Effect of digit-sucking habits on root morphology in primary incisors

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Abstract

The purpose of this paper is to determine if digit sucking causes root resorption on primary central incisors. Randomly selected dental records of 98 patients, ages two to four years, were examined. The presence or absence of a digit habit, as determined from the history, was compared to anterior occlusal radiographs for evidence of root resorption on maxillary primary central incisors. The three- and four-year-old age groups contained 39 and 37 subjects, respectively. The digit habit patients had 86% of the atypical resorptions in the three-year-old group and 84% in the four-year-old group. Fifty-nine per cent of patients with habits demonstrated unusual resorptive patterns, compared with 8% of those without habits. The association between atypical resorptive patterns and the presence of digit habits was significant in both groups and when the groups were combined (p < .0005). The presence of digit sucking appears to contribute to atypical resorptive patterns on maxillary primary central incisors.

Digit sucking is one of several oral habits which have garnered attention among health professionals for many years, particularly because of the harmful effects upon the dentition and supporting structures. There is little doubt that digit sucking can result in malocclusion if the intensity, duration, and frequency of the habit are pronounced.

Popovich and Thompson, in a study involving 1,258 children, found that there was a significant association between the incidence of Class II malocclusions and persistent digit sucking.\(^1\) It also appears that digit habits can create strong anterior forces on the maxillary arch, causing more anteriorly positioned maxillae in sucking than in nonsucking groups.\(^2\) Furthermore, children with digit habits tend to have increased frequencies of posterior crossbite.\(^3\)

No studies have been done which fully examine the effect of digit habits on the morphology of the tooth root. It is well established as part of orthodontic theory that excessive orthodontic forces, in terms of duration and amount, will cause external root resorption.\(^4\) Therefore, if a digit habit is of sufficient intensity, duration, and frequency, it is reasonable to speculate that root resorption might occur. The rationale for this study is that an increased frequency of digit habits demonstrates a circumferential or semilunar root resorption on the primary central incisors. The purpose of this paper is to investigate any such effect.

Methodology

Dental records of 98 randomly selected patients, ages two through four years, were examined. The presence or absence of digit habits was compared to radiographic evidence of atypical root resorption on maxillary primary central incisors. Size 2 maxillary anterior occlusal radiographs were used to evaluate all cases. The radiographs were taken using standard pedodontic technique and under the supervision of a certified dental assistant and an x-ray technician.

A dichotomous categorical scale was devised for evaluation of root resorption. The categories were: (1) normal root appearance or normal resorption, and (2) atypical, or "circumferential" root resorption. (Author's term; because radiographs are only two-dimensional, it is difficult to ascertain in this study if the resorption actually surrounds the entire root.) Normal root appearance or normal resorption was defined as roots exhibiting no evident resorptive activity or roots which were blunted only slightly, i.e., very mild apical resorption (Figure 1). The roots categorized as having circumferential resorption were those showing resorptive activity or indentations along the side of the root, according to the pictorial criteria in Figure 1. It was decided that the atypical, or circumferential resorptive activity must be present on
without knowledge of the absence or presence of a digit

DIGIT-SUCKING/PRIMARY INCISORS: Taylor and Peterson

analyzed for association between these variables by Chi

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skew the results toward a more conservative result. In

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was possible that some children had digit habits in the

past, which were absent at the time of the study. These

have been reported between 13 and 45% by other au-

The prevalence of thumb sucking in child populations

Discussion

The overall rate of digit sucking found in this inves-

tigation (43%) appears to conform with other studies.

The prevalence of thumb sucking in child populations

has been reported between 13 and 45% by other au-

One of the most comprehensive investigations

observed 2,650 infants and children from birth to 16

years of age and calculated that 45.6% had digit habits at

some point during the observation.8

An association seems to exist between the presence of

digit and atypical types of root resorption on primary maxillary central incisors as seen radiographi-

cally. In particular, the presence of digit sucking seems
to contribute to circumferential resorptive patterns, as
evidenced by increased resorption on the lateral aspects
of the roots. This has interesting clinical relevance, be-

three of the four root surfaces of the central incisors to

to be categorized as circumferential resorption. This elimi-
nates local factors affecting only one small area of the

root from consideration.

There were several important considerations in the

evaluation of the morphology of the tooth root. The first

was the improbability of normal root resorption in the

age groups under consideration. In other words, an

alysis of atypical root resorative patterns ordinarily

would not be complicated by normal resorative patterns

in these age groups. Secondly, in three cases the resor-

tion pattern was so severe that virtually no root re-

mained. This is certainly atypical, and these cases all

involved habit patients. However, since the resorative

pattern did not coincide with the study's criteria, the

cases were discarded. This was an intentional attempt

toward conservatism, since the patterns probably rep-

resented "advanced" circumferential resorption.

Thirdly, all cases were eliminated which involved a

history of any of the following: (1) trauma to the anterior

maxillary segment, (2) caries and/or restorations, and (3)
pulp therapy. These subjects were eliminated because of

the potential for root resorative activity being unrelated

to a digit habit. Seventy-seven of the 98 randomly se-

lected patients met these criteria.

Patients were identified as to the presence of a digit

habit from the medical/dental history, which contained a

question for parents regarding the presence of such

habits. There were two limitations which emerged in

this part of the study. First, it was possible that some

parents denied the presence of a digit habit. Second, it

was possible that some children had digit habits in the

past, which were absent at the time of the study. These

children would be "counted" as nonhabit cases, in spite

of the fact that the old habit may have influenced the

shape of the root. The nature of this study makes these

deficiencies uncorrectable. However, both deficiencies

skew the results toward a more conservative result.

In other words, these considerations would tend to mathe-
matically favor a dilution of the amount of resorptive

activity in the habit group, while increasing the amount

of resorptive activity in the nonhabit group.

Two pedodontist judges evaluated all radiographs,

without knowledge of the absence or presence of a digit

habit. Their assessments of the types of resorptive pat-

terns were totalled into habit and nonhabit groups, and

analyzed for association between these variables by Chi
Table 1. Root Resorption and Habit Prevalence in Three- and Four-Year-Old Patients

<table>
<thead>
<tr>
<th>Three-Year-Olds</th>
<th>Habit</th>
<th>No Habit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circumferential Resorption</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>7 (17.9%)</td>
<td>21.5 (55.1%)</td>
<td>28.5 (73.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>16 (41.0%)</td>
<td>23 (59.0%)</td>
<td>39 (100.0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Four-Year-Olds</th>
<th>Habit</th>
<th>No Habit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circumferential Resorption</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>4.5 (12.2%)</td>
<td>20 (54.1%)</td>
<td>24.5 (66.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>15 (40.6%)</td>
<td>22 (59.5%)</td>
<td>37 (100.0%)</td>
</tr>
</tbody>
</table>

Atypical root resorption along with those already known, such as trauma, deep caries, failed pulp treatments, etc. Consequently, the presence of a digit habit may complicate diagnostic assessments in trauma cases and in cases involving questions regarding the success or failure of pulp therapy.

It also is interesting that there is an increased prevalence of atypical resorption patterns in the four-year-old group versus the three-year-old group. This may be a result of habits that are of longer duration, eventually affecting the root morphology. Furthermore, it also is possible that exfoliation-related root resorption might be hastened and/or accentuated by digit sucking habits.

Conclusion

Atypical root resorption, as evidenced by radiographic signs of lateral root resorption appears to be greater in children two to four years old who have a history of a digit habit as compared to those children who do not.

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Quotable Quote

It is fashionable for persons to write of the appalling illiteracy of this generation, particularly its supposed inability to write grammatical English. But what of the appalling “innumeracy” of most people, old and young, when it comes to making sense of the numbers that run their lives? As Senator Everett Dirksen once said, “A billion here, a billion there; soon you’re talking real money . . . .” It is numbers of this size that we are dealing with when we talk about a Defense Department overrun of $750 billion over the next four years. A really fancy single-user computer costs approximately $75,000. With $750 billion to throw around we could give one to every person in New York City, which is to say we could buy about 10 million. Or, we could give $1 million to every person in San Francisco and still have enough left over to buy a bicycle for everyone in China. There is no telling to what good uses we could put $750 billion. But, instead, it will go into ammunition, tanks, fighters, war games, missile systems, jet fuel, and so on.