ANALYSIS OF TYPE OF SUTURE MATERIAL USED FOR MANDIBULAR TRAUMA- A RETROSPECTIVE STUDY

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ABSTRACT:

The ability to suture is one of the essential skills required of anyone planning to perform surgery. Although it can appear to be a simple procedure, suturing properly requires a sound understanding of the biology of wound healing, good hand–eye coordination, good judgment, and some finesse. Also the knowledge about the type of suture to be used in closure of a particular type of wound is essential to obtain the desired results. The aim of this retrospective study was to determine the type of sutures used in wound closure of different types of mandibular traumas. This retrospective study was conducted in the Department of Oral and Maxillofacial Surgery of Saveetha Dental College. The records from June 2019 till 2020. The relevant information was gathered and tabulated. Total 38 cases were included in this study. All the 38 cases of mandibular were operated for open reduction and internal fixation. The patients operated for panfacial trauma were excluded from the study. There was no specific inclusion or exclusion criteria regarding age and gender of the patient. Chi square test was performed to find the statistical significance. Male predilection (92.1%) was observed in cases of mandibular trauma. Isolated unilateral parasymphysis fracture (31.6%) was the commonest mandibular fracture observed in this study followed by isolated angle fracture (26.3%) and combination of angle and parasymphysis fracture (23.7%). 3-0 polyglactin (56.26%) was the most used suture material in case of mandibular trauma followed by 4-0 vicryl (26.32%). Within the limits of this study we conclude that 3-0 and 4-0 polyglactin is the most commonly used suture material for the wound closure after open reduction and internal fixation of different mandibular traumas.

KEYWORDS: Mandibular fractures, Suture materials, Polyglactin, Ethilon, Silk, Prolene, Polypropylene

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INTRODUCTION:

Surgical suture is a material used to hold the tissues together after an injury or a surgical procedure. (1)The ability to suture is one of the essential skills required of anyone planning to perform surgery. Although it can
appear to be a simple procedure, suturing properly requires a sound understanding of the biology of wound healing, good hand–eye coordination, good judgment, and some finesse.(2)

There are various types of suture materials used for wound closure in maxillofacial trauma. The sutures are mainly classified as absorbable- non absorbable, braided- monofilament, synthetic-natural. Commonly used suture materials in maxillofacial traumas include, silk, polyglactin, nylon, and propylene;(3) however, the choice of suture material depends upon the extent of the trauma, type of the structures involved and choice of the surgeon.

Also there are newer suturing techniques and materials available in the market such as staples, adhesives tapes, cyanoacrylates, etc.(4) However, sutures are still the most preferred method used by the surgeons for closure of the wound.

Previously our team had conducted numerous studies which include in vitro studies (5), review (6,7) , survey (8–11) and clinical trials (12–19). Now we are focussing on retrospective studies, and this study is to analyze the type of suture material used for the different mandibular traumas.

MATERIAL AND METHODS:

This retrospective study was conducted among patients reporting to the Outpatient Dental Department of Oral Surgery Clinic at Saveetha Dental College, Chennai during the period from June 2019 to March 2020 and was approved by the Institutional Research Board (SDC/SHHEC/2020/DIASDATA/0619-0320).

A total of 86000 patient records were reviewed and analysed. There were 38 patients with radiographically confirmed mandibular trauma. All the 38 cases of mandibular were operated for open reduction and internal fixation. The patients operated for panfacial trauma were excluded from the study. There was no specific inclusion or exclusion criteria regarding age and gender of the patient.

The data regarding age of the patient, gender of the patient, type of trauma and the suture material used was extracted for the purpose of the study. The findings were thereafter recorded and the subjects were divided into 7 age groups- Group1: 0-10 years, Group 2: 11-20 years, Group 3: 21-30 years, Group 4: 31-40 years, Group 5: 41-50 years, Group 6: 51-60 years, Group 7: 61-70 years.

All assessments were done by a single examiner and the findings were reviewed and recorded by two independent investigators.

The data was tabulated and analysed using IBM SPSS version 2.0 software. Non-parametric data were analysed using descriptive statistics measuring frequency and percentage. Pearson’s Chi Square Test was used to assess the association between type of trauma and type of suture material used.

RESULTS AND DISCUSSION:

Total 38 cases were included in this study according to the inclusion and exclusion criteria. Age group 1 and 5 had 7.9% of patients, age group 2 had 10.5% of patients, age group 3 had 34.2%, of patients. Age group 4, 6 and 7 had 31.6%, 5.3% and 2.6% of the patients respectively (refer table 1). The maximum number of mandibular trauma patients was observed in the group 3 and 4. There were 35 (92.1%) males and 3 (7.9%) females were involved in this study (refer table 2).

The different types of mandibular traumas included isolated angle fracture, unilateral parasymphysis fracture, isolated condylar fracture, fracture of the body, bilateral parasymphysis fracture. Combination of fractures like angle + parasymphysis, angle + condylar fracture, parasymphysis + condylar fracture. Unilateral parasymphysis
fracture was the commonest fracture observed (31.6%) followed by angle (26.3%) and unilateral parasymphyseal + angle (23.7%). Isolated condylar fracture (2.6%), angle + condylar fracture (2.6%) and parasymphyseal + condylar fracture (2.6%) were the least commonly observed fracture according to this study (refer Figure 1).

Different types of suture materials (refer Figure 2) used in this study included 3-0 silk, 3-0 vicryl, 4-0 vicryl, 4-0 ethilon and 4-0 prolene. 3-0 vicryl was the commonest suture used. Also use of combination of suture materials like polyglactin + nylon, silk + polyglactin, polypropylene + polyglactin was observed. The detailed description of the type of suture material used in a particular trauma is given in table no. 3

The ability to suture is one of the essential skills required of anyone planning to perform surgery. Although it seems to be a simple procedure, suturing requires a sound understanding of the biology of wound healing, good hand–eye coordination skills, and some finesse. Learning to suture in an expert manner requires an understanding of the proper techniques and dedicated practice.(20) Proper closure of the wound is a key to the healing after any surgery. It is important to achieve favourable and successful healing in order to reduce the chances of postoperative infections.(21)

Suturing in the maxillofacial region differs from the other parts of the body due to involvement of the effects of saliva, the existence of oral bacteria and their by products of metabolism, high tissue visualization and movement of wound edges during phonetics and speech intraorally and the esthetic zone in the extraoral facial region.(22) Hence, the selection of the sutures is very important according to the region of the wound closure.

There are multiple sutures available in the markets, but silk and polyglactin are the most preferred sutures used for the intraoral suturing. In case of maxillofacial traumas, absorbable sutures like polyglactin are preferred over the silk sutures for intraoral suturing.(23) This is mostly due to the property of self-absorbability and the better knot stability to withstand the oral environment and the forces exerted while chewing and the phonetics.(24) For extraoral suturing, monofilament synthetic non absorbable sutures like nylon and polypropylene are preferred in maxillofacial regions as they provide excellent esthetic results; however, the knot stability is poor and requires placement of the multiple knots.

In this study it was found that there was maximum use of 3-0 and 4-0 polyglactin sutures for wound closure of the trauma, especially in the parasymphyseal and the angle region. Though the use of absorbable sutures like polyglactin is preferred in trauma cases, use of sutures like polypropylene and nylon was also observed. This might be due to the extraoral approaches to the fracture site in case of angle and condylar fractures. A combination of polyglactin + polypropylene and polyglactin + nylon was observed in case of some surgeries due to a combination of the intraoral and extraoral approaches to the fracture sites. Also in case of isolated condylar fracture, 4-0 polypropylene and 4-0 polyglactin sutures were used due to the requirement of layer wise closure. The study was found to be statistically insignificant at p<0.09. This might be due to the less sample size and the duration of the study.

CONCLUSION:

Within the limits of this study we can conclude that the prevalence of use of 3-0 and 4-0 polyglactin sutures was the highest in case of wound closure after open reduction and internal fixation of the mandibular traumas. Also it was observed that the choice of suture material differs according to the site of the trauma, requirement of the type of closure and the choice of the surgeon.

AUTHORS CONTRIBUTION

Data collection: Dr. Ashutosh Deshpande
Data analysis and interpretation: Dr. Ashutosh Deshpande
Drafting of the article: Dr. Ashutosh Deshpande

Critical revision of the article: Dr. Hemavathy O.R; Dr. Balakrishna R N
Final approval of the version to be published: Dr. Hemavathy O.R; Dr. Balakrishna R N

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CONFLICT OF INTERESTS:
The authors would like to declare that there is no conflict of interests in this study.

REFERENCES:


Table 1: The table shows distribution of the study subjects according to the age groups. Highest number of individuals are seen in the age group between 21-30 years (34.2%) followed by 31-40 years (31.6%).

<table>
<thead>
<tr>
<th>Age groups (in years)</th>
<th>Frequency</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>0-10</td>
<td>3</td>
<td>7.9</td>
</tr>
<tr>
<td>11-20</td>
<td>4</td>
<td>10.5</td>
</tr>
<tr>
<td>21-30</td>
<td>13</td>
<td>34.2</td>
</tr>
<tr>
<td>31-40</td>
<td>12</td>
<td>31.6</td>
</tr>
<tr>
<td>41-50</td>
<td>3</td>
<td>7.9</td>
</tr>
<tr>
<td>51-60</td>
<td>2</td>
<td>5.3</td>
</tr>
<tr>
<td>61-70</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>Total</td>
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</tr>
<tr>
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<td>Frequency</td>
<td>Percent</td>
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</tr>
<tr>
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</tr>
<tr>
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<td>92.1</td>
</tr>
<tr>
<td>Total</td>
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<td>100.0</td>
</tr>
</tbody>
</table>

Table 2: The table shows distribution of the study subjects according to the gender. Number of male individuals involved in the study are more than the female individual (92.1%).
Figure 1: Pie diagram reveals the type of mandibular fractures involved in the study. Number of parasymphyssis fractures were highest (Red) (31.58%); followed by mandibular angle fracture (blue) (26.32%); followed by parasymphyssis+angle fracture (Turquoise) (23.68%); bilateral parasymphyssis fracture (Beige) (5.25%); mandibular body (Purple) (5.25); condylar fracture (Yellow) (2.63%); angle+condylar fracture (Green) (2.63%); parasymphyssis+condylar fracture (Grey) (2.63%)

Figure 2: Pie diagram reveals the type of suture material used in the study. Number of use of vicryl(polyglactin) 3-0 sutures used were highest (Green) (55.26%); followed by vicryl(polyglactin) 4-0 (Red) (26.32%); followed by vicryl(polyglactin) 3-0+silk 3-0 (Yellow) (5.26%); vicryl(polyglactin) 3-0+ proleene(polypropylene) 4-0 (Purple) (5.26%); vicryl(polyglactin) 3-0+ ethilon(nylon) 4-0 (Beige) (5.26%); ethilon(nylon) 4-0 (Blue) (2.63%)
## Table 3

<table>
<thead>
<tr>
<th>Type of Trauma</th>
<th>Type of Suture Material Used</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Ethilon 4-0</td>
</tr>
<tr>
<td>1 angle</td>
<td>0</td>
</tr>
<tr>
<td>2 angle + condyle</td>
<td>0</td>
</tr>
<tr>
<td>3 b/l parasympysis</td>
<td>0</td>
</tr>
<tr>
<td>4 body</td>
<td>0</td>
</tr>
<tr>
<td>5 condyle</td>
<td>0</td>
</tr>
<tr>
<td>6 Unilateral parasympsis</td>
<td>1</td>
</tr>
<tr>
<td>7 parasympsis + angle</td>
<td>0</td>
</tr>
<tr>
<td>8 Parasympsis condyle</td>
<td>0</td>
</tr>
</tbody>
</table>

Chi-Square value- 46.250

P value- 0.09 (p>0.05)

Table 3: The table shows distribution of the study subjects according to the type of fracture and the suture materials used. 3-0 and 4-0 vicryl (polyglactin) were most commonly used sutures. Chi-square test was done and was found to be statistically not significant [Chi-Square value- 46.250; P value- 0.09 (p>0.05)]. Vicryl size 13-0 was commonly used for unilateral parasympysis fracture.