Study of the Incidence of Radicular Grooves in Maxillary Incisors

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The purpose of this investigation was to determine the incidence of radicular grooves in the upper incisors of 642 patients from the region of Ribeirão Preto, SP, Brazil. Radicular grooves, present in 3.9% of the patients, were found mainly on the lingual surface of the maxillary lateral incisor (3.0%). The maxillary central incisors showed radicular grooves on both the buccal and lingual surfaces with an incidence of 0.9%. It was not possible to relate the incidence of these grooves with race (white and negro) or with sex.

Key Words: radicular grooves, maxillary incisors.

Introduction

The radicular groove or the radicular depression is a morphological defect found in teeth and has been reported as a predisposing factor for periodontal disease (Lee et al., 1968; Everett and Kramer, 1972; Withers et al., 1981; Meister et al., 1983).

Radicular grooves found in maxillary incisors have been called: palatal-gingival grooves (Lee et al., 1968), radicular development anomaly (Simon et al., 1971), distolingual groove (Everett and Kramer, 1972) and radicular lingual groove (August, 1978).

Everett and Kramer (1972) report that the distolingual groove may have different depths and lengths and they emphasize that once exposed to the buccal environment, bacterial plaque and calculi may become lodged in this groove. The cleaning of this area by the patient is impossible, causing the formation of a periodontal pocket. Treatment of these pockets is very difficult. Radicular grooves may be detected radiographically as a radiolucent parapulpal line.

August (1978) emphasizes the importance of diagnosing the presence of radicular grooves so the dentist can instruct the patient about dental hygiene of this area to avoid periodontal problems. The formation of a periodontal pocket in a tooth with an extensive radicular groove has an unfavorable prognosis.

Withers et al. (1981) studied the incidence of lingual gingival grooves in 2099 teeth of 531 patients and detected the presence of radicular grooves in 2.3% of the central and lateral maxillary incisors examined. Periodontal problems were associated with the presence of radicular grooves.
Pécora et al. (1991b) examined 921 maxillary incisors, 500 central and 421 lateral, in vitro. They reported the presence of a radicular groove in 2% of the central incisors and 2.6% of the lateral incisors. A majority of the radicular grooves found on the central incisors were located on the buccal root surface (1.6%) and only 0.4% were located on the lingual surface. All of the radicular grooves of maxillary lateral incisors were located on the lingual surface. This groove began on the lingual surface of the crown and extended to the root. It may reach the cervical region or the medial region and in many cases reach the apical region.

The objective of the present investigation was to study in vivo the incidence of radicular grooves in maxillary central and lateral incisors and correlate this incidence with sex and race (white or negro).

Material and Methods

A total of 642 patients between the ages of 7 and 68 years were examined (163 white males, 272 white females, 104 black males and 103 black females). Age, sex, race and name of each patient were noted.

Clinical examination was made by direct or indirect viewing with the aid of a reflecting light and magnifying glass (4X). An exploratory, periodontal probe was also used.

Only radicular grooves found on the buccal and lingual surfaces of the maxillary incisor crowns and extending beyond the cementoenamel junction were considered. Grooves present only on the dental crown were not considered. The presence or absence of a periodontal pocket near the radicular groove was also noted.

Results

Of the 642 patients examined, 25 (3.9%) presented radicular grooves on the buccal or lingual surface of the maxillary incisors. Of these patients, 435 (68%) were white and had an incidence of 3.4% in relation to race. A total of 207 black patients were examined, with 10 presenting radicular grooves in the maxillary incisors (4.8% in relation to race).

Table 1 shows the number of patients with radicular grooves in their maxillary incisors, related to sex and race. The Fisher test showed no statistically significant difference in relation to sex and race.

<table>
<thead>
<tr>
<th></th>
<th>Male (267)</th>
<th>Female (375)</th>
<th>Total (642)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White (435)</td>
<td>7</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Black (207)</td>
<td>8</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Total (642)</td>
<td>15</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>
Table 2 reports the incidence of radicular grooves found in male and female patients in the maxillary central and lateral incisors. The Fisher test indicated no statistically significant difference in the incidence of radicular grooves related to the tooth or race.

Table 2 - Numerical relationship of male and female patients with radicular grooves in the maxillary central and lateral incisors (distribution by sex and race).

<table>
<thead>
<tr>
<th></th>
<th>Central</th>
<th>Lateral</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White (163)</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Black (104)</td>
<td>2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Total (267)</td>
<td>4</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White (272)</td>
<td>2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Black (103)</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total (375)</td>
<td>2</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 3 reports the number of radicular grooves found on the surfaces of the maxillary incisors of males and females of both races. Radicular grooves were found more frequently on the lingual surface of maxillary lateral incisors for both sexes and races (19 patients, 3.0%).

Table 3 - Radicular grooves on the surfaces of maxillary central and lateral incisors (distribution by sex and race).

<table>
<thead>
<tr>
<th>Incisors</th>
<th>Central</th>
<th>Lateral</th>
<th>Central</th>
<th>Lateral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buccal</td>
<td>Lingual</td>
<td>Buccal</td>
<td>Lingual</td>
</tr>
<tr>
<td><strong>Male (267)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White (163)</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Black (104)</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td><strong>Female (375)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White (272)</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Black (103)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>
Only 4 patients (0.6%) presented radicular grooves on the lingual surface of maxillary central incisors and only 2 patients (0.3%) presented radicular grooves on the buccal surface of maxillary central incisors. No patient of either sex or race presented a radicular groove on the buccal surface of the maxillary lateral incisors. A periodontal pocket was present in 52% of the teeth with radicular grooves.

Discussion

Maxillary incisors are normally uniradicular teeth and the majority have only one canal (Pucci and Reig, 1944; De Deus, 1982). However, various researchers have reported cases of anomalies, mainly of the maxillary lateral incisor (Christie et al., 1981; Herrero-Moraes, 1983; Halton and Ferrilho, 1989).

The region of the maxillary lateral incisor is considered to be an area of great embryological risk and a number of malformations can occur: cleft lip and cleft palate, globular maxillary cyst, supernumerary teeth, conic teeth, *dens invaginatus*, and cuspid talon (Mitchell, 1982; Goldstein and Medina, 1974; Gardner and Girgis, 1979; Pécora et al., 1987, 1991a,b; Vansan et al., 1990; Pécora and Santana, 1991).

Radicular grooves or depressions are found on maxillary incisors, mainly on lateral incisors, and this anatomic anomaly favors the development of a periodontal pocket which is difficult to treat (Everett and Kramer, 1972).

Pécora et al. (1991b) observed a greater incidence of radicular grooves on the lingual surface of maxillary lateral incisors in their *in vitro* study which is in agreement with the current findings *in vivo*. In the present study, we found a lower incidence of radicular grooves on the buccal surface of the roots of the central incisors (0.3%) than the study of Pécora et al. (1991b). This may be due to the fact that the presence of a groove on the root is more easily observed on extracted teeth.

A groove can be easily detected on the dental crown, mainly on the lingual surface. Normally, this groove begins coronally to the tuberculum and runs in a disto-linguo-apical direction continuing along the disto-lingual aspect of the root, thus, deriving the name disto-lingual groove (Everett and Kramer, 1972). This groove can be variable in both depth and extension.

When the radicular groove extends to the middle or apical region of the root, the presence of a periodontal pocket determines the loss of this element in most cases. An endoperiodontal relationship is common in these cases.

The percent of periodontal pockets encountered in teeth with radicular grooves would be greater if the age range of the patients with this anomaly was not between 7 and 15 years of age. In this age group, accentuated periodontal problems are not yet found.

The professional ought to be attentive in diagnosing radicular grooves in his patients’ teeth so that he may educate them in oral hygiene and alert them to the possibility of an unfavorable prognosis.
Construction of prosthetic elements fixed on teeth with a radicular groove ought to be very well considered and its use as a support for the fixed prosthesis ought to be avoided if there is a periodontal pocket present.

The patient with a radicular groove in the maxillary incisor ought to be educated in correct oral hygiene and the necessity of periodic visits to the dentist to avoid the formation of periodontal pockets.

Conclusions

There is no relationship between sex and race and the incidence of radicular grooves in maxillary incisors.

Of the patients examined, 3.9% presented radicular grooves in the maxillary incisors.

The maxillary lateral incisor presented a high incidence of radicular grooves in its lingual surface (3% of the patients examined).

The maxillary central incisors may present a radicular groove on both the buccal surface and the lingual surface.

The presence of a periodontal pocket in teeth with radicular grooves is a common finding.

References


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