Evaluation of anxiety and hemodynamic changes in surgical removal of lower third molar under local anesthesia.

Faryal1, Asna Khalid2, Muhammad Ahmed Khan2, Suneel Kumar Punjabi4, Usman Manzoor5, Muhammad Aqeel Aslam6, Salman Shams7


ABSTRACT... Objective: To determine the anxiety and hemodynamic changes in surgical removal of lower third molar under local anesthesia. Study Design: Comparative Cross-sectional study. Setting: Department of Oral and Maxillofacial Surgery, Institute of Dentistry of Liaquat University of Medical Health Sciences, Jamshoro. Period: January 2021 to December 2021. Material & Methods: Three hundred and fourteen patients were selected by non-probability convenience sampling technique. Patient having age between 18 to 50 years with either gender presented with third molar surgical extraction, first experience of tooth extraction and partial bony impaction were included in study. The demographic and clinical parameters like age, gender, level of anxiety and hemodynamic changes were identified. Hemodynamic parameters were recorded on before starting the surgical procedure (T1), after 5 minutes of injecting local anesthesia (T2) and after completion of surgery (T3). Results: Out of 314 patients, male patients were 156 (49.7%) and female patients were 158 (50.3%) with mean age of 31.0 ± 9.2 (18-50). In third molar extraction significant difference was observed for hemodynamic parameters at T1, T2 and T3 intervals. Conclusion: Surgical removal of lower third molar under local anesthesia significantly increases the anxiety, blood pressure and heart rate after injecting local anesthesia.

Key words: Anxiety, Hemodynamic, Local Anesthesia, Surgical Extraction, Third Molar.

INTRODUCTION

It is common knowledge that dental anxiety exists, and wisdom teeth extraction is the dental treatment that causes the most dental anxiety out of all others.1 According to the American Heritage Science Dictionary, anxiety is a feeling of fear brought on by the expectation of a dangerous circumstance or occurrence. While severe dental anxiety (DA), commonly referred to as dental phobia, is a significant and persistent worry that is inordinate or unjustified and is triggered by the thought of a certain item or circumstance. Many individuals of all ages and socioeconomic backgrounds have dental anxiety, which continues to be a substantial issue for both the dentist and the patient while obtaining dental treatment.2

The reason of dental anxiety and fear varies depending on the age at which it first manifests; in children, a bad dental encounter is often to blame, but in adults, general anxiety moods are more likely to be to blame. Hemodynamic changes during the procedure may be brought on by such anxiety as well as the use of vasoconstrictor medications and local anesthetics. During the surgical removal of a lower third molar, fluctuations in hemodynamic measures, including systolic and diastolic blood pressure and heart rate, are examined for their relationships to patient gender and anxiety.3

It is acknowledged that controlling dental anxiety is a crucial problem in dental practice. Dental treatment is hampered by a patient’s fear, which negatively impacts a dentist’s performance.4 Dentists have additional work stress as a consequence of the longer treatment times and often unsatisfactory outcomes of treating worried
patients. The dentist may take steps to reduce
the patient’s anxiety during the surgical operation
if he is aware of the patient’s degree of dental
anxiety in advance.5

The therapy of third molars often depends on
determining the existence of symptoms or a
condition that may be directly linked to the third
molar. A strong contraindication to keeping
an impacted third molar in place should go
hand in hand with a strong reason to remove it.
Indications of tooth removal are Pericoronitis,
Caries, Root resorption, Formation of follicular
cyst, Tumors arising in the follicular (Dentigerous
cysts) and Temporomandibular joint symptoms,
while the contraindications are acute infections
with pericoronitis, medically compromised state–
uncontrolled diabetes, Extremes of age – Old
age.6-10

One of the most frequent operations carried out
in offices of oral and maxillofacial surgery is third
molar surgery. However, this operation needs
precise preparation and surgical expertise.
Complications may always happen during surgical
operations, which may also increase patient worry
and panic. Permanent nerve damage, mandibular
fracture, atypical inflammatory processes and
abscess development, displacement of third
molars and tools, along with other unexpected
issues, are common intra- and postoperative
difficulties and adverse effects related to third
molar removal. In order to lessen patient concern
and provide the best possible care, it is important
to be aware of any potential risks connected with
this surgery.9-11

Individuals’ quality of life, looks, and self-esteem
are significantly influenced by their oral and dental
health; hence dentists are required to continually
monitor their patients during any dental surgical
operation to prevent any potentially dangerous
responses. Such type of data is limited, and
no such kind of study has been carried out in
our population. In order to ascertain if these
fluctuations are caused by the patient’s worry, this
research will examine the hemodynamic changes
that occur in healthy individuals after the surgical
removal of the lower third molar.

**MATERIAL & METHODS**

This study was conducted after approval
(LUMHS/REC/-65) of Ethics Review Committee
(ERC) of University followed by informed consent
of patients fulfilling inclusion criteria. Diagnosis
depends on history, clinical examination, and
radiographs (whenever suitable for every case).
Total sample size was calculated as 314 by using
Rao Soft sample size formula. The demographic
and clinical parameters like age, gender, level
of anxiety and hemodynamic changes were
identified and recorded on proforma. The
standard protocol of preparation and sterilization
was done, and all surgeries were performed by the
principal investigator, under the local anesthesia.

**Inclusion Criteria**
- Patients between the age group of 18 to 50
  years of irrespective of gender.
- Third molar surgical extraction.
- First experience of tooth extraction.
- Partial bony impaction

**Exclusion Criteria**
- Patients with comorbidities. (diabetes, heart
disease, hypertension, psychiatric disorders,
or substance abuse).
- Pregnant patients.
- Closed Extraction.
- Patients with skeletal deformities.

**PROCEDURE**

During the procedure, patient position was
reclined at an angle of 120° following standard
protocol of draping and aseptic technique, under
local anesthesia (Medicaine Made in Korea). After
the incision with blade no. 15 (Feather blade) and
reflection of soft tissues with molt no.9 periosteal
elevator, bone was drilled using a round bur no.
6 (rose head) with irrigation using normal saline
(0.9% Searle Made in Pakistan). After exposing
the tooth sufficiently, luxation was achieved
with the help of straight elevator followed by
tooth removal. The sharp edges of the socket
bone were smoothened by bone files. Closure
was done with vicryl 4-0. In postoperative care,
standard antibiotic therapy and analgesic was
prescribed along with home remedies (i.e., cold
and hot sponges).
The Modified Dental Anxiety Scale (MDAS), which consists of 5 items with a 5-category rating scale ranging from “not anxious” to “extremely anxious,” was used to quantify dental anxiety. The OMRON M7 BP Monitor was used to monitor the patients’ systolic and diastolic blood pressure and the Certeza PO 907 - Finger Pulse Oximeter was used to measure the patients’ heart rate and oxygen saturation.

**Data Analysis Procedure**

The data was analyzed in Statistical Package for Social sciences (SPSS) version-22 (registered). Frequencies and percentages were calculated for the categorical variables. The continuous variables like age, hemodynamic parameter e.g., SBP DBP, SPO2 and HR, and anxiety scale were presented as mean and standard deviation. The mean difference was calculated in hemodynamic variables between the three sets of scores by one way repeated measure ANOVA test. Categorical variables were compared by Chi-square test. P value ≤ 0.05 was considered as significant.

**RESULTS**

Distribution of gender in patients underwent for third molar surgical extraction was done. In this study 156 (49.7%) patients were male, and 158 (50.3%) patients were female. Table-I

Descriptive statistics of continuous variable of age (years) inpatients underwent for third molar surgical extraction was done and that showed mean and standard deviation of age as 31.0 ± 9.2 (18-50) years. Table-II

In Table-III distribution of patients as per anxiety classification, blood pressure classification, oxygen saturation classification and heart rate classification have been mentioned in patients who underwent for third molar surgical extraction.

In this study mean and standard deviation of anxiety score was 7.2 ± 2.4 (5-16), 9.3 ± 4.2 (5-18) and 8.6 ± 7.8 (5-66) at T1, T2 and T3 respectively. Mean and standard deviation of anxiety systolic blood pressure was 114.0 ± 10.8 (98-180) mmHg, 127.3 ± 14.2 (110-180) mmHg and 121.9 ± 11.0 (110-155) mmHg, while diastolic blood pressure was 72.8 ± 4.6 (62-90) mmHg, 78.3 ± 5.8 (70-100) mmHg and 75.5 ± 6.3 (70-107) mmHg at T1, T2 and T3 respectively. Oxygen saturation was 98.6 ± 0.6 (97-99)%%, 98.6 ± 0.6 (97-99)% and 98.7 ± 0.5 (97-99)% at T1, T2 and T3 respectively. Mean and standard deviation of heart rate was 75.9 ± 4.2 (66-87) beats per minute, 81.3 ± 6.0 (69-92) beats per minute and 78.9 ± 4.7 (72-93) beats per minute at T1, T2 and T3 respectively. Table-IV

**Table-I Patients distribution according to gender (n=314)**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency (%)</th>
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<tbody>
<tr>
<td>Male</td>
<td>156 (49.7%)</td>
</tr>
<tr>
<td>Female</td>
<td>158 (50.3%)</td>
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<tr>
<td>Total</td>
<td>314 (100.0%)</td>
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**Table-II. Descriptive statistics of age (Years) (n=314)**

<table>
<thead>
<tr>
<th>Variable</th>
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<tr>
<td>N</td>
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<tr>
<td>Minimum</td>
<td>18</td>
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<tr>
<td>Maximum</td>
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</tr>
<tr>
<td>Mean</td>
<td>31.0</td>
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<tr>
<td>SD</td>
<td>9.2</td>
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</table>

**Table-III. Patients distribution according to anxiety, blood pressure, oxygen saturation and heart rate classification in different stages**

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DISCUSSION

Most people have some degree of dental anxiety, particularly those who have had bad dental experiences in the past. The local anesthetic injection is a typical practice that makes people afraid of receiving dental care. The majority of patients are afraid of getting local anesthetic injections since they hurt, even though its primary goal is to reduce discomfort during dental treatment procedures. The main source of the fear is that after a third molar extraction, pain is the most common postoperative consequence. Furthermore, anxiety and hemodynamic changes in people are linked to dental dread and discomfort.13,14,15,16

In this study both male (49.7%) and female (50.3%) patients were equally affecting from third molar impaction and underwent for third molar surgical extraction. A similar study by Alemany-Martínez A et al17 reported the 50.0% female patients and 50.0% male patients underwent for surgical removal of lower third molar under local anesthesia. Another study by Raacharenporn S18 reported the 63.0% female patients and 37.0% male patients underwent for surgical removal of lower third molar under local anesthesia. All similar studies are reporting that both male and female patients are affected with impacted mandibular third molar.

In this study, mean age of impacted mandibular third molar patients was 31.0 ± 9.2 (18-50) years, whereas majority of the patients were in age group of 20-30 years having 18-30 years having 191 (60.8%) patients followed by age group of 31-40 years having 78 (24.8%) patients and 41-50 years having 45 (14.3%) patients. A study by Alemany-Martínez A17 reported the mean age of 27 years, while Gadve VR1 reported the mean age of 37 years and Raacharenporn S18 reported the reported the mean age of 24 years. All similar studies are reporting that young adults are suffering from impacted mandibular third molar.

In this study, significant (p-value < 0.001) increase in anxiety score was observed after injecting local anesthesia that decreased after the completion of surgery. Mean anxiety score was 7.2 ± 2.4 before

<table>
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<tr>
<th>Variable</th>
<th>Statistics</th>
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<th>T2</th>
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<td>Anxiety Score</td>
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<td>Minimum</td>
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<td>5</td>
<td>5</td>
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<tr>
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<td>SD</td>
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<tr>
<td></td>
<td>Minimum</td>
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<tr>
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<td>Maximum</td>
<td>180/90</td>
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<td>155/107</td>
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<tr>
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<td>Mean</td>
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<td>127.3/78.3</td>
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<td>SD</td>
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<td>11.0/6.3</td>
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<tr>
<td>Oxygen Saturation</td>
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<td>97</td>
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<td>SD</td>
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<tr>
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<td>Minimum</td>
<td>66</td>
<td>69</td>
<td>72</td>
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<td></td>
<td>Maximum</td>
<td>87</td>
<td>92</td>
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<tr>
<td></td>
<td>Mean</td>
<td>75.9</td>
<td>81.3</td>
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<td></td>
<td>SD</td>
<td>4.2</td>
<td>6.0</td>
<td>4.7</td>
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Table-IV. Descriptive statistics of anxiety score, blood pressure, oxygen saturation (SPO2) and heart rate in different stages.
Local Anesthesia

surgery that increased to 9.3 ± 4.2 after injecting local anesthesia and then decreased to 8.6 ± 7.8 after the completion of surgery. Different studies reported the similar high mean of anxiety score such as Gadve VR, et al. 10.3 ± 2.95, Liau FL16 9.3 ± 2.5 and Kunzelmann KH19 8.6 ± 3.7. All similar studies are reporting the higher anxiety score during third molar surgical extraction.

In this study, significant (p-value < 0.001) increase in blood pressure (systolic blood pressure and diastolic blood pressure) was observed after injecting local anesthesia that decreased after the completion of surgery. Systolic blood pressure was 114.0 ± 10.8 mmHg before surgery that increased to 127.3 ± 14.2 mmHg after injecting local anesthesia and then decreased to 121.9 ± 11.0 mmHg after the completion of surgery. Similarly, diastolic blood pressure was 72.8 ± 4.6 mmHg before surgery that increased to 78.3 ± 5.8 mmHg after injecting local anesthesia and then decreased to 75.5 ± 6.3 mmHg after the completion of surgery. A study by Alemany-Martínez A17 reported the lowest BP values in most anxious patients. The greatest mean SBP and DBP values were noted during the time of osteotomy and/or tooth sectioning. The fluctuations in BP during surgical extraction of the molars were within normal limits and no noteworthy changes were reported. A study by Gadve VR1 reported the significant changes in SBP and DBP and highest value was recorded at the time of osteotomy/tooth sectioning. A study by Raoccharempong S18 also reported the significant differences in the blood pressure.

In this study, non-significant (p-value 0.726) change in oxygen saturation was observed before surgery 98.6 ± 0.6%, after injecting local anesthesia 98.6 ± 0.6% and after the completion of surgery 98.7 ± 0.5%. Alemany-Martínez A17 noticed that SPO2 values showed no significant changes and were lower at the start of the surgical procedure.

In this study, significant (p-value < 0.001) increase in heart rate was observed after injecting local anesthesia that decreased after the completion of surgery. Mean heart rate was 75.9 ± 4.2 beats per minute before surgery that increased to 81.3 ± 6.0 beats per minute after injecting local anesthesia and then decreased to 78.9 ± 4.7 beats per minute after the completion of surgery. A study by Alemany-Martínez A17 reported the highest heart rate in most anxious patients. The variations in heart rate during surgical extraction of the molars were within normal limits. The lowest heart rate values were recorded at baseline, before the start of the surgical procedure, whereas the highest values were obtained during incision and flap raising. A study by Raoccharempong S18 also reported the significant differences in the heart rate. All similar studies are reporting the significant changes in anxiety score, blood pressure and heart rate. So, it is very much important for oral surgeons that they should continuously monitor the anxiety score and vital signs during surgical removal of lower third molar under local anesthesia.

CONCLUSION

The results of the study led the researchers to the conclusion that surgical removal of a lower third molar under local anesthetic results in a considerable rise in anxiety, blood pressure, and heart rate immediately after the injection of local anesthesia, but that these variables return to normal once the procedure is over.

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### AUTHORSHIP AND CONTRIBUTION DECLARATION

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