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Risk of Mandibular Angle Fracture and Its Co-relation to Absence/Presence,Type of Mandibular Impacted 3rd molar; A Retrospective and Prospective Study

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ABSTRACT

Introduction: The study is designed to evaluate the influence of presence ,eruption status and position of mandibular third molars on mandibular angle fracture.

Materials and Methods: A retrospective and prospective study design and a sample composed of panoramic radiographs of 80 patient and CT scan wherever needed . The predictor variables were the presence and position of impacted 3rd molar. 3rd molar position was grouped in categories based on the Pell and Gregory classification. The outcome variable was the presence of an angle fracture and commonly associated with types and position of impacted 3rd molar and also the nature of fracture .

Results: Of total 79 sample of mandibular angle fracture44(55.7%)mesioangular, 17(21.5%)vertical,10 (12.7%)horizontal and 8(10.1%) distoangular impacted 3rd molar are associated. Also revealed that incidence of angle fracture were high in patients with impacted 3rd molar with position B 28(35.4%) and position A 23(29.1%) have high incidence of angle fracture in the study. About the nature of the fracture , out of total 44 all 44(100%) mesioangular impacted 3rd molar caused horizontal unfavourable fracture. 39(88.8%) caused vertical unfavourable fracture and rest 5(11.5%) caused vertical favourable fracture

Conclusion: The mandibular angle with an impacted third molar tooth is comparatively weaker than the angle region without an impacted tooth. The chances of angle fracture in superficially erupted mandibular third molar is higher than those with a deeply impacted 3rd molar.The study results conclude that patients with mesioangular positionB impacted 3rd molar present in the mandible comparatively increased risk for angle fractures.

Keywords: *impacted third molar, Mandibular angle fracture,Position,favourable ,unfavourable*

1. INTRODUCTION

The mandible consists of a tubular long bone which is bent into a blunt V –shape. The cortical bone is thicker anteriorly and at the lower border of the mandible, while posteriorly the lower border is comparatively thin. The central cancellous bone of the body forms a loose network with frequent, large bone free space. Mandible is strongest anteriorly in the midline along with less strength towards the condyles.

Though , being the strongest bone in the maxillofacial region ,the mandible is one of the most commonly fractured bone [Kumar SR et-al 2015] due to its prominence in the face and weakening of the corticocancellous framework due to presence of teeth.[Menon S et-al 2016] Mandible accounts for 40-65% of all facial fractures. Fracture of angle(25-33%) and condyle (26%) share almost an equal weightage in fracture mandible [Kumar SR et-al 2015,1 Menon S et-al 2016, Halazonetis JA 1968, Tevepaugh DB, Dodson TB 1995., Lee JT, Dodson TB 2000]The energy required to fracture mandible ranges from 44.6-74.4 kg/m. Most common cause for mandibular fractures are road traffic accident, fall, assault, sports, fights or may be pathological. The condylar region is most commonly fractured and the angle is the 2nd most common site. But if only one fracture occurs it is more commonly at the angle than the condyle. Mandibular angle region containing unerupted mandibular 3rd molar generates 4.3 times more mandibular angle fracture than those with erupted third molar.[Kasamatsu A 2003] Based on the findings of our study we propose to suggest a protocol on the relationship between type of impacted mandibular 3rd molar and severity of angle fracture. This will fecilitate prophylactic extraction of impacted 3rd molar according to its position to prevent the angle fracture.

2. METHODOLOGY

Aim and objective of the study is to- evaluate the relationship of state of eruption, presence or absence of lower third molar and its risk associated with the incidence of angle fracture.And to propose the which type of impacted mandibular 3rd molar has higher incidence of unfavourable mandibular angle fracture.

Inclusion Criteria**:1)**Patient with age group above 16 years.**2)**Patient with unilateral or bilateral angle fracture.**3)**Dentulous patient with erupted, impacted mandibular 3rd molar.**4)**Patient's consent to participate in the study**.**Exclusion Criteria:1)Pediatric patient.**2))**Patient with edentulous jaw.**3)**Non cooperative patient.

A retrospective and prospective study will be conducted. Study sample will consist of patients with mandibular angle fractures as described by Kelly and Harrigram. Following collected data would undergo Radiographical assessment with OPG/CT SCAN (wherever indicated,**Figure 1,2,3)** to ascertain - Any displacement of fracture segments,- Favorable/unfavorable fracture (horizontal/vertical).-To determine presence or absence of impacted 3rd molar.

If impacted 3rd molar is present it will be categorized :According to Winters classification-a)Mesioangular b) Distoangular c) Horizontal d) Vertical According to Pell and Gregory's classification-Based on their relationship with the anterior border of mandible:

a)Class I b) Class II c) Class III and also,Based on the amount of bone covering the impacted tooth and relation to occlusal plane:a) Position A b) Position B c) Position C

Based on clinical and radiographical findings.

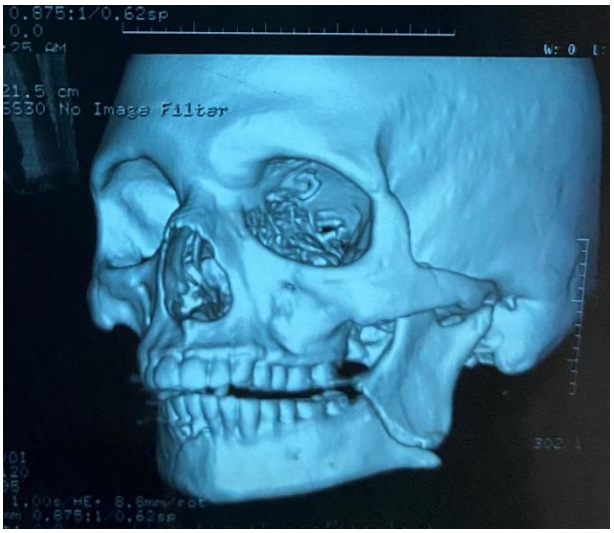
Figure 1

Figure 2

3. RESULT

Of the 79 patients with mandibular angle fractures. 80.1% of patients were men and 19.9% were women.The age range of the patients was 20- 60 years. From all the position of tooth associated with the angle fracture,44(55.7%) mesioangular,17(21.5%)vertical,10(12.7%)horizontal and 8(10.1%) distoangular impacted 3rd molar is associated with the total 79 mandibular angle fracture**.(Figure 3)**Also found in the study 28(35.4%)impacted 3rd molar with position B, 23(29.1%) position A and 12(15.2%) position c and 16(20.3%)displaced 3rd molar is associated with the incidence of total 79 angle fracture.(**table1a).**

Figure 3



Of total 79 angle fracture ,44 patient having angle fracture with mesioangular impacted 3rd molar, 39(68%) are associated with unfavourable vertical fracture and 5 (22.7%) are associated with favourable vertical fracture.A total of 8 distoangular impacted 3rd molar 5(8.8%) distoangular impacted 3rd molar are associated with unfavourable vertical fracture. 3 (13.6%)are associated with favourable vertical fracture. Of total 10 horizontal impacted 3rd molar, 10(17.5%)are associated with unfavourable fracture. And no horizontal impacted seen causing favourable vertical fracture. Out of 17 vertically impacted 3rd molar ,3(5.3%) are associated with unfavourable vertical fracture and 14 (63.6%) are associated with favourable vertical fracture. And accordingly we see of total 23(29.1%) impacted 3rd molar with position A ,17(29.8%) caused vertical unfavourable fracture and and 6(27.3%) caused favourable vertical fracture and total 28(35.4%) impacted 3rd molar with position B , 21(22.85%) caused unfavourable vertical fracture and 7(31.8%) are associated with with favourable vertical fracture. Total of 12(15.2%) impacted 3rd molar with position C, 12(21.1%) are associated with unfavourable vertical fracture and**.** Angle fracture associated with of total 17(21.5%) displaced 3rd molar,8(14.0%) are associated with unfavourable vertical fracture and 9(40.9%) are associated with favourable vertical fracture.If we compare the vertical angle fracture in relation with class of the impacted 3rd molar,of total 56(70.9%) impacted 3rd molar with class I ,56(98.2%) caused vertical unfavourable fracture. Of total 17(21.5%) impacted 3rd molar with classII, 1(1.8%) are associated with vertical unfavourable fracture and 16 (72.7%) are associated with favourable vertical fracture . Of 6 (7.6%) class III impacted 3rd molar ,all 6 (27.3%) are associated with only vertical favourable fracture**(table1b)**Now if we see the association of horizontal angle fracture with the types of impacted 3rd molar ,of total 44(55.7%) are mesioangular and all 44(62.9%) are associated with unfavourable horizontal fracture .Of total 8(10.1%) distoangular impacted 3rd molar ,all are associated with horizontally unfavourable fracture. Total of 10(12.7%) horizontal impacted 3rd molar,all are associated with horizontal impacted 3rd molar. Of total 17(21.5%) vertical impacted 3rd molar,8(11.4%) are associated with unfavourable horizontal fracture and 9(100%) are associated with horizontal favourable fracture . Of total 70 unfavourable horizontal fracture 20(28.6%) are impacted 3rd molar with position A, 28(40.0%) are with position B and 12(17.1%)are with position C and 10(14.3%) are displaced . Out of total 9 horizontal favourable fracture ,6 dispaced 3rd molar (66.7%) are associated with it and 3(33.3%) impacted 3rd molar with position A are also associated with it**.**Of total 70 horizontal unfavourable fracture ,56(80.0%) are impacted 3rd molar with class I, 14(20.0%) are with class II and no impacted 3rd molar with class III are found. Of total 9 horizontal favourable angle fracture 3(33.3%)are associated with impacted 3rd molar with class II and 6(66.7%)are with classIII.(**Table1c)**

Table 1a-Impacted Mandibular 3rd molar Position and Angulation and its co-relation with mandibular Angle fracture

		Frequency	Percent
Position	A	23	29.1%
	B	28	35.4%
	C	12	15.2%
	Displace	16	20.3%
	Total	79	100.0%

Table 2: Association of type of impacted 3rd molar, position of impacted 3rd molar and Association of Class with unfavourable or favourable vertical mandibular fracture

			Angulation				Total
			Mesioangular	Distoangular	Horizontal	Vertical	
Vertical	Unfavourable	n	39	5	10	3	57
		%	68.4%	8.8%	17.5%	5.3%	100.0%
	Favourable	n	5	3	0	14	22
		%	22.7%	13.6%	0.0%	63.6%	100.0%
Total		n	44	8	10	17	79
		%	55.7%	10.1%	12.7%	21.5%	100.0%
P value			<0.001, S				

			A	B	C	Displace	
vertical	Unfavourable	n	17	21	12	7	57
		%	29.8%	36.8%	21.1%	12.3%	100.0%
	Favourable	n	6	7	0	9	22
		%	27.3%	31.8%	0.0%	40.9%	100.0%
Total		n	23	28	12	16	79
		%	29.1%	35.4%	15.2%	20.3%	100.0%
P value			0.011, S				

			class			Total
			Class I	Class II	Class III	
vertical	Unfavourable	n	56	1	0	57
		%	98.2%	1.8%	0.0%	100.0%
	Favourable	n	0	16	6	22

		%	0.0%	72.7%	27.3%	100.0%
Total		n	56	17	6	79
		%	70.9%	21.5%	7.6%	100.0%
P value			<0.001, S			

Tb 3: Association of type of impacted 3rd molar, position and Association of Class with unfavourable or favourable horizontal mandibular fracture

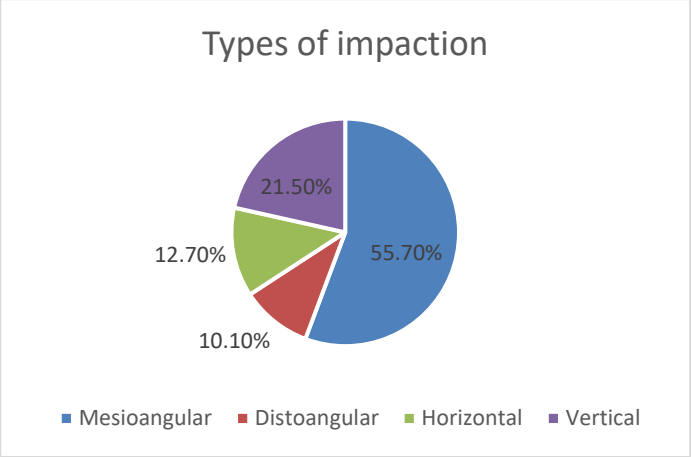
			angulation				Total
			Mesioangular	Distoangular	Horizontal	Vertical	
Horizontal	Unfavourable	n	44	8	10	8	70
		%	62.9%	11.4%	14.3%	11.4%	100.0%
	Favourable	n	0	0	0	9	9
		%	0.0%	0.0%	0.0%	100.0%	100.0%
Total		n	44	8	10	17	79
		%	55.7%	10.1%	12.7%	21.5%	100.0%
P value			<0.001, S				

			position				Total
			A	B	C	Displace	
Horizontal	Unfavourable	n	20	28	12	10	70
		%	28.6%	40.0%	17.1%	14.3%	100.0%
	Favourable	n	3	0	0	6	9
		%	33.3%	0.0%	0.0%	66.7%	100.0%
Total		n	23	28	12	16	79
		%	29.1%	35.4%	15.2%	20.3%	100.0%
P value			0.001, S				

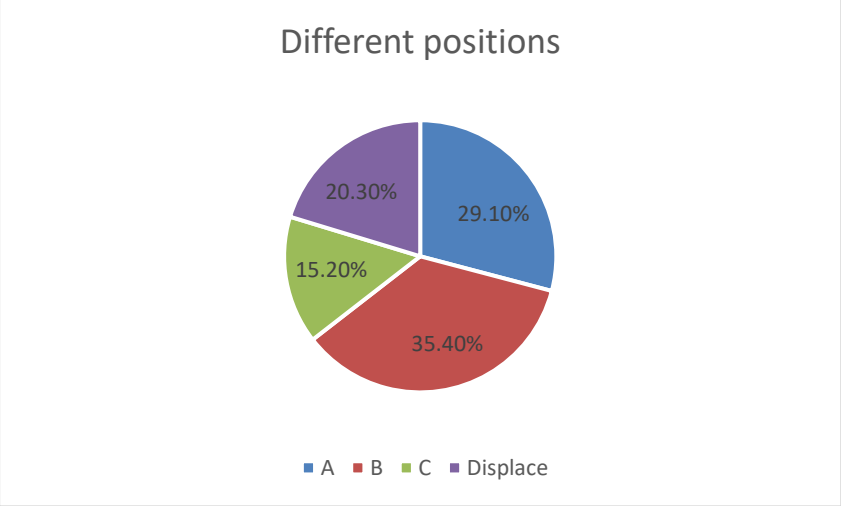
			class			Total
			Class I	Class II	Class III	
Horizontal	Unfavoura	n	56	14	0	70

	ble	**%**	**80.0%**	**20.0%**	**0.0%**	**100.0%**
	Favourable	**n**	**0**	**3**	**6**	**9**
		%	**0.0%**	**33.3%**	**66.7%**	**100.0%**
Total		**n**	**56**	**17**	**6**	**79**
		%	**70.9%**	**21.5%**	**7.6%**	**100.0%**
P value			**<0.001, S**			

Graph 1



Graph 2



4. DISCUSSION

The purpose of the study is to evaluate the nature of the mandibular angle fracture according to the type and position of the third molar teeth. Study provides clinical evidence to suggest that unerupted third molar teeth weaken the mandibular angle[Schwimmer A 1983, Safdar N 1995, Ma'aita J 2000].Our results confirmed an increased risk of angle fractures when 3rd molars were present and also find a correlation for angle fractures depending on 3rd molar position. We found higher

incidence of angle fracture in the age group B which is similar to the study of Praveen satish kumar et al . [Joyce T Lee et al 2000 , Kumar PS 2015, Halmos DR 2004, Duan DH 2008, **Schwimmer A 1983**]also found the that the deepest impaction position was associated with the lowest risk for an angle fracture compared to the superficial impaction. In our study we found 28(35.4%)postion B impacted 3rd molar are associated with angle fracture followed by 23(29.1%) position A and 12(15.2%) position C are involved Reitzik M et-al 1978, **Huelke DF et-al 1961**.

If it is hypothesised that 3rd molar increases the risk of mandibular angle fractures by occupying osseous space and thereby weakening the angle region, deeper 3rd molars should increase the risk of fractures[6] which is also supported by Kumar SR et-al 2015 , but our result found on the contrary and supporting the hypothesis which Menon S et-al 2016 suggested that mandibular strength is derived from maintenance of cortical, not medullary bone integrity. As such, superficially positioned 3rd molar disrupts the cortical integrity of the external oblique ridge, producing a point of weakness in the mandible and making it susceptible to fracture.44(55.7%) mesioangular impacted 3rd molar are associated with the mandibular angle fracture followed by vertical 17(21.5%) followed by horizontal 10(12.7%) and distoangular 8(10.1%) impacted 3rd molar. The most commonly associated impacted 3rd molar tooth with angle fracture is mesioangular and position B .Similarly Rajkumar K et-al 2009. stated that more superficial position of an impacted third molar was associated with an increased risk of angle fractures Fuselier JC et-al 2002. . According to Fuselier et al. 2002 angle fractures are more common in subjects with mesioangular third molars similar to our result . where Maaita et-al 2000. found the result on the contrary, a higher prevalence for vertical and distoangular third molars.

About the nature of the fracture , out of total 44 all 44(100%) mesioangular impacted 3rd molar caused horizontal unfavourable fracture. Of 44 total, 39(88.8%) caused vertical unfavourable fracture and 5(11.5%) caused vertical favourable fracture. Out of 28, 21(75%) impacted 3rd molar position B caused vertical unfavourable fracture and 7(33.3%) caused vertical favourable fracture.out of 28, all caused horizontal unfavourable fracture.

5. CONCLUSION

The results of the study conclude that unerupted third molar teeth present an area of weakness of the mandible and predispose the angle region to fracture in condition of trauma and also found mandible containing superficially erupted mandibular third molar has higher risk for angle fracture than those with a deeply impacted 3rd molar.

Conflict of interest- none

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