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Original Research

Evaluation of patients with apical root resorption after fixed orthodontic treatment: An observational study

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ABSTRACT:
Background: The literature indicates that patients undergoing orthodontic treatment are more likely to have severe External apical root resorption. Hence; the present study was undertaken for assessing the profile of patients with apical root resorption after orthodontic treatment. **Material and method:** A total of 30 patients who underwent fixed orthodontic treatment and in which apical root resorption was present were included in the present study. Complete demographic details of all the patients were obtained. Complete clinical and radiographic findings of all the patients were assessed. Pretreatment radiographs and orthopantomographs (OPG) were also collected. A fresh OPG all patients were also carried out to compare the root resorption with the pre-treatment status. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. **Results:** In the present study, a total of 30 patients who underwent fixed orthodontic treatment were enrolled. Mean age of the patients was 12.8 years. 40 percent of the patients belonged to the age group of less than 12 years. 60 percent of the patients were males while the remaining were females. 17 cases were of maxilla while 13 cases were of mandible. While assessing the correlation of gender with apical root resorption in maxilla and mandible, non-significant results were obtained. While assessing the correlation of age wise distribution with apical root resorption in maxilla and mandible, non-significant results were obtained. **Conclusion:** Maxillary teeth are more prone to apical root resorption induced by fixed orthodontic treatment.
Key words: Root Resorption, Orthodontics

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INTRODUCTION

Inflammatory root resorption is a side effect related to the biological tissue response that enables teeth to be moved during orthodontic treatment and with which it was first associated already in 1914. In histologically examined teeth, it has been found in up to 100% of orthodontically treated teeth but less often in teeth examined by panoramic or intraoral radiography. In most studies of orthodontically induced inflammatory root resorption (OIIRR), intraoral radiography has been used. Even with efforts to obtain periodically identical radiographs, this technique has shortcomings.[1-3] External apical root resorption is an undesirable complication of orthodontic treatment that results in permanent loss of tooth structure from the root apex. However, it can be avoided with more accurate management of orthodontic treatment. The literature indicates that patients undergoing orthodontic treatment

are more likely to have severe External apical root resorption. While this is not the only factor responsible for External apical root resorption, the effect of orthodontic treatment can be a major trigger.[4- 7] Hence; the present study was undertaken for assessing the profile of patients with apical root resorption after orthodontic treatment.

MATERIAL AND METHOD

The present study was conducted for assessing the profile of patients with apical root resorption after orthodontic treatment. A total of 30 patients who underwent fixed orthodontic treatment and in which apical root resorption was present were included in the present study. Complete demographic details of all the patients were obtained. Patients with history of any other systemic illness, any known drug allergy or patients with presence of any bone metabolic disorder were excluded from the present study. Inclusion criteria for the present study included patients who had received fixed orthodontic treatment one year back. Complete clinical and radiographic findings of all the patients were assessed. Pretreatment radiographs and orthopantomographs (OPG) were also collected. A fresh OPG all patients were also carried out to compare the root resorption with the pre-treatment status. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Student t test was used for evaluation of level of significance.

RESULTS

In the present study, a total of 30 patients who underwent fixed orthodontic treatment were enrolled. Mean age of the patients was 12.8 years. 40 percent of the patients belonged to the age group of less than 12 years. 60 percent of the patients were males while the remaining were females. 17 cases were of maxilla while 13 cases were of mandible. Among maxilla cases, 10 patients were males while remaining 7 were females. While assessing the correlation of gender with apical root resorption in maxilla and mandible, non-significant results were obtained.

In the present study, among the patients with less than 12 years of age, 8 cases were present in maxilla while the remaining was in mandible. While assessing the correlation of age wise distribution with apical root resorption in maxilla and mandible, non-significant results were obtained.

Table 1: Age and gender-wise distribution

Parameter		Number of patients	Percentage of patients
Age group (years)	Less than 12	12	40
	12 to 16	8	26.67
	More than 16	10	33.33
Gender	Males	18	60
	Females	12	40

Table 2: Correlation of gender with apical root resorption in maxilla and mandible

Gender	Maxilla	Mandible	p- value
Males	10	8	0.25
Females	7	5	

Table 3: Correlation of age group with apical root resorption in maxilla and mandible

Age group (years)	Maxilla	Mandible	p- value
Less than 12	8	4	0.74
12 to 16	4	4	
More than 16	5	5	

DISCUSSION

Root resorption in orthodontics is referred to as induced inflammatory resorption, and it is a form of pathological root resorption, in which orthodontic forces are transferred to the teeth and hyalinized areas are thus removed in the periodontal area. During the removal of hyalinized tissues, the cementum is also removed. The resorption process is initiated by dentinoclasts. Osteoclast-like cells referred to as odontoclasts caused resorption. They have a pleomorphic shape and are usually multinuclear. The etiology of Orthodontic induced apical root resorption is unclear with various studies reporting 7% to 15% of untreated patients present with non-orthodontically induced external apical root resorption prior to orthodontic treatment.[6- 9] Hence; the present study was undertaken for assessing the profile of patients with apical root resorption after orthodontic treatment**.**

In the present study, a total of 30 patients who underwent fixed orthodontic treatment were enrolled. Mean age of the patients was 12.8 years. 40 percent of the patients belonged to the age group of less than 12 years. 60 percent of the patients were males while the remaining were females. 17 cases were of maxilla while 13 cases were of mandible. Among maxilla cases, 10 patients were males while remaining 7 were females. While assessing the correlation of gender with apical root resorption in maxilla and mandible, non-significant results were obtained. Baumrind S et al analysed the relationship in orthodontically treated adults between upper central incisor displacement measured on lateral cephalograms and apical root resorption measured on anterior periapical x-ray films. Mean apical resorption was 1.36 mm (sd +/- 1.46, n = 73). Mean horizontal displacement of the apex was -0.83 mm (sd +/- 1.74, n = 67); mean vertical displacement was 0.19 mm (sd +/- 1.48, n = 67). The regression coefficients for the intercept and for retraction were highly significant; those for extrusion, intrusion, and advancement were not. At the 95% confidence level, an average of 0.99 mm (se = +/- 0.34) of resorption was implied in the absence of root displacement and an average of 0.49 mm (se = +/- 0.14) of resorption was implied per millimeter of retraction. Only Gender, Elapsed Time, and Total Apical Displacement displayed statistically significant associations with apical resorption. Additional multiple regressions were then performed in which the data for each of these three statistically significant variables were considered separately, with the data for the four directional displacement variables. The addition of information on Elapsed Time or Total Apical Displacement did not explain a significant additional portion of the variability in apical resorption.[10]

In the present study, among the patients with less than 12 years of age, 8 cases were present in maxilla while the remaining was in mandible. While assessing the correlation of age wise distribution with apical root resorption in maxilla and mandible, non-significant results were obtained. Alejandro Iglesias-Linares et al determined whether orthodontic treatment with removable aligners vs fixed orthodontic appliances is associated with a different frequency of orthodontically induced external apical root resorption (OIEARR) when genetic, radiographic, and clinical factors are accounted for. Three hundred seventy-two orthodontic patients treated with removable aligners (Invisalign) or fixed appliances were genetically screened for interleukin 1B gene (IL1B) (rs1143634), interleukin 1 receptor antagonist gene (IL1RN) (rs419598), and osteopontin gene (SPP1) (rs9138/rs11730582). Twelve clinical variables, potentially associated with OIEARR, were also considered. Subjects were divided according to the presence of radiographically determined OIEARR (>2 mm). The association between OIEARR and appliance type, and radiographic, clinical and genetic factors, was assessed using backward stepwise conditional logistic regression. Reliability of the methods was adequate. Clinical case complexity (American Board of Orthodontics [ABO] Discrepancy Index) and extent of incisor apical displacement in the sagittal plane were associated with an increased OIEARR risk. After adjusting for associations between clinical/radiographic/genetic factors, there were no statistically significant differences with respect to OIEARR or type of orthodontic appliance used, whether removable aligners or fixed appliances. Only subjects homozygous for the T allele of IL1RN (rs419598) were more prone to OIEARR during orthodontic treatment. A similar OIEARR predisposition was identified using either removable aligners (Invisalign) or fixed appliances.[11]

CONCLUSION

Under the light of above mentioned data, the authors concluded that maxillary teeth are more prone to apical root resorption induced by fixed orthodontic treatment. However; further studies are recommended.

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