



## To Compare the Efficacy of Passively Repositioned Closure Technique with that of Conventional Closure Technique after Surgical Extraction of Impacted Mandibular Third Molar-An In Vivo Study

<sup>1</sup>Dr Pallavi Kalia, <sup>2</sup>Dr Sumit Kumar Sharma, <sup>3</sup>Dr Kusum Singh, <sup>4</sup>Dr Sumit Chopra, <sup>5</sup>Dr Vipul Garg

1. Senior Resident (Oral & Maxillofacial Surgery), Department of Dentistry, Jawaharlal Nehru Medical College, Ajmer, Rajasthan.
2. Junior Specialist (Dentistry), Government General Hospital, Nasirabad, Ajmer, Rajasthan.
3. Associate Professor, Department of Dentistry, Sardar Patel Medical College, Bikaner, Rajasthan.
4. Professor and Head, Department of Oral & Maxillofacial Surgery, HIDS, Paonta Sahib, Himachal Pradesh.
5. Reader, Department of Oral & Maxillofacial Surgery, HIDS, Paonta Sahib, Himachal Pradesh.

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### ABSTRACT

**Aim** – An in vivo study to compare the efficacy of passively repositioned closure technique with that of conventional closure technique after transalveolar extraction of mandibular third molar.

**Objectives** – The study was conducted to evaluate and compare the effect of passively repositioned closure technique with that of conventional closure technique on post operative pain, swelling, trismus and bleeding in mandibular third molar surgery.

**Methodology** – Forty adult patients between the age of 18-50 years requiring surgical extraction of mandibular third molar were randomly divided into experimental and control groups (n = 20 patients each). The allocation of patient to experimental and control group was not biased by demographic factors like age, sex, caste, socio-economic factors etc. In experimental group (Group A) flap was passively re-approximated to get passive closure of the wound. In control group (Group B) flap was primarily closed with 3-0 black silk with multiple interrupted sutures. Both groups were evaluated for measurements related to pain, swelling, trismus and bleeding. The measurements were used for statistical analysis by chi-square test.

**Results** – Statistically significant difference was observed in the mean pain score in suture and sutureless group on third post operative day. There was no statistically significant difference in swelling between the two groups; mean swelling score was more in suture group. Statistically significant difference was noted in trismus between the groups at third, seventh and tenth post-operative day. There

was no statistically significant difference observed in bleeding score between the two groups on 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> day post-operatively.

**Conclusion** – Passively repositioned closure technique (Sutureless technique) is a simple and viable option for minimizing the post-operative morbidity associated with inflammatory sequelae after third molar surgery.

**Key words** – Sutureless, primary healing, secondary healing, pain, swelling, trismus, bleeding, impacted third molars.

### I. INTRODUCTION

Impacted teeth are developmental pathological medical deformities characteristic of modern civilization. As a result of eating refined diets that do not cause attrition of proximal dental surfaces and owing to oral health care's success in retaining full compliments of tooth crowns in their original eruptive dimensions, many people lack space needed to accommodate the eruption of third molars posterior to second molars.<sup>1</sup> The performance of surgical procedures for impacted teeth includes some fundamental supportive measures that are based on surgical principles. Patients frequently complain of pain, swelling, limitation in mouth opening and wound infection associated with inflammatory response following third molar surgical extraction. Methods to alleviate these complications have been the focus of several experimental studies. These include different closure techniques with and without incorporation



of drains<sup>2,3</sup>, use of drugs such as analgesics,<sup>4</sup> corticosteroids,<sup>5,6</sup> and antibiotics.<sup>7</sup> Physical therapeutic methods such as cryotherapy<sup>8</sup> and soft tissue laser application,<sup>9</sup> are also used. Techniques that allow for evacuation of inflammatory exudates appear to have received more attention.<sup>10,11</sup> In passively closure technique, flap is repositioned passively to facilitate closure of wound without any means of retaining the flap in repositioned state. Healing is by secondary intention. It provides better room for evacuation of inflammatory exudates resulting in less pain, swelling and trismus. The associated disadvantage is that it may lead to accumulation of food debris thereby; increasing the possibility of infection and healing may be delayed.<sup>11</sup> Whereas in conventional closure technique sutures are used and healing is by primary intention. It is time consuming and needs good suturing skills and requires second patient visit for the removal of sutures.<sup>12</sup> In this clinical study, we compared the effect of passively repositioned closure technique with that of conventional closure technique on pain, swelling, trismus and bleeding after surgical extraction of mandibular third molar.

## II. METHODOLOGY -

### Inclusion criteria-

1. Age group: 18-50 years.
2. Patient with mesioangular, distoangular, horizontal and vertical mandibular third molar impactions with a difficulty index of 3-5, according to Pederson Difficulty Index.
3. Healthy patient (ASA I, II) without any significant medical disease that may compromise healing.
4. Absence of symptoms such as pain, swelling or limited mouth opening from any cause within 10 days preceding surgery.
5. Absence of active infection both pericoronally and periapically at the time of surgery.

### Exclusion criteria-

1. Medically compromised patients (ASA III, IV, V).
2. Pregnant or lactating patients.
3. Smokers.
4. Patients on medications that can interfere with the postoperative healing.
5. Minors.
6. Patients having swelling, pain and trismus within 7 days prior to extraction.
7. Presence of active infection both pericoronally and periapically at the time of surgery.
8. Patients allergic to the medications (amoxicillin, metronidazole, ibuprofen) used in the study.

Selected forty adult patients between the ages of 18-50 years who required transalveolar extraction of

mandibular third molars were randomly divided into two groups (n=20 patients each). The allocation of patient to two groups was not biased by demographic factors like age, sex, caste, socio-economic factors etc.

## III. METHODOLOGY

This comparative study was conducted in three phases viz. Presurgical Phase, Surgical Phase and Postsurgical Phase.

**I. Presurgical Phase-** In this phase of the study, detailed case history was taken along with other relevant patient related data. This was followed by detailed clinical examination including both, extraoral and intraoral.

**Clinical Examination-** General physical examination was carried out and documented. The data obtained from clinical examination was recorded to establish base line data.

**Radiological Examination-** Intraoral periapical radiographs were taken to classify impaction, to draw winter's (war lines) and to calculate Pederson difficulty index.

**Laboratory Investigations-** Preoperatively, routine laboratory investigations were done, which include routine blood investigations such as Hemoglobin (Hb), Bleeding Time (BT; Duke's method), Clotting Time (CT; Slide method), Total Leukocyte Count (TLC), Random Blood Sugar (RBS) and investigations for HBsAg and HIV. All investigations were carried out within 24 hours prior to surgical procedure.

Prior to extraction, all patients were assessed medically for fitness for extraction procedure. Patients were explained regarding the surgical procedure, potential risks and benefits of the procedure and possibilities of postoperative complications.

**II. Surgical Phase-** Strict sterilization protocol was followed with proper barrier techniques. All the patients used chlorhexidine mouthwash (0.2%) for mouth rinsing, just before the administration of local anesthesia. Transalveolar extractions of mandibular third molars were done under local anesthesia using 2% Xylocaine with 1:200000 adrenaline. The standard envelop incision was given in all the patients of both groups. Incision was given with B.P. blade no. 15. After incision a full thickness mucoperiosteal flap was reflected followed by removal of the bone with straight fissure bur. Removal of the bone was accompanied by continuous irrigation with normal saline to prevent bone necrosis. Tooth sectioning was performed if required to facilitate extraction. Smoothing of bone margins was performed followed by irrigation of socket with normal saline. After carrying out



surgical extractions, the closure of the surgical wound was done according to group allocated. Wet gauge pressure pack was placed and postoperative instructions were explained to the patient. Sutures were removed on 7<sup>th</sup> postoperative day. In all patients transalveolar extractions were performed by the same doctor under similar clinical conditions to rule out any bias with respect to difference in working technique of different clinicians.

**III. Postsurgical Phase-** Patients were evaluated postoperatively for collection of data based on parameters under investigation. The patients were evaluated as:

1. Post-operative bleeding was recorded immediately and on 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> post operative day.

2. Pain, swelling and trismus were recorded on 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 14<sup>th</sup> post-operative day.

**Estimation of Postoperative Pain-** Postoperative pain in the patients were evaluated by noting the analgesic requirement of the patient and degree of pain relief after taking these analgesics as evaluated by "Numerical Pain Intensity Scale"(NPIS). In this method, the patients were instructed to mark the intensity of their pain by pointing on a 0-10 point scale. The two extreme values of the NPIS are value 0 indicating no pain and value 10 indicating worst possible pain. Patients were instructed to keep on recording their pain intensity on NPIS for 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 14<sup>th</sup> day after surgery.

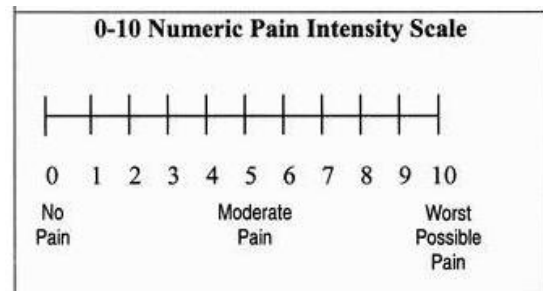


Figure 1: Numerical Pain Intensity Scale.

**Postoperative Swelling-** Postoperative swelling was evaluated by measuring the distance from the corner of the mouth to the attachment of the earlobe following the bulge of the cheek and the distance from the outer canthus of the eye to the angle of the mandible. The arithmetic mean of the two measurements was considered as baseline value.



Figure 2: Landmarks for estimation of postoperative swelling.

**Postoperative Bleeding-** It was evaluated according to the index as follows:

0	No bleeding	The patient does not detect any blood in saliva
1	Oozing	The patient detects a slight blood but it is not very noticeable
2	Accidental low bleeding	The patient has low bleeding sometimes
3	Continuous low bleeding	The patient has low bleeding often
4	Massive bleeding	Continuous high bleeding

**Postoperative Trismus Evaluation (Mouth Opening)-** Opening of mouth after removal of impacted third molar was evaluated by measuring the distance between incisal edges of maxillary and mandibular central incisors using Vernier's calliper. Postoperative interincisal distance was subtracted from preoperative interincisal distance to calculate decreased mouth opening/trismus evaluation.

**Statistical Analysis-** Data so obtained in 40 patients was subjected to statistical analysis to evaluate postoperative outcomes of passively repositioned closure technique and conventional closure technique after surgical extractions of mandibular third molar.



**IV. OBSERVATION & RESULTS – GRAPHS & TABLES**

**Table 1** - Comparison Between Experimental Group (Sutureless Group) and Control Group (Suture Group) with Respect to Pain in Postoperative Period at Various Time Intervals.

	Group	N	Mean (Unit)	Std. Deviation	p-value
3rd Day	Experimental Group (Sutureless Group)	20	1.1500	0.81273	0.002*
	Control Group (Suture Group)	20	2.0000	0.79472	
7th Day	Experimental Group (Sutureless Group)	20	0.1500	0.48936	0.547 <sup>#</sup>
	Control Group (Suture Group)	20	0.2500	0.55012	
10th Day	Experimental Group (Sutureless Group)	20	0.0000	0.00000	0.324 <sup>#</sup>
	Control Group (Suture Group)	20	0.0500	0.22361	
14th Day	Experimental Group (Sutureless Group)	20	0.0000	0.00000	-
	Control Group (Suture Group)	20	0.0000	0.00000	

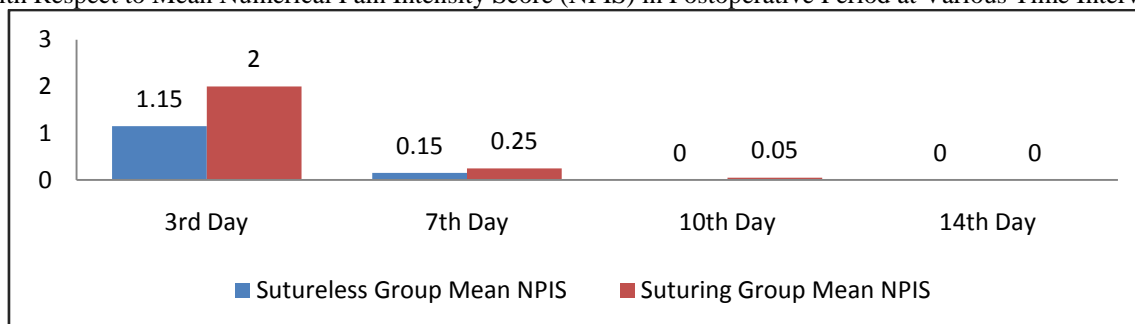
Pain being a subjective phenomenon, there is no standard instrument for the measurement of pain. In experimental group mean value of pain score was 1.15 whereas in control group mean pain score was 2.00 on 3<sup>rd</sup> post-operative day.

On 7<sup>th</sup> post-operative day, in experimental group, mean value of pain score was 0.15 where as

in control group, it was 0.25. On 10<sup>th</sup> postoperative day mean value of pain score was 0.0 whereas in control group was 0.05.

Statistically significant difference was observed in mean pain score in suture and sutureless group on 3<sup>rd</sup> postoperative day.

**Graph 1** - Comparison Between Experimental Group (Sutureless Group) and Control Group (Suture Group) with Respect to Mean Numerical Pain Intensity Score (NPIS) in Postoperative Period at Various Time Intervals.



**Table 2** - Comparison Between Experimental Group (Sutureless Group) and Control Group (Suture Group) with Respect to Swelling in Postoperative Period at Various Time Intervals.

Swelling	Group	N	Mean (mm)	Std. Deviation (mm)	p-value
3rd Day	Experimental Group (Sutureless Group)	20	4.9750	1.32263	

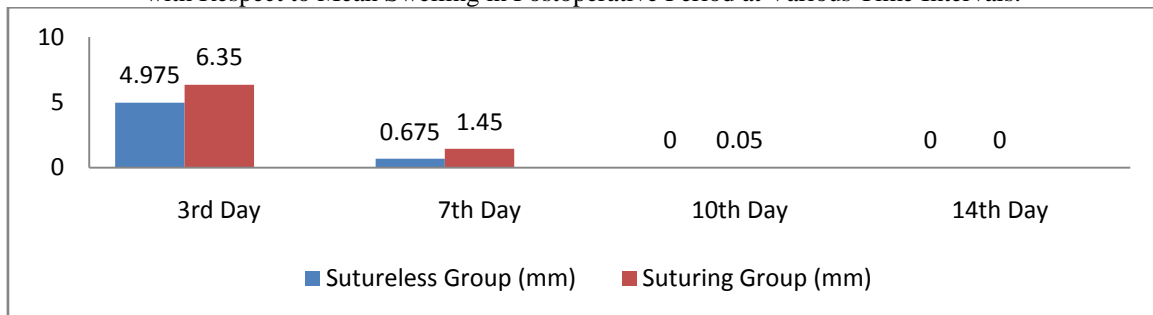


	Control Group (Suture Group)	20	6.3500	3.35645	0.096 <sup>#</sup>
7th Day	Experimental Group (Sutureless Group)	20	0.6750	1.07941	0.117 <sup>#</sup>
	Control Group (Suture Group)	20	1.4500	1.87013	
10th Day	Experimental Group (Sutureless Group)	20	0.0000	0.24468	0.0983
	Control Group (Suture Group)	20	0.0500	0.22361	
14th Day	Experimental Group (Sutureless Group)	20	.0000	0.00000 <sup>a</sup>	-
	Control Group (Suture Group)	20	0.0000	0.00000 <sup>a</sup>	
* Statistically Significant (Independent t-test)					
<sup>#</sup> Statistically Not Significant (Independent t-test)					

There was no statistically significant difference in swelling between the two groups, but there was marked difference in the mean value of swelling at 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> post-operative day,

indicating that swelling is lesser in experimental group as compared to the control group as there was no pathway for the drainage of fluid.

**Graph 2 - Comparison Between Experimental Group (Sutureless Group) and Control Group (Suture Group) with Respect to Mean Swelling in Postoperative Period at Various Time Intervals.**



**Table 3- Comparison Between Experimental Group (Sutureless Group) and Control Group (Suture Group) with Respect to Trismus (Decreased Mouth Opening in Postoperative Period at Various Time Intervals).**

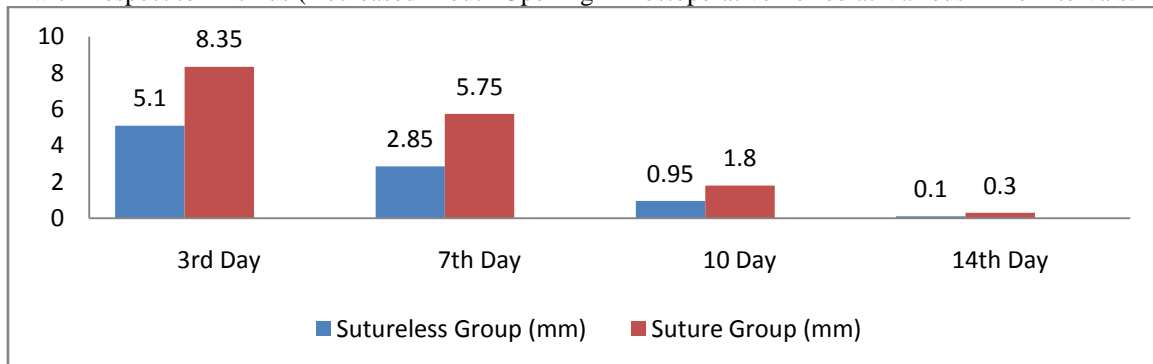
Trismus	Group	N	Mean (mm)	Std. Deviation (mm)	p-value
3rd Day	Experimental Group (Sutureless Group)	20	5.1000	2.10013	0.000*
	Control Group (Suture Group)	20	8.3500	2.00722	
7th Day	Experimental Group (Sutureless Group)	20	2.8500	1.22582	0.000*
	Control Group (Suture Group)	20	5.7500	1.48235	



10th Day	Experimental Group (Sutureless Group)	20	0.9500	0.82558	0.011*
	Control Group (Suture Group)	20	1.8000	1.15166	
14th Day	Experimental Group (Sutureless Group)	20	0.1000	0.44721	0.336#
	Control Group (Suture Group)	20	0.3000	0.80131	
* Statistically Significant (Independent t-test)					
# Statistically Not Significant (Independent t-test)					

There was statistically significant difference in trismus between two groups at 3<sup>rd</sup>, 7<sup>th</sup> and 10<sup>th</sup> day post-operatively. Trismus was observed more in Control group (Suture Group) as compared to Experimental group (Sutureless Group).

**Graph 3** - Comparison Between Experimental Group (Sutureless Group) and Control Group (Suture Group) with Respect to Trismus (Decreased Mouth Opening in Postoperative Period at Various Time Intervals).



**Table 4** - Comparison Between Experimental Group (Sutureless Group) and Control Group (Suture Group) with Respect to Bleeding in Postoperative Period at Various Time Intervals.

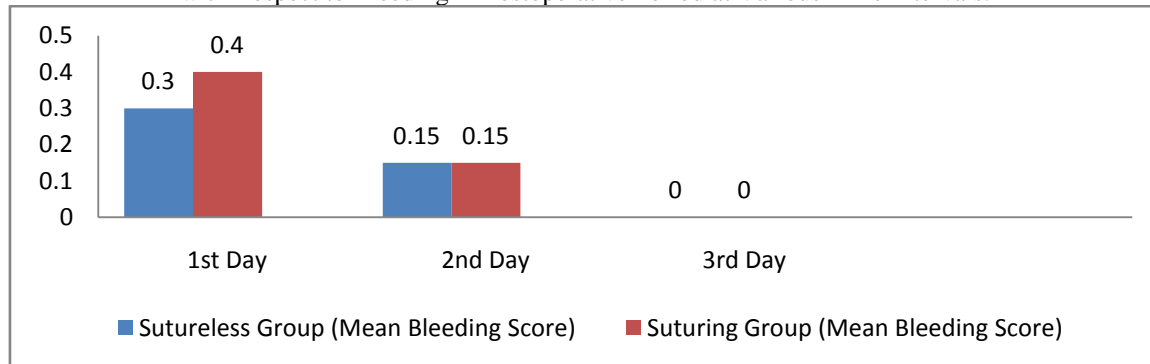
Postoperative Bleeding	Group	N	Mean (Unit)	Std. Deviation	p-value
1st Day	Experimental Group (Sutureless Group)	20	0.3000	0.65695	0.639#
	Control Group (Suture Group)	20	0.4000	0.68056	
2nd Day	Experimental Group (Sutureless Group)	20	0.1500	0.48936	1.000#
	Control Group (Suture Group)	20	0.1500	0.36635	
3rd Day	Experimental Group (Sutureless Group)	20	0.0000	0.00000	-
	Control Group (Suture Group)	20	0.0000	0.00000	
# Statistically Not Significant (Student's t-test)					





There was no statistically significant difference observed in bleeding score between two groups on 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> day post-operatively.

**Graph 4 - Comparison Between Experimental Group (Sutureless Group) and Control Group (Suture Group) with Respect to Bleeding in Postoperative Period at Various Time Intervals.**



## V. DISCUSSION

Third molars are the most commonly impacted teeth and their surgical removal is one of the most common surgical procedures performed by Oral and Maxillofacial Surgeons.<sup>13</sup> Morbidities associated with the surgical removal of an impacted third molar, such as pain, swelling, trismus, alveolar osteitis (dry socket), nerve damage and compromised periodontal status of the adjacent second molar, still pose a major problem for surgeons. Postoperative morbidity has important medical, legal and economical implications.<sup>14</sup> Factors affecting postoperative morbidity could be patient related factors, tooth related factors and operative factors. The acute post operative sequelae of impacted mandibular third molar surgery are manifestations of inflammation on tissue injury. Inflammatory reactions after trauma to tissue are known to be the purposeful defensive mechanism of the part of body. Damage to the capillary vessels and release of inflammatory cytokines as a result of trauma lead to increased permeability of vessels, which results in accumulation of serosanguinous fluid and exudates.<sup>15</sup> The inflammatory response is closely intertwined with the process of repair. This is necessary if healing is to occur but often excessive inflammation causes unnecessary pain, edema and trismus.

Methods to alleviate these complications have been the focus of several experimental studies. The studies related to above mentioned treatment modalities have shown that, there is no ideal agent that can minimize postoperative pain, swelling and trismus without unwanted side effects.<sup>4</sup> Techniques that allow for evacuation of inflammatory exudates appear to have received more attention in the past as these have been thought to result in less pain, swelling and trismus with comparatively few

undesirable effects. These method include excision of mucosa immediately distal to second molar to create a window, which serves as an outlet for inflammatory exudates.<sup>2,10,11</sup> Other methods include a combination of mucosal excision and drains,<sup>11</sup> incorporation of drains which may be in form of a gauze or rubber<sup>12</sup> and suture-less techniques in which no form of suturing is used. Suture-less third molar surgery is gaining global attention fastly. Several studies have evaluated the influence of age on post-operative morbidity following surgical extraction of impacted third molar. The surrounding bone in young patients is relatively soft and more resilient as compared to the older patients. Where the bone is harder, it necessitate more bone removal there by resulting in more post operative pain, swelling and trismus. This was in accordance with Bruce et al (1980) who found that patients above 35 years experience more swelling and trismus.<sup>16</sup>

In present study, we compared the efficacy of passively repositioned closure technique with that of conventional closure technique. Primary closure of a third molar flap is derived from basic surgical principles and recommended by Howe<sup>17</sup>, Archer<sup>18</sup>, Peterson.<sup>6</sup> Other authors such as Hunter<sup>19</sup>, Bourgoyne<sup>20</sup>, Blair and Ivey<sup>21</sup> recommend secondary intention to facilitate irrigation and drainage. Pain being a subjective phenomenon there is no standard instrument for the measure of pain. In this study pain was evaluated using Numeric Pain Intensity Scale which is considered to be an efficacious tool to evaluate clinical parameters that influence the subjective experience of an individual. In our study statistically significant difference was observed in mean pain score in suture and sutureless group on 3<sup>rd</sup> postoperative day. This was due to the maintenance of pathway to drain the inflammatory exudates and fluids after extraction in sutureless



group. Results of this study were similar to studies carried out by Pasquilini et al (2005)<sup>11</sup>, Holland and Hindle et al (1984)<sup>3</sup>, Dubois et al (1982)<sup>2</sup>, Kiran Khande et al (2011)<sup>22</sup>, Osunde OD et al (2012)<sup>23</sup>. Swelling was assessed by the extra oral objective measurements. There is no statistically significant difference in swelling between the two groups, but there is a marked difference in the mean values of swelling at 3<sup>rd</sup>, 7<sup>th</sup> and 10<sup>th</sup> postoperative day indicating that swelling is lesser in experimental group as compared to the control group as there was no pathway for the drainage of fluid in conventional closure technique. These results were similar to the study carried out by Khande K et al (2011)<sup>22</sup>, Danda et al (2010)<sup>24</sup>, Brabander and Cattaneo (1988)<sup>25</sup>. They also evaluated two different types of wound closure after removing impacted mandibular third molars and found that the pain and swelling were less in secondary closure as compared to primary closure. There was a statistically significant difference in trismus between two groups at 3<sup>rd</sup>, 7<sup>th</sup> and 10<sup>th</sup> postoperative day. These results were similar to the study carried out by AC Labra et al (2012)<sup>26</sup>, OD Osunde et al (2012)<sup>23</sup> who also evaluated trismus in two types of wound closure after surgical removal of impacted mandibular third molar and found that trismus was less in secondary closure as compared to primary closure. In our study there was no statically significant difference observed in the bleeding score between the experimental and control group on 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> post-operative day. HASHEMI H M et al (2012)<sup>27</sup> assessed the influence of sutureless and multiple suture closure of wounds on post operative complications included pain, swelling, bleeding and formation of periodontal pockets and found that there were no signs of excessive bleeding or oozing postoperatively. The commonest suture material used is silk in the oral cavity. Silk elicits more intense tissue inflammatory response and delayed wound healing as compared to other suture materials. An important complication of suturing is a stitch abscess. An abscess around a stitch or suture is called a stitch abscess. A stitch abscess may lead to superficial cellulitis and even deeper seated infection. If suturing is too tight it may cause sloughing or trismus. In experimental group (sutureless group), strict oral hygiene measures have to be carried out by the patient, this technique is economical, saves operative time, minimizes manipulation of soft tissue and hence causes less surgical morbidity, allows for drainage of inflammatory exudates and less traumatic as compared to suture technique after surgical removal of impacted mandibular third molar.

## VI. CONCLUSION-

From the above results, it is concluded that sutureless technique is cheap, saves operative time, minimizes the manipulation of soft tissues and hence causes less surgical morbidity. Sutureless third molar surgery is less traumatic and does not require additional hospital visits for the removal of sutures. Sutureless technique is a simple and viable option for minimizing post operative morbidity associated with inflammatory sequelae after third molar surgery.

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