

PREVALENCE OF ROOT ANGULATION IN VIDARBH POPULATION: A PANORAMIC RADIOGRAPHIC STUDY

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ABSTRACT:

Objective: the main objective of this study was to evaluate the prevalence of root angulation in Vidarbh population using panoramic radiographs.

Methods: This prospective study was carried out on Orthopantomograms of 1000 subjects between the age group ranges of 18-70 years to evaluate the prevalence of root dilacerations in Vidarbh region using orthopantomograms.

Angulation of each tooth root was measured using annotation software in the CR system. A single examiner analyzed all radiographs root angulations in mesial or distal direction starting from 50° were measured. (fig 1)

Results: Teeth with root angulation >50° were considered as dilacerated. In the present study maxillary and mandibular molars had the maximum number of dilacerations

Conclusion: This study shows that this anomaly is distributed maximum in maxillary and mandibular posterior teeth. Additionally, the dilacerations are clearly more common in the posterior teeth which are less related to trauma than the anterior teeth. OPGs may be routinely employed as an initial screening/diagnostic modality and further followed up using periapical radiograph if and when necessary as root angulation of teeth influences the planning and execution of dental treatment to varying extents.

Keywords: Dilaceration, root angulation



INTRODUCTION:

The term dilaceration was first coined in 1848 by Tomes who defined the phenomenon as the forcible separation of the cap of the developed dentine from the pulp in which the development of the dentine is still progressing.^[10] Later, it was defined as a disturbance in tooth formation that produces a deviation or curve in the linear relationship of a crown of a tooth to its root.^[2] All teeth roots are curved to some degree, so the term dilaceration is

reserved for instances of excess or abnormal root curvature that could complicate endodontic or exodontic procedure.^[2,6]

According to some authors a tooth is considered to have a dilaceration toward the mesial or distal direction if there is a 90-degree angle or greater along the axis of the tooth or root, whereas others defined dilaceration as a deviation from the normal axis of the tooth of 20

degrees or more in the apical part of the root. [4] Only few studies have reported the prevalence of dilaceration in multiple permanent teeth in adults. [1, 2, 3]

The objective of this study was to evaluate the prevalence of root angulation in Vidarbha population using panoramic radiographs.

MATERIALS & METHODS:

This prospective study was carried out on Orthopantomograms of 1000 subjects between the age group range of 18-70 years to evaluate the prevalence of root dilacerations in Vidarbha region using orthopantomograms.

Angulation of each tooth root was measured using **annotation software** in the CR system. A single examiner analyzed all radiographs root angulations in mesial or distal direction starting from 50° were measured and poor quality radiographs were excluded. (fig 1) The findings were recorded and the gathered data was sorted, tabulated and subjected to statistical analysis.

OBSERVATIONS AND RESULTS

A total of 1000 subjects included for the study out of which 436 (43.6%) were male and 564 (56.4%) patients were female.

ROOT ANGULATION IN DIFFERENT AGE GROUPS

In the present study most of the patients belonged to the age group 18-20 years and 21-30 years and these groups had

maximum number of root angulation (72, 92) as elaborated in **table 1**.

ROOT ANGULATION AMONG VARIOUS TEETH IN MAXILLA AND MANDIBLE

A total of 32000 teeth were evaluated in 1000 OPG out of which, 928 (2.9%) maxillary teeth and 1704 (5.32%) mandibular teeth had root angulation. Out of 928 maxillary teeth with root angulation, maximum teeth having root angulation were first molar (8%), second molar (13.2%) and third molar (11.6%).

Out of 1704 mandibular teeth with root angulation, maximum teeth with root angulation also were first molar (15%), second molar (13%) and third molar (30.6%). No statistical significance was found in comparison of root angulation among various teeth in maxilla and mandible ($p > 0.05$) as shown in **table 2**.

ROOT ANGULATION >50 DEGREES AMONG VARIOUS TEETH IN THE MAXILLA

There were a total of 95 maxillary teeth having root angulation $>50^\circ$. Out of these 95 teeth maximum were the maxillary molars (12 first molar, 29 second molars, 23 third molars) which had varying degrees of angulations between 51- 80°. No Statistical significant difference was found out after comparing the degree of root angulation between these maxillary teeth as shown in **table 3. (P>0.05)**

ROOT ANGULATION >50 DEGREES AMONG VARIOUS TEETH IN THE MANDIBLE

There were a total of 197 mandibular teeth having root angulation $>50^\circ$, Out of these 95 teeth maximum were the mandibular posterior teeth (47 first molar, 35 second molars, 50 third molars). No Statistical significant difference was found out after comparing the degree of root angulation between various teeth in mandible as shown in **table4.(P>0.05)**

DISCUSSION:

The term dilaceration was first coined in 1848 by Tomes who defined the phenomenon as the forcible separation of the cap of the developed dentine from the pulp in which the development of the dentine is still progressing. Later, it was defined as a disturbance in tooth formation that produces a deviation or curve in the linear relationship of a crown of a tooth to its root. [2,3] Stewart has likened tooth dilaceration to the hand of a traffic policeman, whereas Moreau used the term scorpion tooth for this condition. [2]

There are 2 possible cause of dilaceration. The most widely accepted cause is mechanical trauma to the primary predecessor tooth, which results dilaceration of the developing permanent tooth. An idiopathic developmental disturbances is proposed as another possible cause in cases that have no clear evidence of traumatic injury. [4] Dilaceration can be seen in both the permanent and deciduous dentitions, but the incidence in the latter is very low. [6]

To diagnose dilaceration of the root, radiographic examination is required. The direction of radiographically evaluated dilacerations of roots can be read in 2 planes and categorized as mesial, distal, or orofacial. [3] Periapical radiographs are considered the most appropriate means to diagnose dilacerated teeth, but in a third world country, taking full mouth diagnostic periapical radiographs for all patients may be neither viable nor practical. Taking an OPG may be more desirable. [1, 2, 4]

Diagnosing a dilaceration is critical as severely angulated roots of teeth may complicate dental treatment viz; root canal treatment, extraction and orthodontic treatment. Only few studies have reported the prevalence of dilaceration in multiple permanent teeth in adults. Most of the published articles are case reports of dilacerations pertaining to a single permanent tooth. [1]

H Çolak et al (2012) [2] conducted a study to determine, retrospectively, the prevalence and distribution of the dilaceration of the root for each tooth-type in a sample of Central Anatolian Turkish population by using panoramic radiographs. Whereas, the objective of this study was to investigate, prospectively, the prevalence of root angulation in Vidarbh region using orthopantomograms.

OzkanMiloglu et al (2010) [4] studied the prevalence of root dilacerations in a Turkish population using periapical

radiographs which is contradictory to our type of imaging technique.

A total of 1000 conventional panoramic radiographs were included for the present study between the age group range of 10-70 years out of which 436 (43.6%) belonged to male and 564 (56.4%) patients belonged to female . Whereas in a study by **PM Omal et al (2012)** ^[1] 506 conventional panoramic radiographs between the age range 18 and 70 years were screened, out of which 196 (38.7%) belonged to males and 310 (61.2%) to females.

In the present study maximum patients who had root angulations belonged to the age group of 21-30 years (92) with least number of root angulation in the age group of 61-70 which is similar to findings of **PM Omal et al (2012)** ^[1] who also found out that the age group of 21 to 30 years showed maximum number of persons with root angulations and least number was observed in the 61 to 70 years age group.

Teeth having angulation $<50^{\circ}$ were considered for the present study whereas in the study by **Ana Malc'ic et al (2006)** ^[3] a deviation of 90° or more from the normal long axis of the tooth was considered as a dilacerations and in the study by **PM Omal et al (2012)** ^[1] root angulations in mesial or distal direction starting from 20° were measured.

In the present study a total of 16000 teeth were evaluated in 1000 OPG out of which, 928 (5.8%) maxillary teeth and

1704(10.65%) mandibular teeth had root angulation.while in a study by **H Çolak et al (2012)** ^[2] dilacerations were detected in 1504 teeth out of a total of 192 150 (0.78%).

PM Omal et al (2012) ^[1] in his study stated that root angulations were seen significantly more in the maxilla (2.43%) than in the mandible (0.89%) which is contradictory to the findings in the present study where root angulations were more prominent in mandibular teeth.

In this study, amongst the maxillary teeth having root angulation $>50^{\circ}$ the maxillary molars were dilacerated most often and maxillary anterior teeth having least prevalence (12 - first molar, 29 - second molar and 23 - third molar) which is similar to the findings of **Ana Malc'ic et al (2006)** ^[3] and contradicts the findings of **H Çolak et al (2012)** ^[2] who stated that dilaceration were mostly found in 1.23% of maxillary second premolars.

In the present study, amongst mandibular teeth, maximum mandibular molars were having root angulation $>50^{\circ}$ ((47 - first molar, 35- second molar and 50 - third molar) with mandibular anterior teeth having least prevalence which is similar to the findings by **H Çolak et al (2012)** ^[2] who concluded that Mandibular third molars were dilacerated most often (3.76%), followed by mandibular second molars (1.81%).

Since there exists a difference in root angulation values in studies from two

different populations, more studies may be necessary to know the exact prevalence, if any, of individual tooth angulation in different populations.

CONCLUSION:

This study shows that this anomaly is distributed maximum in maxillary and mandibular posterior teeth. Additionally, the dilacerations are clearly more common in the posterior teeth which are less related to trauma than the anterior

teeth. OPGs may be routinely employed as an initial screening/diagnostic modality and further followed up using periapical radiograph if and when necessary as root angulation of teeth influences the planning and execution of dental treatment to varying extents.

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TABLES:

Age groups (in years)	Number of patients screened	Number of patients having root angulation	Percentage
18-20	320	72	22.5%
21-30	300	92	30.66%
31-40	192	63	32.81%
41-50	110	42	38.18%
51-60	52	12	23.07%
61-70	26	11	42.3%
Total	1000	292	29.2%

Tooth type	No. of maxillary teeth examined	No. of maxillary teeth with root angulation	Percentage	No. of mandibular teeth examined	No. of mandibular teeth with root angulation	Percentage
Central incisor	2000	8	0.4%	2000	12	0.6%
Lateral incisor	2000	64	3.2%	2000	44	2.2%
Canine	2000	28	1.4%	2000	116	5.8%
1 st premolar	2000	48	2.4%	2000	208	10.4%
2 nd premolar	2000	124	6.2%	2000	152	7.6%
1 st molar	2000	160	8%	2000	300	15%
2 nd molar	2000	264	13.2%	2000	260	13%
3 rd molar	2000	232	11.6%	2000	612	30.6%
Total	16000	928	5.8%	16000	1704	10.65%

- χ^2 -value=8.96, p-value=0.25, NS, p>0.05

Table 3: ROOT ANGULATION >50 DEGREES AMONG VARIOUS TEETH IN THE MAXILLA					
Tooth type	No. of teeth with root angulation	<i>Number of angulated root with degrees</i>			
		51-60	61-70	71-80	81-90
Central incisor	3	2	1	0	0
Lateral incisor	8	5	2	1	0
Canine	4	1	1	1	1
1 st premolar	7	2	3	1	1
2 nd premolar	9	4	3	2	0
1 st molar	12	7	2	2	0
2 nd molar	29	11	7	8	3
3 rd molar	23	13	7	9	3

- X2-value=11.248,p-value=0.95,NS,p>0.05

Table 4: ROOT ANGULATION >50 DEGREES AMONG VARIOUS TEETH IN THE MANDIBLE					
Tooth type	No. of teeth with root angulation	<i>Number of angulated root with degrees</i>			
		51-60	61-70	71-80	81-90
Central incisor	1	1	0	0	0
Lateral incisor	2	2	0	0	0
Canine	17	7	7	2	1
1 st premolar	28	10	12	5	1
2 nd premolar	17	8	7	1	1
1 st molar	47	29	8	7	3
2 nd molar	35	12	14	5	4
3 rd molar	50	31	13	5	1

- X2-value=20.74,p-value=0.47,NS,p>0.05

FIGURE:

Fig 1: cropped panoramic view showing mandibular molar with 65.6° of root angulation

