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Original research article

A comparative study to identify the fate of the third molar along the line of fracture in mandibular angle fracture

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Abstract

Aims: to identify the fate of the third molar along the line of fracture in mandibular angle fracture.

Materials and Methods: A Retrospective study was conducted in the Department of Dentistry, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India from March 2019 to August 2019. Total 100 cases were enrolled for the study, divided into two groups – group 1 in which third molar was retained and group 2 in which third molar was extracted. The cause for removal included development of pain, redness, discharge indicating periodontal problems including mobility and periapical lesions. Keeping the progress of healing of the bone in mind these teeth were extracted.

Result: The mean age group of the population of the study was 33.42 (20 to 60 years), out of which majority of the cases 85%(85) were male patients and 15%(15) were female patients. There were a total of 100 patients with mandibular angle fracture who underwent open reduction and internal fixation. 32% (n=32) the third molar was removed, while in 68% (n=68) retained. In 45% (45) cases the third molar was completely erupted and 55% (55) were impacted third molars. In the impacted molars 50.91% were mesioangular, 38.18% were vertical and 10.91% were distoangular. Out of the 100 cases included in this study 13 cases underwent implant removal. 9 in case in retained group and 4 in the removal group. In the retained group, extraction of the third molar was carried out along with removal of the implant. A p value of 0.14 was noted and a Chi square value of 1.85.

Conclusion: We conclude that the partially impacted tooths are best to be removed during the procedure for better outcomes provided the fractured segments stability is maintained.

Keywords: Mandibular angle, Third molar, Tooth in line of fracture

Introduction

The most commonly fractured facial bone is the mandible due to its prominent position. Around 27-30% of all mandibular fractures are in the angle region due to the change in the direction of forces from the dentate to the non-dentate region.[1,2] The treatment of angle fracture is often complicated and debated upon due to the presence of the mandibular third molar in the line of fracture.[1] The presence of the third molar increases the risk of angle fractures when compared to its absence.[3] The maintenance of these teeth can favor the treatment in some cases; therefore they contribute for the stability of the fracture. Its removal can be harmful, once that can diminish the contact between fragments, cause additional trauma to the region, increase the risk of contamination of the fracture through the empty alveolus, convert a closed fracture into an open fracture and cause the loss of the bony bunch in the zone of tension. A retained tooth is when, after normal eruption, is still covered by bone and/or soft tissue.[4] This can occur due to: early loss of deciduous teeth, dental

anomalies, poor positioning of the dental germ or of adjacent teeth, lack of space for eruption, permanence of deciduous teeth, trauma, impacted hard, soft, or both tissues, supernumerary teeth, odontogenic cysts, and/or tumors.[5,6] Verri et al[7] indicated that lower third molars are the teeth that most remain impacted, followed by upper third molars, upper canines, and supernumerary teeth. These data were confirmed by other authors.[4,5] Retained third molars can be classified according to the angle of the third molars' long axis compared with the adjacent second molars.[8] The vertical position is the most common, followed by mesial or mesioangulated, [9] but and Farish and Bouloux[10] ensured that the mesioangulated lower third molars are the most common position, followed by the vertical. Thus this study aimed to determine, whether the tooth in line of fracture predisposed to infection which in turn may lead to retrieval of implants.

Material and methods

A Retrospective study was conducted in the Department of Dentistry, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India from March 2019 to August 2019, after taking the approval of the protocol review committee and institutional ethics committee.

Inclusion criteria

- Patients with angle fracture that required open reduction and internal fixation,
- Age between 20-60 years

Exclusion criteria

- Patients with pre-existing medical conditions
- Infected fracture site
- Patients who were treated by closed reduction
- Patients having less than 6 months follow up

Intraoral vestibular incision was used to approach the fracture, anatomic reduction was obtained and plating was done. The third molar was removed when the teeth were fractured, pre-existing pericoronal/periodontal infection, dental caries, tooth mobility, exposure or involvement of the apical half or more of the root, and third molar does not compromise the reduction of bone fragments. For the purpose of this study, postoperative infection was defined as that has a purulent discharge requiring surgical intervention including removal of plates. For all the cases semi-rigid fixation was done with plates and screws after fracture reduction, standard analgesics and antibiotic coverage were given. Total 100 cases were enrolled for the study, divided into two groups – group 1 in which third molar was retained and group 2 in which third molar was extracted. The cause for removal included development of pain, redness, discharge indicating periodontal problems including mobility and periapical lesions. Keeping the progress of healing of the bone in mind these teeth were extracted. At the 3rd month follow up 9 teeth which were initially retained were extracted when signs of infection were first seen. At the 6th month follow up the implants were removed along with extraction of the teeth, in the retained group i.e 9 in number and 4 cases of implant removal in the removed group.

Results

The mean age group of the population of the study was 33.42 (20 to 60 years), out of which majority of the cases 85%(85) were male patients and 15%(15) were female patients (Table 1). There were a total of 100 patients with mandibular angle fracture who underwent open reduction and internal fixation. 32% (n=32) the third molar was removed, while in 68% (n=68) retained (Table 2). The etiology of the cases were attributed to RTA and assault, the former being in majority of cases, i.e. 88% and 12% respectively. The side of the angle

fracture in this study were almost similar, incidence of left side fracture being 55% and the right side fracture being 45%. In 45% (45) cases the third molar was completely erupted and 55% (55) were impacted third molars. In the impacted molars 50.91% were mesioangular, 38.18% were vertical and 10.91% were distoangular (Table 3). At 4 months follow up, based on the signs of infection it was decided to extract the third molars. The signs and symptoms considered were –pain, redness or discharge at the third molar site. At the end of the 4 month, 10 cases showed signs of infection in the retained group due to which extraction of the third molar was carried out under local anesthesia following aseptic precautions. There were no re fractures during extraction. Out of the 100 cases included in this study 13 cases underwent implant removal. 9 in case in retained group and 4 in the removal group. In the retained group, extraction of the third molar was carried out along with removal of the implant. A p value of 0.14 was noted and a Chi square value of 1.85(Table 4).

Table 1: Demographic Profile

Gender	**N=100**	**%**
Male	85	85
Female	15	15
Age		
Below 20	7	7
20-40	80	80
40-60	13	13
RTA	88	88

Table 2: Distribution of the subjects based on retainment or removal of third molar

	N=100	**%**
3rd molar Removed Group	32	32
3rd molar Retained Group	68	68
Total	100	100

Table 3: Cross-tabulation of 3rd molar impaction and type of impaction

Type of impaction		**3rd molar impaction**		**Total**
		Complete	**Partial**	
Not applicable	Count	45	0	45
	Percent	100.0%	0.0%	45%
disto-angular	Count	0	6	6
	Percent	0.0%	10.91%	6%
mesio-angular	Count	0	28	28
	Percent	0.0%	50.91%	28%
vertical	Count	0	21	21
	Percent	0.0%	38.18%	21%
Total	Count	45	55	100
	Percent	100%	100%	100%

Table 4: Cross-tabulation of 3rd molar retainment and implant retrieval

Implant retrieval		3rd molar retainment		Total
		Retained	Removed	
Retained	Count	23	64	87
	Percent	71.87%	94.12%	87%
Retrieval	Count	9	4	13
	Percent	28.13%	5.88%	13%
Total	Count	32	68	100
	Percent	100%	100%	100%

Chi-square value- 1.77, P value- 0.11

Discussion

The aim of this retrospective study was to identify the fate of the third molar along the line of fracture in mandibular angle fracture over a period of 6 months. This has always been a question of debate and the risk pertaining to retaining or removing the tooth has been varyingly assessed in literature ever since evolution of open reduction and fixation for maxillo facial fractures were introduced.

This has always been a question of debate and the risk pertaining to retaining or removing the tooth has been varyingly assessed in literature ever since evolution of open reduction and fixation for maxillo facial fractures were introduced. In the present study, angle fracture was observed in the age group ranging from 20 to 60 years and the mean age was 33.42 years. Based on age the patients were classified into three categories i.e. younger age group below 20 years years, middle aged group 20 to 40 years, and older age group - above 40 years. Out of the 100 patients included in the study, 7 belonged to the young group, 80 to the middle age group and 13 to the old age group, indicating that majority of the angle fractures occurred in middle age group, and road traffic accidents being the most common cause of it. This result was in consistent with the results of the study conducted by Sakr et al, who reported that incidents of angle fracture between 20-29 years is higher. The reason is due to the fact that a high incidence of un-erupted third molars are seen in this age group.[11] Our study consisted of 85% of male patients and 15% of female patients. This observation was in agreement with studies conducted by Dongas et.al and Mahesh Kumar et al who reported male predominance in angle fractures due to the fact that they are more exposed to the risk factors for facial trauma as they are prone to get involved in violent conduct, indulging in reckless driving, exhibiting physical aggression and engaging in contact sports.[12,13] The majority of the cases had an etiology of road traffic accidents i.e. 88 and 12% of cases had an etiology of assault. This result was consistent with the study conducted by Ugboko et who had observed that road traffic accidents were the main cause of mandibular angle fractures. This is attributed to multiple reasons, but the main reason being lack of road safety awareness, violation of traffic rules like over-speeding and not using helmet, use of alcohol or other intoxicating agents.[14] We found 55 (55%) cases of mandibular angle fracture on the left side as compared to 45 (45%) on the right side. This was in agreement with the study findings of Inaoka et al., where they proved left side had more angle fractures than the right side. However, the side did not present a significant relationship with angle fracture. The site of impact is usually restricted to the side of fall. If the impact is of a high velocity, then a direct fracture at the point of application will occur. If the impact is of a low velocity, the bow will transfer to the contralateral side, causing an indirect fracture.[9] In case of assaults, considering the predominance of the right-handed people, the victim will be facing the opposite direction and hence the site of fracture is to the side of impact. In our study we noted that all the assault cases had an angle fracture on the left side. In our study 45% of the cases had their third

molar completely erupted whereas as 55% of the cases exhibited impaction of the third molar due to the fact that majority of the cases belonged to the young age group. Among the impacted cases, it was noted that mesioangular impaction was the most common type of impaction this was in agreement to the study findings of Fuselier et al.[15] it was attributed that mesioangular impacted teeth are more prone to angle fracture as the root is directed towards the angle of mandible, which may act as a wedge splitting the mandibular angle, because of which the injury forces are redirected towards the mandibular angle, and decreased amount of bone in that area increases the risk of angle fracture. Mandibular angle fractures observed along with other impaction positions of third molars in decreasing order were: Vertical, horizontal, and distoangular. The type of impacted teeth did not have a role in deciding whether the tooth needed to be removed or retained intra-operatively. In the post-operative follow – up period it was noted that signs of infection which led to the removal of the impacted teeth were noted more in partially impacted cases. The study conducted by Balaji et al was in agreement to our stud, this was simply because of the position of the tooth which makes it an area for harboring debris and pathogen which in-turn led to periodontal infection.[16] In a recent systematic review by Bobrowski et al, of the 1542 cases, tooth was removed in 788 (51.1%). During the follow-up period infection occurred in 84 cases (10.66%). On other hand, 84 cases out of 754 in the retained group showed signs of infection. This had no statistical significance. Thus the study was concluded by saying that retaining or removing the third molar did not have a significant effect on infection.[17] In an article by Ellis et al, Muller had recommended that multi-rooted tooth in the line of fracture be always removed.[18] In another similar study with the same sample size conducted by Lim et al, 49 patients had third molars in the line of fracture. The third molar were retained in 39 cases and the third molars were extracted in the rest of the cases. It was noted that several patients in the retained group exhibited post op infections, nerve paresthesia, temporomandibular disorders and also change of occlusion. Whereas in case of the group in which the third molars were extracted, they noticed that the patients presented with only nerve injury. However this study also did not yield a statistically significant value.[19] In our study we did not encounter any TMD or nerve injury cases, although post-operative infection was noted. In a study conducted by Kahnberg and Ridell it was found that the teeth which were retained along the fracture line resulted in satisfactory healing, which was around 59%.[20] This was later supported by works of Macan et al.[21] Other teeth have relatively better access and survival rate with adjuvant treatments like root canal therapy while the third molar would lack the same. Also, this study proves that fully impacted third molar teeth when removed did not cause any further infection, while the partially impacted teeth which were left behind, proceeded to infection and subsequent loss of teeth. In our study the difference in survival of third molar was not statistically significant between right and left side. The partially impacted teeth, due to its position would harbor more debris and pathogens contributing to poor periodontal health. Although this finding did not yield a statistically significant it was what we inferred from our study.

Conclusion

Retaining the third molar has an increased chance of post-operative infections it is not statistically significant. Other reasons also lead to the post-operative infections. We conclude that the partially impacted tooths are best to be removed during the procedure for better outcomes provided the fractured segments stability is maintained.

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