Research Article

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Comprehensive Evaluation of Correlation Between Different Factors of Mandibular Impacted Third Molar and Angle Fracture- A Clinico-Analytical Study

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ABSTRACT

Background: Mandibular impacted third molar often exerts undue pressure around its root apex. This stress usually transferred to the mandibular angle, thereby elevating the comparative risk of fractures related to mandibular angle. In this paper, authors aimed to evaluate the correlation between different factors of impacted mandibular third molar and angle fracture in the studied patients.

Materials and Methods: This study was conducted in the department of oral and maxillofacial surgery of the institute wherein total 20 patients studied genuinely. Final diagnosis was made on the basis of clinical examination and radiological inferences. All 20 patients were in the age range of twenty to forty-five years. Any correlation between magnitude of force and number of fracture sites were evaluated. Clinical status of mandibular impacted third molar in the region of the mandibular angle fracture was studied in detail. Angulations of impacted mandibular third molar in the region of the mandibular angle fracture were studied in detail. Position (Pell and Gregory) of Ramus and its correlation with mandibular angle fracture was studied in detail. Number of roots of third molar and its correlation with mandibular angle fracture was studied in detail.

Results: Out of 20 patients, males were 14 and females were 6. 14 cases were noticed with low trauma force with single fracture site. 4 cases showed moderate trauma force with two fracture sites. Out of twenty, thirteen were partially impacted while 7 were fully impacted. P value was significant for partially impacted group (0.02). Total 16 fracture cases were related to single rooted third molars. Roughly half of the studied third molars were impacted in mesioangular direction. P value was significant for this group (0.01).

Conclusion: Within the limitations of the study, the authors concluded that impacted mandibular third molar increases the risk for mandibular angle fracture. This relative risk is significantly affected by multiple factors including status of eruption, angulations, position, and number of roots in impacted third molar. These types of crucial and precise detail must be meticulously studied in all mandibular angle fracture cases.

Keywords: Surgery, Fracture, Third Molar, Impaction.

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INTRODUCTION

As we all are aware that the maxillofacial trauma commonly results in injuries to soft tissues, teeth, and major skeletal constituents of the face including mandible, maxilla, zygomaticus, nasal, orbital and ethmoidal structures.[1,2] Mandible is the most common facial bones that fracture in road traffic accidents. This may happen solo or in alliance with other facial bone fractures. In spite of the fact that mandible is the most intense and strongest facial bone, it is highly vulnerable to fractures for few definite reasons like it's shape, it's located in the lower half of the face.[3,4] This is particularly because of it is having relative prominent position in relation to common impact forces. Many of the prominent researchers have shown that the mandible is the only movable bone of the facial bone and it is solely accountable for different significant functions like preservation of occlusion, chewing, deglutition and speaking.[5,6] Because of these factors only, such fractures are never left unobserved. It is also due to its extremely painful nature specially while chewing, deglutition, speaking and respiratory movements. The mandible is one of the most frequently fractured bones because of its eminence in the face which deteriorate its cortical cancellous structure. The prototype of mandibular fractures depends on numerous factors, including direction and amount of force, existence of soft tissue mass and biomechanical features of the mandible, such as bone density and presence or absence of teeth.[7,8,9,10] Though, usually the mandible is a tough bone, some of its areas like mandibular angle, the mandibular condyle, and the parasymphysis are considered to be mechanically weak. The most common area of contamination in post operative phase of mandibular fractures happens along with the angle of the mandible. The causes attributed to few imperative incidents. The angle of the mandible is reasonably susceptible due to the fact that it makes the junction between the ramus and the body and is influenced, to a great extent, by the muscles inserted to its medial and lateral surfaces.[11,12,13,14] Additionally, it is the area where unerupted or partially erupted mandibular third molars are typically found. By occupying an area that should be filled with bone, these teeth affect the local distribution of traumatic forces, which might render the region more susceptible to fractures. Mandibular impacted third molar often exerts undue pressure around its root apex.[15,16,17] This stress usually transferred to the mandibular angle, thereby elevating the comparative risk of fractures related to mandibular angle. In this paper, authors aimed to evaluate the correlation between different factors of impacted mandibular third molar and angle fracture in the studied patients.

MATERIAL AND METHOD

This study was planned, outlined and executed in the department of oral and maxillofacial surgery of the institute wherein total 20 patients studied purposefully. Patients who reported with mandibular angle fracture were provisionally selected for the study. Final diagnosis was made on the basis of clinical examination and radiological inferences. Detailed history of all patients pertaining to trauma was recorded and thorough clinical examination was done. Almost all of our selected patients gave the history of road traffic accident. So, it is very obvious that RTA was the commonest aetiology for mandibular angle fracture in our study. Detailed radiological examination was done by panoramic radiography of all patients. Patients with any kind of gross anomaly of oral and maxillofacial structure were excluded from the study. All 20 patients were in the age range of twenty to forty five years. The significance, purpose and methodology of the study were explained in detail to all participating patients. Informed consent was obtained from all participating patients. Classic inclusion criterion for mandibular factures were; fracture relating the angle of mandible, fracture related to mandibular impacted third molar, fracture extending from any point on the curve formed by the junction of the body and posterior border of the ramus of the mandible. Any correlation between magnitude of force and number of fracture sites were evaluated. The magnitude of trauma force was considered as "low" if only one fracture site was present, "moderate" if two

fracture sites were evident and "high" if three or more mandibular fracture sites were evident. The relative morphologic, anatomic and other factors of mandibular third molar as related to the mandibular angle fracture was studied in detail. Clinical status of mandibular impacted third molar in the region of the mandibular angle fracture was studied in detail. Angulations of impacted mandibular third molar in the region of the mandibular angle fracture were studied in detail. Position (Pell and Gregory) of Ramus and its correlation with mandibular angle fracture was studied in detail. Number of roots of third molar and its correlation with mandibular angle fracture was studied in detail.

RESULTS

In this study, all evident findings and data were sent for statistical analysis using statistical software Statistical Package for the Social Sciences version 21 (IBM Inc., Armonk, New York, USA). The finalized data was subjected to suitable statistical tests to obtain p values, mean, standard deviation, chi- square test, standard error and 95% CI. Table 1 and graph 1 shows age & gender wise distribution of patients. Table 1 and Graph 1 showed that out of 20 patients, males were 14 and females were 6. So, in the random selection of the patients authors noticed obvious male predilection. All selected and studied patients were divided into 4 age groups. 4 patients were falling in the age range of 20-25 years. 7 patients were falling in the age range of 26-30 years. Accordingly we can assume that roughly more than half of the studied patients were of first two age groups. P value was found to be significant in group I & IV of age range 20-25 and 36-40 years. The calculated p value was 0.01 and 0.04 respectively. Table 2 illustrates about the relationship between trauma force and number of fracture sites. Total 14 cases were noticed with low trauma force with single fracture site. 4 cases showed moderate trauma force with two fracture sites. 2 patients showed high trauma force with more than two fracture sites. The basic statistical descriptions have been described in detail in table 2. P value was significant for low trauma force with single fracture site (0.01). Table 3 illustrates about clinical status of impacted mandibular third molar in the region of the mandibular angle fracture. Out of twenty, thirteen were partially impacted while 7 were fully impacted. P value was significant for partially impacted group (0.02). The fundamental statistical explanations have been described in detail in table 3. Table 4 shows about aangulations of impacted mandibular third molar and its correlation with mandibular angle fracture. Approximately half of the studied third molars were impacted in mesioangular direction. P value was significant for this group (0.01). Total 5 third molars were impacted in vertical direction. P value was significant for this group (0.02). The fundamental statistical explanations have also been described in detail in table 4. Table 5 shows about the status of Ramus position and its correlation with mandibular angle fracture. Approximately seventy percent of the studied third molars were related to class II ramus position. P value was significant for this group (0.02). The basic statistical explanations have also been described in detail in table 5. Table 6 shows about the number of roots of impacted third molar and its correlation with mandibular angle fracture. Total 16 fracture cases were related to single rooted third molars (could be fusion of multiple). P value was significant for this group (0.01). Total 4 fracture cases were related to multiple rooted third molars. The basic statistical explanations have also been described in detail in table 6.

Table 1: Age & gender wise distribution of patients

Age Group (Yrs)	Male	Female	Total	P value
20-25	3	1	4	0.01*
26-30	5	2	7	0.07
31-35	4	2	6	0.06
36-40	2	1	3	0.04*
Total	14	6	20	*Significant

***p<0.05 significant**

Table 2: Relationship between trauma force and number of fracture sites (with detailed statistical description)

Parameters (Trauma force)	Angle Fracture	Risk	Statistical Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Low trauma force (1 fracture site)	14	70%	4.82	0.486	0.945	1.96	1.983	1.0	0.01*
Moderate trauma force (2 fracture site)	4	20%	1.91	0.622	0.609	1.89	1.546	2.0	0.09
High trauma force (fracture site>2)	2	10%	1.07	0.499	0.832	1.98	1.690	1.0	0.06

***p<0.05 significant**

Table 3: Clinical status of impacted mandibular third molar in the region of the mandibular angle fracture (with detailed statistical description)

Parameters (Status of mandibular Third molar)	Angle Fracture	Risk	Statistical Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Completely impacted	7	35%	3.84	0.647	0.535	1.96	1.635	2.0	0.50
Partially impacted	13	65%	5.54	0.938	0.849	1.84	1.948	1.0	0.02*

***p<0.05 significant**

Table 4: Angulations of impacted mandibular third molar and its correlation with mandibular angle fracture (with detailed statistical description)

Parameters (Angulations of Impacted third molar)	Angle Fracture	Risk	Statistical Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Vertical	5	25%	1.24	0.749	0.637	1.66	1.637	2.0	0.02*
Distoangular	1	5%	1.08	0.938	0.884	1.44	1.838	1.0	0.09
Mesioangular	10	50%	4.83	0.738	0.536	1.96	1.736	2.0	0.01*
Horizontal	1	5%	1.08	0.923	0.838	1.98	1.029	1.0	0.50
Bucco-version	1	5%	1.08	0.878	0.938	1.72	1.820	1.0	0.09
Linguo-version	1	5%	1.08	0.865	0.423	1.54	1.990	1.0	0.07
Torso-version	1	5%	1.08	0.944	0.539	1.90	1.730	1.0	0.80

***p<0.05 significant**

Table 5: Status of Ramus position and its correlation with mandibular angle fracture (with detailed statistical description)

Parameters (Ramus Position)	Angle Fracture	Risk	Statistical Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Class –I	5	25%	1.98	0.837	0.422	1.63	1.425	1.0	0.08
Class-II	14	70%	3.48	0.746	0.838	1.24	1.938	2.0	0.02*
Class-III	1	5%	1.43	0.039	0.584	1.98	1.748	2.0	0.01*

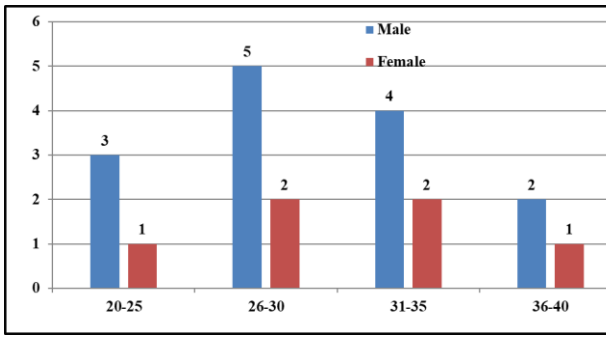
***p<0.05 significant**

Table 6: Number of roots of impacted third molar and its correlation with mandibular angle fracture (with detailed statistical description)

Parameters (Number of roots of impacted third molar)	Angle Fracture	Risk	Statistical Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Single (Could be fusion of multiple)	16	80%	2.92	0.455	0.426	1.66	1.542	2.0	0.01*
Multiple	4	20%	1.42	0.920	0.866	1.84	1.890	1.0	0.08

***p<0.05 significant**

Graph 1: Age & gender wise distribution of patients



DISCUSSION

Many of the pioneer workers in the literature have shown that that mandible is the hardest and most rigid bone of the head and neck region. Nonetheless, it is the second most commonly fractured facial bone.[18,19,20] Such susceptibility is a result of its anatomic location, as it is at risk of maxillofacial and associated trauma. The occurrence of third molar is related with higher risk of angle fractures compared with the absence of third molar, and the fractures are most likely to take place in youngsters and those in their middle aged.[21,22,23] This must be of clinical curiosity as this age group is most likely to have unerupted third molar. Mandibular fractures are one of the commonest maxillofacial bony injuries. Numerous factors such as the size, direction, nature, and surface area of the impacting force are known to persuade the prototype of mandibular fractures.[24,25,26] Mandibular angle fractures follow a pattern common to many injuries and this depends on multiple factors including direction, amount of force, presence of soft tissue bulk, and biomechanical characteristics of the mandible such as bone density, mass, or anatomic structures creating weak areas. The mandible is considered the strongest bone in the facial skeleton.[27,28] Nevertheless, because of its uncovered position and anatomic organization, traumatic forces leading to mandibular fractures are reported to be high, comprising of 79% of all maxillofacial fractures.[29,30,31] The most frequent mandibular fractures are the mandibular condyles, followed by mandibular symphysis, body, and angle. Significant investigations and findings have revealed that mandibular fractures comprise roughly 38 to 78% of all maxillofacial fractures. Etiologic factors of mandibular fractures include motor vehicle accidents, assaults, falls, and sport activities including cycling. Most mandibular fractures are reported in male patients. According to the literature, the average age of patients with an angle fracture is not different from that of patients with a condylar fracture.[32,33,34] Our study aimed to evaluate the correlation between different factors of impacted mandibular third molar and angle fracture in the studied patients.

CONCLUSION

Within the limitations of the study, the authors concluded that impacted mandibular third molar increases the risk for mandibular angle fracture. This relative risk is significantly affected by multiple factors including status of eruption, angulations, position, and number of roots in impacted third molar. Such types of crucial and precise details must be meticulously studied in all mandibular angle fracture cases. Also, inferences could be utilized for successful

surgical management of mandibular angle fracture. Our study implications should be considered as suggestive for presuming prognosis for similar clinical conditions. Nevertheless, we expect some other large scale studies to be performed that can further establish certain standard and concrete guidelines in these perspectives.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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