

## Indices Of Assessment Of Root Resorption.

### Abstract

Root resorption is one of the main complication of orthodontic treatment. The onset and progression of root resorption are associated with risk factors related to the orthodontic treatment such as duration of the treatment, the magnitude of the force applied., the direction of the tooth movement, the method of force of application. Patient related risk factors are individual susceptibility on a genetic basis, some systemic diseases, anomalies in root morphology, dental trauma and previous endodontic treatment. The present study reviews the various indices devised so far for root resorption following orthodontic treatment

### Key Words

Root Resorption, Orthodontic Treatment, Dental Trauma, Cementoclasts, Index

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### Introduction:

Root resorption associated with orthodontic treatment has been recognised as a clinical problem since 1920's. It is an undesirable sequel of orthodontic treatment leading to permanent loss of tooth structure from root apex. Its pathogenesis is associated with removal of necrotic tissue from the areas of periodontal ligament that have been compressed by orthodontic load. Loss of apical root structure is unpredictable and is irreversible when it extends into the dentine.

The assessment of root resorption should be simple and easily applicable. The morphological assessment of root resorption should also be associated with clinical signs and symptoms. Literature is full with number of root resorption indices, but no index has included root resorption with associated clinical features. The present literature reviews the existing indices and also develops an index which includes the measurement of root resorption with associated clinical signs and symptoms

### 1. Indices of the root resorption in vital permanent teeth was studied by Samuel Hemley.<sup>1</sup>

In spite of the difficulties involved in differentiating the degree of root resorption, it was felt that some arbitrary division was important so that not only the incidence but also the degree of root resorption should be measured.

Different degree of root resorption was

noted:

**1st stage:** There was merely blunting of apices of teeth

**2nd stage:** There was loss of apices to the extent of from slight to that involving less than one third of the length of root.

**3rd stage:** Extent of the root resorption was approximately one third of the root.

**4th stage:** Resorption would exceed one third of the root.

### 2. Indices by Nasser and Malone<sup>2</sup>

Amount of the periapical root resorption in the roentgenogram of each tooth was assessed in the following manner:

**Degree Description Or Type of resorption**  
**0.** No evidence of resorption.

**1.** Resorption questionable. Root outline intact but there appears to be minute areas of spotty resorption. Lamina Dura

is interrupted and periodontal membrane widened.

**1+** Root apex definitely blunted and resorbed for at least 1 mm to about 2mm. Lamina dura interrupted and periodontal membrane widened about the apical area of the root

**2+** Resorption of the root apex for at least 2mm to 4mm. lamina dura. Interrupted and periodontal membrane widened.

**3+** Resorption of root 4mm ½ of the root length.

**4+** More than ½ of the root resorbed.

**5+** Root resorption definitely related to the root canal therapy (degree not assessed)

**6+** Root resorption definitely related to the periapical infection (cysts, etc)

**8.** Not diagnosable (roentgenogram of poor quality)

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## 9. Tooth marring.

This method of rating the amount of root resorption was similar to but more detailed than the one employed by Hemley S.

### 3. Phillips<sup>3</sup> evaluated each tooth using the following criteria for estimating the amount of apical root loss

**Slight:** Minimal blunting of the root apex.

**Moderate:** Upto approximately ¼ th the root length

**Excessive:** Over ¼ the root length loss.

**Questionable:** Possible traces of resorption not positively identifiable because of distortions due to film placement or differences in x-ray cone angulation.

### 4. Classification given by DeShields<sup>4</sup>:

Apical Resorption of the maxillary incisors was evaluated by the following classification:

**Grade 0-** No resorption.

**Grade 1-** Possible resorption. There was some indistinctness of apical outline.

**Grade 2-** Definite resorption. The apical outline was definitely irregular but the root was not shortened.

**Grade 3-** Mild apical blunting. The reduction in the root length was less than 3mm.

**Grade 4-** Moderate apical blunting. The root was reduced in length, more than 3mm but less than 1/3 the root length.

**Grade 5-** Severe blunting, more than 1/3 of the original root length was lost.

### 5. Root resorption index by VonderAhe et al<sup>5</sup>

Arbitrary standards defining various levels of severity of root and resorption were chosen to conform the three groups used previously by Phillips and Stucki

**Group 1:** Slight or minimal blunting of root apices

**Group 2:** Moderate or upto approximately ¼ the root length loss.

**Group 3:** Excessive or over 1/4th root length loss.

### 6. Indices by Plets et al<sup>6</sup>

The apical anatomy of the maxillary central incisors was also evaluated and graded according to the most common apical configuration observed. The classes were as follows

1. Normal, regular and definite apical outline.

2. Irregular, break in continuity or irregular outline

3. Angular, definite angular discrepancy to the apex.

4. Rounded or flat, either round or flat appearing with either angular or rounded borders.

If the apex has characteristics of the two classes the more severe class was recorded.

Class 1 is normal. Class 2 to Class 4 shows progressively greater amounts of root loss. This system is supplemental to the use of root length to the total tooth length ratios.

### 7. Root resorption in patients was classified according to four categories by Newman<sup>7</sup>

0- No resorption or shortening.

1- Questionable root shortening

2- Definite root shortening but not severe

3- Severe shortening

### 8. Root resorption indices according to Goldson and Henrikson<sup>8</sup>

0- No visible resorption

1- Irregular root contour probably caused by resorption.

2- Root resorption as oblique resorption in the apical 1/3 rd of the root. The resorption surface or surfaces do not cut the midline of the tooth.

3- Root resorption apically less than 2 mm. The resorption surface cuts the midline of the tooth.

4- Same as three combined with the oblique resorption within the apical third if the root.

5- Root resorption apically 2mm to 1/3 rd of the root.

6- Same as five combined with oblique resorption within apical third of the root.

7- Root resorption 1/3 rd to the 2/3 of the root

8- Root resorption more then 2/3 rd of the root.

9- Short root rounded apically with even root control.

10- Manifest root resorption but not measurable because of unsuitable projection

11- Unevaluable roetengenogram.

### 9. In Odenrick's<sup>9</sup> Study apical root resorption was recorded and graded by using the following index.

0- no sign of root resorption.

1- Irregular apical root contour

3- Resorption less than 2mm

5- Resorption from 2mm to 1/3 of root length.

7- Resorption of 1/3 rd to 2/3 of root length.

### 10. Index by Levender and Malngrem<sup>10</sup>:

1. Irregular root contour

2. Less than 2mm root resorption (minor)

3. 2mm to 1/3 rd of the root length loss (severe)

4. Exceeding 1/3rd of root (extreme)

After reviewing the literature it was found that all the root resorption indices considered the length of the roots only but from clinical aspect crown and root length ratios are to be considered. Therefore an index was designed that took into the consideration the root crown ratio. IOPA radiographs are to be taken using the paralleling technique and without bending the film.

## Root resorption index considering crown and root length ratio associated with clinical symptoms:

- 1- Normal and definitive outline.
- 2- Irregular outline.
- 3- Angular resorption.
- 4- Rounded or flat apex and crown root ratio is nearly equal 1:1.2.
- 5- Marked resorption, crown root ratio 1:1.
- 6- Severe resorption, crown root ratio 1:<1 and tooth is symptomless and no mobility present.
- 7- Extensive root resorption, crown root ratio 1:<1, symptomatic tooth but no mobility.
- 8- Functional impairment leading to failure crown root ratio 1:<1, symptomatic tooth with mobility.

## Conclusion:

The root resorption index developed can be very useful in Clinical studies because it takes into consideration the Clinical sign and symptoms associated with root resorption, since in most of the cases the root resorption due to treatment may not be so severe, so as to decrease the longevity and the functional capacity of the involved teeth.

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## IJDS in News

Friday, September 30, 2011

**Shimla:** Governor Smt. Urmila Singh stressed upon the need to maintain healthy academic atmosphere in Universities congenial for pursuing higher studies and added that quality education should be imparted to the students at University level. She urged the Vice Chancellors to play a pro active role in this direction. She also emphasized on focusing upon research activities for enriching higher education. She was addressing the North Zone Vice Chancellor's Conference here today.

Smt. Urmila Singh said that education played an important role in ensuring balanced growth of the students and added that aim of the education should not be merely employment seeking but also equipping the students with technical expertise so that they could adopt self employment ventures. Education should ensure holistic development of students, she said.

Governor urged the youth to take up self employment ventures and added that higher education should ensure employment opportunities to students. She further said that youth were playing a constructive role in nation building by becoming entrepreneurs leading to their economic empowerment.

Smt. Urmila Singh said that India had marched ahead on the path of progress in all sectors and added that rural development was essential for overall development of the country. She also stressed upon expansion of education for transforming the country as a completely developed nation. She hoped that constructive deliberations would be held in the conference which was held for the first time at Shimla.

Governor released HPU News letter, Tourism Development Journal and **Indian Journal of Dental Science.**

Shri I.D. Dhiman, Education Minister stressed upon the need to encourage Guru-Shishya tradition. He emphasized upon promoting Hind and Sanskrit languages.

Shri P.T. Chande, President, Association Indian Universities also spoke on the occasion.

Shri A.D.N. Vajpayee welcomed the Governor and others on the occasion.

Prof. H.S. Banyal, Dean of Studies HPU proposed vote of thanks.

