

To Evaluate the Prevalence of Root Resorption by means of Radiograph in Bihar: A Cross-Sectional Study

Konark^{1*} Anju Singh²

¹Senior Lecturer, Department of Conservative Dentistry and Endodontics, Patna Dental College and Hospital, Patna, Bihar, India.

²Assistant Professor, Department of Dentistry, Nalanda Medical College and Hospital, Patna, Bihar, India.

ABSTRACT

Aim: Evaluation of prevalence of root resorption radiographically in different tooth groups in Bihar.

Materials & Methods: Full- mouth radiographs of 356 patients (9536teeth) were evaluated for the presence of root resorption. At least 2 radiographic projections on periapical films were evaluated by two different observers.

Results: Root resorption were found in 103 radiographs (28.8%). Among them the common form of resorption was pulpal infection (71.2%). Resorption due to orthodontic treatment was detected in 14.6% of resorption cases. Resorption due to impaction was observed in 10.2% of all cases of resorption, and periodontal infection resorption was identified in 3.9% of all resorption cases in all tooth groups ($P > .05$).

Conclusion: In the general population pulpal infection related root resorption was the most common. It is probable that most are unrelated to trauma the teeth.

Keywords: Root resorption, radiograph, infection.

INTRODUCTION

The mineralized tissues of the permanent teeth are not normally resorbed. The etiology of root resorption involves injury to non mineralized tissues covering the external surface of the root or internal surface of the root canal (pre-dentin).^{1,2} Resorption is a condition associated with either a physiologic or pathologic process resulting in a loss of dentin, cementum, and/or bone.³ Continuation of the resorption process depends on common stimulation factors of the osteoclastic cells, either infection or by pressure.⁴

Removal of periodontal infection stimulation is unpredictable, and prognosis is fair. Only ankyrotic root resorption maintains itself without stimulation, and no predictable treatment is known.⁴ It is important to assess the prevalence of various types of root resorption in the general population to focus

the attention of researchers and clinicians to this pathologic process and render proper therapy when indicated.

It is hypothesized that a similar prevalence and distribution of root resorption between different tooth groups would be found in the general population of the same socioeconomic status. The present study was aim to evaluate the prevalence of various types of root resorption radiographically in a general population of Bihar.

MATERIAL AND METHOD

The full-mouth radiographs of 356 patients referred for treatment at Patna Dental College and hospital, Patna, Bihar, were evaluated for the presence of root resorption. Each tooth from at least 2

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*Correspondence Dr. Konark.

Department of Conservative Dentistry and Endodontics, Patna Dental College and Hospital, Patna, Bihar, India.

Email: Not Disclosed

radiographic projections on periapical films were evaluated by two different observers. Morphology of the root surface, periodontal ligament space width was assessed. All radiographs were viewed under 5× magnification. A total of 9536 teeth were evaluated. Radiographs in which root resorption was noted were scanned to the computer and categorized according to following signs 4:

1. Pulpal infection root resorption: internal-radiolucency in the internal root canal dentin walls; external-radiolucency in the external root surface of the dentin and adjacent bone.
2. Periodontal infection resorption-resorption lacuna in the dentin usually at the crestal bone level, expanding to the coronal or apical direction with or without radiolucency at the alveolar bone adjacent to the resorption lacuna of the dentin.
3. Orthodontic pressure resorption-short roots with no signs of radiolucency in the bone or root.
4. Impacted tooth pressure resorption-radiolucent area in the dentin located adjacent to the impacted tooth or tumor (lesion not of endodontic origin).
5. Ankylotic resorption—resorption lacunae filled with bone and missing periodontal ligament space; no radiolucent areas are observed.

RESULTS

Of the 356 radiographs, 184 were of females (51.7%) and 172 of males (48.3%). The mean age of the patients was 35.2 years old (youngest 12 years, oldest 80 years). Of these, 102 (28.8%) radiographs revealed teeth exhibiting signs of root resorption.

A statistically significant difference was found for the prevalence of different types of root resorption ($P < .01$). The most common was pulpal infection root resorption, followed by orthodontic pressure resorption, impacted tooth pressure resorption, and periodontal infection resorption. Internal root resorption and ankylosis were not found in any tooth (Table 1).

Table 1: Different types of root resorption in various patient groups.

Type of resorption	No. of patients (n = 356)	Males (n-172)	Females (n-184)	Patients' mean age
Pulpal infection	73	31	42	40
Periodontal infection	4	2	2	33
Orthodontic treatment	15	7	8	28
Impaction	10	6	4	34
Ankylosis	0	0	0	0

Pulpal infection external resorption was the most common type of root resorption, observed in 20.5% of the patients and 71.2% of all cases of root resorption. All cases were from root canal-treated teeth with radiographic signs of apical periodontitis. It was generally seen as radiolucent indentations or blurred irregularities on the root contour. There was no significant difference between genders. Significantly more patients with pulpal infection external resorption were in the older age group (over 40 years) than patients with no pulpal infection external resorption (mean age 34.5 years) ($P < .05$). Mandibular molars were the most affected ($P < .01$). Periodontal infection resorption was identified in 1.1% of all patients and 3.9% of all resorption cases. There was no significant difference between genders, and no statistical significant correlation with age. The prevalence of periodontal root resorption was the same for all tooth groups ($P > .05$).

Orthodontic pressure resorption was the second most common type of resorption, observed in 4.2% of patients and 14.6% of all cases of root resorption. This kind of resorption was found only in the apical part of the tooth. There was no significant difference between genders and no correlation with age ($P > .05$). Maxillary incisors were the most affected ($P < .01$).

Impacted tooth pressure resorption was seen in 3.0% of all patients and 10.2% of all cases of resorption. More patients were in the younger age group (34 years and younger), but no statistical significance was found ($P > .05$). Mandibular molars were the most affected ($P < .01$).

DISCUSSION

In the present study, the radiographic films of patients referred for treatment were evaluated for the presence of root resorption. External pulpal infection root resorption was the most prevalent (20.5%). Each case was found in root canal-treated teeth with radiographic signs of apical periodontitis. The osteoclastic activity in pulpal infection related resorption is stimulated by bacteria in the infected root canal^{2,4} and is commonly associated with teeth with apical periodontitis.^{5,6} Pulpal infection root resorption was more prevalent in the older age group, mainly in mandibular molars. This is reasonable, since older patients have more root canal-treated teeth and apical periodontitis gradually increases with age.⁷

No cases of internal pulpal infection root resorption were found. Internal resorption rarely occurs in permanent dentition.⁸ However, it was reported to be common in 23-year-old women⁹ and has been found in 45-year-old men, with the maxillary incisors mostly affected.¹⁰ Actually, periodontal-related root resorption is erroneously regarded as internal resorption in many cases, especially when it invades the root canal.^{3,4} Internal resorption can be differentiated by radiographs from various angles, when the root canal moves together with the resorption defect.³

Periodontal-related root resorption was found in 1.1% of the patients (0.05% of all teeth). It is generally seen radiographically as a single resorption lacuna at the crestal bone level. With progression of the process, radiolucency may be observed at the alveolar bone adjacent to the resorption lacuna of the dentin.⁴ Heithersay¹¹ analyzed various factors related to the etiology of this type of root resorption and estimated that it occurred in approximately 0.02% of the population; the mean age of the patients was 31.5 years old with no statistically significant differences between genders. This is in accordance with the results of the present study. Heithersay¹¹ found that the maxillary central incisors were more affected by this type of resorption, followed by maxillary canines, mandibular molars, and maxillary lateral incisors. In the present study, the prevalence of periodontal root resorption was identical for all tooth groups. This can be explained by the small number of teeth (8) with this type of resorption.

Early diagnosis is important, since the prognosis of treatment greatly depends on the stage of the resorptive process.¹¹

Orthodontic pressure resorption was detected in 4.2% of the patients. This type of resorption was second by the frequency of occurrence. The prevalence of reported root resorption during orthodontic treatment varies widely among researchers. Most studies agree that the root resorption process ceases once active treatment is terminated.¹² Similar to other studies,^{12,13} it was found in this study that only the apical part of the root undergoes resorption. In the present study, orthodontic pressure resorption occurred primarily in the maxillary incisors, which correlates with other studies.^{12,14}

Impacted tooth pressure resorption was found in 3.0% of the patients and was most prevalent in the mandibular molars. This can be explained by the high occurrence of impacted teeth in this region.¹⁵ No cases of ankylotic root resorption were found. This type of resorption is common after trauma, particularly after avulsions.¹⁶ A 61% prevalence rate of ankylosis following avulsion has been reported.¹⁷ The maxillary central incisors are the most commonly traumatized, and ankylosis usually occurs in children between 7 and 9 years old. The prevalence of resorption after avulsions ranges from 57% to 80%.^{17,18} The rate and progress of resorption primarily depend on damage to the periodontal ligament and the age of the patient.^{17,18} Andersson et al¹⁹ noted that in younger patients (8 to 16 years old) a replanted tooth with a necrotic periodontal ligament survived for 3 to 7 years, while in older patients, the tooth may remain functional for tens of years. In the present study, the mean age of the patients was 35.2 years. Therefore, it is possible that the teeth affected with ankylotic resorption had already been extracted. Surveys of the younger age groups could contribute more information about the prevalence of ankylotic root resorption.

CONCLUSIONS

The most common type of root resorption in a general Bihar population were pulpal infection-related root resorption, orthodontic pressure root resorption, and impacted tooth pressure resorption. It is probable that most are unrelated to traumatic

injuries of the teeth. Whereas in future more studies might be needed with different type of traumatic case.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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