COMPLICATIONS ASSOCIATED WITH CLOSED REDUCTION TECHNIQUE IN THE TREATMENT OF MANDIBULAR FRACTURES IN CALABAR, SOUTH-SOUTH NIGERIA.

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SUMMARY

Objectives: The aim of this study was to evaluate the presence of complications amongst 174 patients that had mandibular fractures and were treated by closed reduction at the University of Calabar Teaching Hospital, Calabar south-south Nigeria.

Methods: We carried out a prospective study of 174 patients with mandibular fracture treated by closed reduction technique at the University of Calabar Teaching Hospital, Calabar Nigeria over a 4-year period. The focus was on the complications developed during and after the treatments.

Results: Of the 174 patients, 36 (20.7%) developed various forms of complications. Amongst the 36 patients, there were 53 different complications. The commonest complication recorded was infection 14 (26.4%) while the least was facial asymmetry and nonunion. According to the duration of onset, more complications were recorded under the intermediate than immediate and late categories. Complications were more common in the third decade of life, but least in the 7th decade. There were 29 (80.6%) males and 7(19.4%) females with a male to female ratio of 4.1:1.

Conclusion: Socioeconomic problems, treatments by quacks and wrong management of patients have been responsible for the occurrence of complications following mandibular fracture. However, the trend of occurrence of complications of mandibular fracture needs comparative analysis with a similar study carried out in the same environment to make a significant conclusion.

This result of this study is therefore a baseline report on, which future studies are expected to use as reference point to determine the trends of occurrence in our environment.

Keywords: Mandibular fracture; Close reduction; Complications; Calabar, Nigeria

INTRODUCTION

Following the development and standardization of modern techniques in the management of mandibular fractures, the frequency of complications has reduced considerably. From available studies, the overall complication rate of both mandibular fracture and its treatment varies between 1.67% and 60%. It was noted that the number of complications recorded depended on the type and size of the population sample, duration of the study and method of treatment employed. On the other hand, no standard time period has been established to follow patients in other to ascertain the results of treatment. According to Worsaae and Thorn, functional adaptation following mandibular fracture and its treatment takes up to two or more years to be completed. However, one of the difficulties in the audit of mandibular fractures is the failure of patients to keep follow-up appointments. Complications have been reported on the basis of severity (major or minor) and duration of onset (immediate, intermediate or late). The present study was designed to determine the duration of onset and relative frequency of the complications associated with mandibular fractures following treatment by closed reduction technique.
MATERIALS AND METHODS
We carried out a prospective study of complications of mandibular fractures seen at the Dental and Maxillofacial Clinic of the University of Calabar Teaching Hospital, Calabar, Nigeria between January 1, 2004 and December 31, 2007. Inclusion criteria are subjects within the age range of one to 70 years, those that presented with mandibular fracture, signed the consent form and attended the minimum (six) follow-up appointments. Excluded from the study were isolated dento-alveolar fractures of the mandible and its complications and subjects that were lost to follow-up. The fractures were treated by closed reduction technique. A minimum of six visits were scheduled for each patient with an average inter-visit interval of one week in the first four weeks and thereafter, fortnightly appointments in the subsequent follow-up period. The outcome of treatment was based on postoperative complaints and clinical evaluation of patients as they present during follow-up reviews. Successful outcome of treatment was defined as healed, stable bone; return to pre-trauma occlusion; no evidence of infection at the fracture site; and no pain on direct palpation or occlusion. Also where follow-up examinations of these patients demonstrate acceptable restoration of pre-trauma form and function were included as such. Complications were conditions arising in patients that occurred during and after treatment and persisted beyond eight weeks from the commencement of treatment that could be verified objectively. These complications were recorded as immediate, intermediate and late depending on the duration of onset. Information obtained from each patient and their relations relevant to the study were documented in a data form. The bio-data include age and gender. The data obtained were analysed with the use of EPI info 2000 version software. Chi square ($X^2$) values and values of levels of significance were obtained where appropriate. P values < 0.05 are considered significant.

RESULTS
A total of 218 patients with maxillofacial fractures were seen within the study period. One hundred and seventy-four had mandibular fractures and were treated with close reduction technique. Thirty-six (20.7%) out of the 174 patients developed 53 different complications. The most common type of complication recorded was infection, which accounted for 26.4% (Table 1). This was followed by nerve dysfunction and occlusal disturbances representing 18.8% each. Malunion, haemorrhage, restricted mandibular excursion, midline deviation on mouth opening and respiratory distress accounted for 3.8% each while facial asymmetry and nonunion represented 1.9% each. In relation to the duration of onset, more complications were recorded under intermediate group than immediate and late. According to the age of patients, complications was more common between the ages of 21-30 years while it was least recorded in the 61-70 years age group (P<0.05) (Table 2). However, of the 36 patients who developed complication, there were 29(80.6%) males and 7(19.4%) females with a male to female ratio of 4.1:1. $X^2 = 0.03$, $P = 0.85$ (not significant).

Table I: Types of complications recorded amongst the patients treated.

<table>
<thead>
<tr>
<th>S/N</th>
<th>DURATION OF ONSET</th>
<th>COMPLICATION</th>
<th>NO. OF PATIENTS</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Immediate</td>
<td>* Haemorrhage</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Respiratory distress</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>2.</td>
<td>Intermediate</td>
<td>* Infection</td>
<td>14</td>
<td>26.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Nerve dysfunction</td>
<td>10</td>
<td>18.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Occlusal disturbances</td>
<td>10</td>
<td>18.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Limitation of mouth opening &lt;35mm</td>
<td>3</td>
<td>5.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Midline deviation on mouth opening</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>3.</td>
<td>Late</td>
<td>* Malunion</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* TMJ click</td>
<td>4</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Facial (mandibular) asymmetry</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Non-union</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Restricted Mandibular excursion</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>53</td>
<td>100.00</td>
</tr>
</tbody>
</table>

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Table 2: Complications recorded according to the age of the patients.

<table>
<thead>
<tr>
<th>AGE (YEARS)</th>
<th>FREQUENCY</th>
<th>FREQUENCY</th>
<th>NO. &amp; TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>0(1.0)</td>
<td>0.0</td>
<td>100</td>
</tr>
<tr>
<td>11-20</td>
<td>7(8.5)</td>
<td>17.1</td>
<td>34(32.5)</td>
</tr>
<tr>
<td>21-30</td>
<td>16(16.6)</td>
<td>20.0</td>
<td>64(63.4)</td>
</tr>
<tr>
<td>31-40</td>
<td>3(5.6)</td>
<td>11.1</td>
<td>24(21.4)</td>
</tr>
<tr>
<td>41-50</td>
<td>6(2.5)</td>
<td>20.0</td>
<td>3(4.8)</td>
</tr>
<tr>
<td>51-60</td>
<td>3(1.2)</td>
<td>50.0</td>
<td>3(4.8)</td>
</tr>
<tr>
<td>61-70</td>
<td>10(6.4)</td>
<td>33.3</td>
<td>2(2.4)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>36</td>
<td>20.7</td>
<td>138</td>
</tr>
</tbody>
</table>

DISCUSSION

The incidence of complications of mandibular fracture varies in different parts of the world. The complication rate of 20.7% recorded is within the reported range of 1.67% to 60%.

The development of complication may be due to the inability of the patients to overcome the different neuromuscular and other functional problems induced by the repositioning of the fractured segments. From the author’s experience, the incidence is also influenced by the economic, socio-cultural and geographical nature of the study environment as recorded by earlier authors.

Haemorrhage was recorded as an immediate complication. This arises from ruptured facial artery as it crosses the lower border of the mandible. 

Haemorrhage from branches of the maxillary artery. Haemorrhage from the present study arose from the severed inferior dental artery post-operatively. Respiratory distress may arise from airway obstruction by blood clot, thick saliva, bone or parts of denture. Banks opined that complete airway obstruction is not possible without a significant degree of mental depression. In the unconscious patient with parasymphyseal fracture, the tongue may fall back and obstruct the airways. A case of bilateral subcondylar fractures leading to airway obstruction was reported by Banks.

Treatment of multiple fractured mandible may impose further embarrassment to the airway and close post operative monitoring is important especially if intermaxillary fixation is used. This complication was recorded preoperatively in our patient that had bucket handle fracture following falling of the tongue posteriorly. Infection may set in around tooth or teeth in the line of fracture. This is especially so in patients with pre-existing poor oral hygiene or general health problems e.g. diabetes mellitus and in those cases presenting late.

Poor sense of selection and wrongful application of treatment procedures, such as placement of transosseous wires across already infected line of fracture could bring about infection of bone. Peled et al. stated that infection following mandibular fracture is related to the mobility of fragments. These observations are in agreement with our findings. Anaesthesia or paraesthesia of the lower lip following mandibular fracture is the commonest neurological complication. This may arise from neurotmesis or neuropraxia of the nerve in its canal caused by the trauma or wrongful placement of fixation materials. Jeter et al. reported cases of facial nerve damage following fractured condyle and ramus from blunt objects. This nerve damage may lead to prolonged sensory disturbances that in some cases might develop into post-traumatic neuralgia.

Cases of mandibular deviations on mouth opening were reported by Hyde et al. This mandibular deviation frequently accompanies condylar fractures and sometimes as a consequence of its treatment. This complication was recorded in our patients due to premature release of inter-maxillary fixation. Talwar et al. reported that the maximum occlusal biting force is reduced following mandibular fracture. Also irrespective of the treatment method employed, the maximum bite force at six weeks postoperatively were about 60% of the normal bite force. However, the main post-traumatic complications involving the temporomandibular joint that has been reported include clicking sound, malocclusion, limitation of range of movement, displacement of the meniscus, chronic pain associated with dysfunctional movement and osteo-arthritis, fibrous or bony ankylosis and disturbances of growth in children.

Jeter et al. considered this to be a common complication of condylar fractures managed by closed reduction with inter-maxillary fixation particularly if adequate follow up of patients is not instituted. This intracapsular and extracapsular temporomandibular joint affliction may also be of myogenic, osteogenic, neurogenic or psychogenic origin. Facial (mandibular) asymmetry sometimes occurs as a complication of condylar fracture in children. This is due to retarded facial growth following damage to the condylar growth centre. It also follows when adequate rehabilitative procedures are not instituted and complied with by the patients in the management of condylar fractures. Possible predisposing factors to non-union of fractures as documented by Banks and Rowe and Williams include bone necrosis, infection, inadequate reduction and immobilization, interposition of soft tissues and persistent movement between fractured bone ends.

Other pathologic factors that have been reported include irradiated bone ends, metabolic disturbances such as thyrotoxicosis, diabetes mellitus, persistent bony cystic conditions, malignancies and chronic alcoholism.
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One of our patients was diabetic and this contributed to non-union. Malunion of fractures is attributed to various factors ranging from delay in presentation\(^1\), attempt at removing the wires by patients for want of food\(^8\) to failure of patients reporting for a follow-up review.\(^7\) Clinically united fractures seen four weeks or more after injury should be treated as an established malunion.\(^9\) The mal-union cases was due to premature release of the inter- maxillary fixation by the patients.

CONCLUSION

Although the incidence of complications recorded compares with what was obtained by some authors\(^1,17\), the result may be attributable to the fact that the Dental and Maxillofacial Clinic where this study was carried out is the only tertiary centre for the treatment of Maxillofacial injuries in this area. Economic problems and wrong management of patients with mandibular fractures have also been responsible for the occurrence of the complications. Some of the patients had either visited traditional clinics, patent medicine vendors or orthodox medical clinics where inappropriate or inadequate treatments were administered. However, the trend of occurrence of complications of mandibular fracture needs comparative analysis with a similar study carried out in the same environment. This result of this study is therefore a baseline report on, which future studies are expected to use as reference point to determine the trends of occurrence in our environment.

REFERENCES