preemptive analgesic principle of this study. Though the mean pain scores for the patients in transdermal patch are lesser than the pain scores for the patients in diclofenac tablet, the differences between them are not statistically significant. Thus leading to the conclusion of equal efficacy of the two medication in management of post operative pain.

SUMMARY AND CONCLUSION

The post operative pain management is the most critical part of any surgery, this includes to the post extraction pain also.From this study we can arrive at a conclusion that both diclofenac tablet and diclofenac transdermal patch are equally effective in management of post extraction pain. And Transdermal patch with its various advantages of transdermal delivery system can be used as an alternative for oral diclofenac in management of post extraction pain.

Diclofenac tablet is the most common NSAID used in dentistry for post extraction pain.The purpose of the study is to compare the efficacy of transdermal diclofenac and oral diclofenac in management of post operative pain in bilateral extraction. The study was designed as a cross over comparative interventional study with the sample size of 20 in each group. After proper case selection based on inclusion and exclusion criteria, the patients with bilateral extraction underwent one extraction with the tablet Diclofenac one hour before surgery (group A) and the pain scores in scales like Visual Analogue Scale, was recorded at the interval of 12hour, 24hours and 48hours &72 hours.After interval of one week the second extraction is done with transdermal patch placed in right shoulder one hour before procedure and the post extraction pain was recorded in similar manner.

In day one, the mean pain score of all the scales decreased with time and 12 hours for all the scales was lesser than the mean pain scores of group B. But the difference was not statistically significant.

In day two, the mean pain score of VAS scale decreased with time significantly in both the groups. The group B mean pain score at 12hours and 24 hours and 48 hours for all the scales were lesser than the mean pain scores of group B.

from the above readings we can conclude that both oral diclofenac sodium tablet and diclofenac sodium transdermal patch are effective in the post operative pain management after the surgical removal of impacted mandibular third molar

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