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Traumatic dental injuries of the permanent incisors and its relation to malocclusion in patients attending the pedodontic clinic in College of Dentistry, Baghdad University

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Abstract

Dental trauma is a public health problem in young aged patients. The aim of this study was to investigate the percentage and severity of dental trauma and malocclusion and their correlation, as well as analyze the general risk factors like the effect of age, gender, causes of the trauma and malocclusion in anterior permanent teeth.

The sample of the present study include patients who came to the Pedodontic clinic in the Pedodontic and Preventive department at the College of Dentistry/Baghdad University seeking treatment of traumatized anterior permanent teeth. The traumatized teeth were examined clinically (according to Garcia-Gody classification) and radiographically. Types of occlusion was determined according to Angle's classification, while the over jet and overbite were recorded according to the coding criteria described by Kinnan's study.

In all age groups, the most frequent cause of trauma was found to be falls (61.4%). Enamel and dentin fracture was the most frequently seen type of injury(38.6%) in which upper central incisors were the most affected teeth from dental trauma(47.7%).Regarding malocclusion, patients with class II malocclusion represent (71.9%) from the total sample, while those with increased over jet (26.3%) in which (66.7) of them seek treatment for two fractured teeth. However, the number of injured teeth per child was 1.54. Increased overbite was correlated with more sever type of dental trauma.

There is a relationship between malocclusion and fractured anterior teeth in which malocclusion will increase the number of fractured teeth as well as the severity of dental trauma.

Keywords: Tooth fractural, trauma, and malocclusion.

Introduction

Oral injuries are the fourth most common area of the body injuries among 7-30 years old [(1)]. Traumatic dental injuries of the permanent incisors and their supporting structures, which occur because of different reasons, constitute a true dental emergency and require immediate assessment and management, because many young, permanent teeth continue their development in those ages [(2-5)].The patients, who are exposed to trauma, are not only physically, but also psychologically affected [(6)], and

the fractured permanent tooth is a tragic experience for both child and parents, who are more concerned with esthetic rather than the symptomatic aspects of the problem[7],however, the most etiologic reasons for dental trauma are falls, playing and collisions[1,2,4,7,8,20,24].

During the childhood, the development of the occlusion both functionally and esthetically is dependent on the satisfactory presence of the teeth. Hence, a traumatized region if ignored will result in malformed or malposed teeth [9].

Predisposing factors for traumatic dental injuries include physical features such as increased incisal over jet ,open bite ,protrusion and lip incompetence[10,11,25,30,31] . While there is a clear evidence of an association between size of over jet and traumatic dental injuries , there is limited evidence whether anterior open bite is related to the occurrence of traumatic dental injuries .Similarly, there are large number of studies assessing this association in the permanent dentition [11-13].

The dentist is instrumental in preventing malocclusion and fractures of anterior teeth in order to improve one's personality and self -esteem. Therefore a study was carried out with the aim to find out the severity of anterior teeth fracture and to correlate with malocclusion among patients attended pedodontic clinic at College of Dentistry, Baghdad University. The objectives were to know the percentage and severity of traumatic dental injuries of the permanent anterior teeth and correlate with general relative factors like age, gender and reasons of trauma.

Materials and Methods

The study was carried out among 57 patients (34 boys and 23 girls) with88 traumatized permanent incisors , aged between 6-14 years, who had attended to pedodontic clinic in Pedodontic and Preventive Department with the complaint of pain and /or esthetic problem because of trauma, during 7 months(November 2008 to May 2009). They were examined clinically according to Garcia-Gody classification [14]. Periapical radiographs of the traumatized teeth were taken. Types of occlusion was determined according to Angle's classification. Over jet is the horizontal distance from the incisal edge of the maxillary central incisor to the most prominent point on the labial surface of the corresponding mandibular incisors, measured parallel to the occlusal plane with the dental arches are in centric occlusion [15]. A digital caliber was used to measure the over jet to the nearest 0.1 millimeter. The subject should close in centric occlusion and the occlusal plane in horizontal position[16]. The coding criteria were used according to Kennan's study [17]. Measurement of over bite was made with aid of metric ruler with the patient in centric occlusion and his/her occlusal plane horizontal. The amount of vertical overlap of the maxillary incisors on the mandibular incisors was marked with an indelible pencil on the labial surface of the mandibular incisors, using the incisal edge of the maxillary incisors to guide the pencil. The upper conical plane of the sharpened part of the pencil and not the shaft of the pencil itself was placed parallel to the patient's occlusal plane. The measurement from the incisal edge of the mandibular central incisors to the pencil mark was made to the nearest millimeter [18] and the coded criteria were used according to Kennan's study [17]. Anterior open bite is a situation when the lower incisors are not overlapped in the vertical plane by the upper incisors and does not

occlude with them[19] and it is recorded as present or not.

Chi-square test was employed to compare and determine the statistical significance relations and it was set at $P<0.05$.

Results

After the seven months period, 57 patients with 88 traumatized anterior teeth were examined. The age of those children ranged from 6 to 14 years with an average age of 10 years. Male patients experienced more traumatic dental injury(59.6 %) and more traumatized teeth (60.2%) than female patients. The 9-11-year-old group had the highest percentage of both traumatic injuries (49.1%) and number of traumatized teeth (50.0%),(Table 1). The causes of dental trauma in relation to age and gender are shown in Table (2),in all age groups , the most frequent cause of dental injury was found to be falls (61.4%), followed by playing (24.6%). The statistical analysis showed that there was no statistical relation between the age and cause of dental injury ($P>0.05$).

Table (3) shows the distribution of patients according to type of injury by age groups, enamel - dentin fracture (class II) was found to be the most frequently seen type of dental injury (38.6%) followed by enamel - dentin and pulp fracture (class III) (30.7%). The relation between age and type of dental injury was found to be statistically highly significant ($P<0.001$).

The mostly affected teeth by dental trauma were maxillary teeth (92.1%) and central incisors represented (88.6%)(the right central incisors 47.7% and 40.9% for the left central incisors), Fig.(1).

Table (4) shows that the distribution of patients with traumatized teeth in relation to type of occlusion which reveals that traumatized children with class II malocclusion were more common (71.9%). No traumatized children were found with class III malocclusion. Statistically, there was no significant relation between types of occlusion and age of patients ($P>0.05$), but there was a significant relation between types of occlusion and gender ($P<0.05$).

The number of injured teeth per child was (1.54) and (52.7%) of the patients were found to have more than one injured tooth. Approximately, (47.4%) of patients presented with one affected tooth, (50.9%) with two teeth and only (1.8%) with three affected teeth. The over jet of more than 4mm had an increased the risk of sustaining traumatic injury to teeth in which (66.7%) of children with increased over jet were with two teeth fracture, however, the differences between the over jet and number of traumatized teeth was not statistically significant ($P>0.05$), while the relation between the over jet and types of dental injury was statistically highly significant ($P<0.001$), Table (5).

Distribution of patients with traumatized teeth according to over bite value was shown in Table (6), which revealed that an over bite value of more than 4mm registered higher percentage in girls (65.3%) compared with boys (32.4%), while normal over bite value (2-4mm) was more common in boys (52.9%) in contrast to that in girls (30.4%), but there was no statistical association between gender and over bite value ($P>0.05$). For the total sample, patients with an over bite value of more than 4mm were (45.6%), while the least percentage was recorded among those with <2mm over bite which registered only (3.5%). Patients with open bite represent (7.0%) from the total sample. Statistically, over bite value was found

to be highly associated with type of trauma (P<0.01).

Discussion

Fifty seven children were examined in this study with different age groups ranged from 6 to 14 years old. This small size of the sample could be due to the fact that the security circumstances were unstable in Baghdad during the time of data collection. The percentage of trauma among boys was found to be higher (59.6%) than girls who attended to the clinic with dental injuries. This might be related to their tendency to be more active and more likely to participate in sports and contact games [20,23]. This was in agreement with the majority of the previous studies[1-4,6,8,20,23,30].In the present study, the most affected age group was 9-11years old group (49.1%) ,when compared with other age groups, and this was similar to previous studies [2,20,21], while other studies reported the peak age was 8 years[3,22].It was found that falls were the most frequent cause of trauma among all age groups followed by playing ,this is generally supported by other previous studies [1-4,8,20], but in disagreement with other studies(4,24)which found that playing was the most frequent cause of trauma.

This study showed that enamel-dentin fracture class II was the most common type of fracture (38.6%) followed by enamel-dentin with pulp exposure class III (30.7%). This result agreed with [1-3,24]. However, there are studies showing that simple enamel fracture class I is the most common type of injury in permanent dentition [4,8,23],variation in sampling and diagnosing criteria between different studies may explain differences in findings. Children with simple enamel fracture class I generally do not have a need for seeking dental care, because they do not have any complaint or they may not be aware of their injured teeth. For this reason, the percentage of class II fracture might be higher in this study.

Regarding the location of traumatized teeth, the maxillary central incisors were the mostly affected teeth by dental trauma, because of their protrusive and vulnerable position. In addition, the upper jaw is fixed to the skull which makes it rigid, while the lower jaw, being a flexible part tends to reduce the impact forces directed on the lower anterior teeth by movement [32]. This finding corroborates the earlier findings of the researchers [1-3,11,20,22-25]. Concerning the side of the jaw, the right side was more frequently involved with dental trauma than the left side and this finding is coincided with those of other previous studies [22-25].

Results of the present study showed that the prevalence of traumatized children was found to be higher with class II malocclusion (71.9%) compared to other type of occlusion. These results were closely similar to those recorded by other studies[24,25].The explanation of this result is that, in cases with normal occlusion, the energy of the trauma is decreased by the larger contact area, the incisal contact of the upper and lower teeth and the protecting effect of lip closure . While in cases of class II malocclusion, the lack of incisal contact, the location of this contact in the cervical part of the upper incisors or the uncompleted lip closure, all increased the risk of being traumatized in children with class II malocclusion [26].

In this study, the number of injured teeth per child was 1.54 and this finding in line with previous studies that found the number of injured teeth per child was varying from 1.1 to 1.97 [1,2,25].

Children with over jet more than 4 mm were 15 children and (66.7%) were with two teeth trauma. An over jet greater than normal may create an obvious risk of injuries[27].The number of traumatized teeth showed that two teeth trauma were the most common type (50.9%) followed by single tooth trauma (47.4%). This results were in agreement with other studies [28,29] and disagree with [24,25]. This result could be explained as that, the investigators in those studies had gone to certain schools and cities and examined all the children there, while in this study, only the children who came to the dental hospital seeking treatment were examined.

A prominent association was found between increased over bite value (more than 4mm) and coronal fracture(45.6%),this was in accordance with previous finding [24,30], but in disagreement with [25]. Overtly as the deep bite may usually be associated with class II malocclusion [26],so the high prevalence of coronal fractures may be confined to this type of malocclusion rather than the increased in over bite. Over bite value was not associated with gender of traumatized patients, but type of trauma was associated with over bite value which mean that increased over bite value was correlated with more sever types of dental trauma [25].

In conclusion, the dental injury is frequently occurring during different stages of life, but they are particularly common in childhood (in the present study the age group more prone to trauma is 9-11 years). There is a strong relationship between malocclusion and fractured anterior teeth in which over jet of more than 4mm increases the risk of trauma to more than one tooth while an over bite of more than 4mm increases the risk of sustaining traumatic injury to their incisors.

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Table(1): Distribution of the sample according to number of traumatized teeth by age and gender.

Age group	Gender	No.	No. of traumatized teeth	%
6 – 8	M	4	6	6.8
	F	3	4	4.5
	Both	7	10	11.3
9 – 11	M	12	19	21.6
	F	16	25	28.4
	Both	28	44	50.0
12 – 14	M	18	28	31.8
	F	4	6	6.8
	Both	22	34	38.6
Total	M	34	53	60.2
	F	23	35	39.8
	Both	57	88	100.0

Table 2: Number of teeth and etiology of dental trauma by age and gender

Age group	Gender	No.	Fall		Playing		Fight		RTA*	
			No.	%	No.	%	No.	%	No.	%
6 – 8	M	4	2	50.0	2	50.0	0	0	0	0
	F	3	2	75.0	1	25.0	0	0	0	0
	Both	7	4	57.1	3	42.9	0	0	0	0
9 – 11	M	12	7	58.3	4	33.3	1	8.3	0	0
	F	16	10	62.5	3	18.8	2	12.5	1	6.3
	Both	28	17	60.7	7	25.0	3	10.7	1	3.6
12 – 14	M	18	11	61.1	3	16.6	3	16.6	1	5.6
	F	4	3	75.0	1	25.0	0	0	0	0
	Both	22	14	63.6	4	18.2	3	13.6	1	4.5
Total	M	34	20	58.8	9	26.5	4	11.8	1	2.9
	F	23	15	65.2	5	21.7	2	8.7	1	4.3
	Both	57	38	61.4	14	24.6	6	10.5	2	3.5

Table (3): Distribution of patients according to type of injury by age group.

Class of trauma	Age group in years							
	6-8		9-11		12-14		total	
	No.	%	No.	%	No.	%	No.	%
I	0	0.0	0	0.0	6	6.8	6	6.8
II	3	3.4	17	19.3	14	15.9	34	38.6
III	2	2.3	13	14.8	12	13.6	27	27.13
IV	0	0.0	0	0.0	0	0.0	0	0.0
V	0	0.0	0	0.0	0	0.0	0	0.0
VI	2	2.3	9	10.2	0	0.0	11	12.5
VII	1	1.1	1	1.1	0	0.0	2	2.3
VIII	0	0.0	3	3.4	0	0.0	3	3.4
IX	2	2.3	0	0.0	0	0.0	2	2.3
X	0	0.0	1	1.1	2	2.3	3	3.4
total	10	11.4	44	50.0	34	38.6	88	100

Table (4): Distribution of patients with traumatized teeth in relation to type of occlusion by age and gender.

Age group in year	Type of occlusion						total	X^2
	Class I		Class II		Class III			
	No.	%	No.	%	No.	%		
6-8	2	28.6	5	71.4	0	0.0	7	X^2=0.0285
9-11	7	25.0	21	75.0	0	0.0	28	df=2
12-14	17	31.8	15	68.2	0	0.0	22	p>0.05 N.S
Gender								
Males	6	17.6	28	82.4	0	0.0	34	X^2=4.534
Females	10	43.5	13	56.5	0	0.0	23	Df=1
Both	16	28.1	41	71.9	0	0.0	57	P<0.05*

N.S (not significant), * (significant)

Table (5): Distribution of patients with traumatized teeth according to overjet value by number of traumatized teeth.

Overjet in mm.	No. of children	No. of traumatized teeth						Total
		one		two		three		
		No.	%	No.	%	No.	%	
<2	2	1	50.0	1	50.0	0	0.0	3
2-4	40	22	55.0	18	45.0	0	0.0	58
>4	15	4	26.4	10	66.7	1	6.7	27
total	57	27	47.4	29	52.6	1	1.8	88

Table (6): Distribution of patients with traumatized teeth according to overbite value by gender.

Gender	Overbite in mm.								Total
	Open bite		<2		2-4		>4		
	No.	%	No.	%	No.	%	No.	%	
Males	3	8.8	2	5.9	18	52.9	11	32.4	34
Females	1	4.3	0	0.0	7	30.4	15	65.2	23
both	4	7.0	2	3.5	25	43.9	26	45.6	57

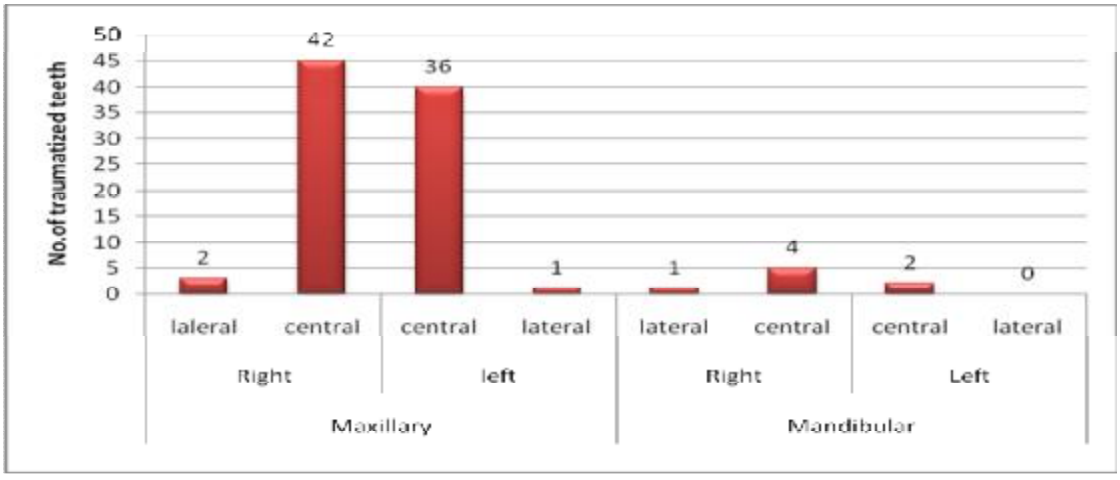

Fig.(1) : Distribution of the traumatized teeth according to the location, side and tooth type.