

Correlation of mandibular incisors proclination and gingival recession in orthodontic patients

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Abstract

Introduction: Evaluation of the gingival biotype is an imperative to commencing orthodontic therapy as it forms the soft tissue envelops for tooth movement.

The aim of the study was to determine the correlation between lower incisors inclination (IMPA) with type of gingival recession/gingival biotype in patients reporting for orthodontic treatment.

Material and methods: This cross-sectional study was consisted of 50 orthodontic patients. Patients with history of prior orthodontic treatment or periodontal surgical procedure, hypodontia in anterior, gingivitis, large restorations, pregnant females, using medicines with known effects on periodontal soft tissues (e.g. Phenytoin), requiring antibiotics were excluded. Gingival recession and gingival biotype of the participants were recorded from the intraoral photograph and clinical examination. Inclination of lower incisors was traced and calibrated on lateral cephalogram. Data were entered and analyzed using the SPSS (version 20.0). The correlation between the gingival recession, gingival biotype and incisor mandibular plane angle (IMPA) was assessed using the Spearman correlation co-efficient test. $P \leq 0.05$ was considered to be statistically significant.

Results: Of total 50 patients 23(46%) were males and 27(54%) were females. The mean age was 21.3 ± 3.45 years. There was no significant difference in Miller's classes of gingival recession in both male and female ($P=0.65$). The gingival recession and biotype had weak and negative but statistically significant correlation with the IMPA ($r=-.023$), ($r=-.025$) respectively.

Conclusions: There is weak and negative correlation between lower incisor inclination and gingival biotype /recession. Although correlation is weak but statistically significant; so great care should be taken during changing inclination of lower incisor during orthodontic treatment.

Keywords: Biotype; gingival; lower incisor inclination

Introduction

The apical migration of free gingival margin from the root surface is termed as

gingival recession.¹ On clinical ground it is recorded from cemento-enamel junction to the most apical point of gingival margin.² Previous studies had reported that labial side of mandibular incisors and upper molars are the vulnerable sites for gingival recession. This might result in dentinal hypersensitivity, esthetic issue and cervical caries.³ However the role of orthodontic tooth movement in the development of gingival recession is still questionable,^{4, 5} as some scientists did not find any relationship between gingival recession fixed bracketed appliance therapy.⁶

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In the same way evaluation of the gingival biotype is as imperative prior to commencing orthodontic therapy as it forms the soft tissue envelop for tooth movement. Gingival biotype can be thin or thick.⁷In thin biotype there is fragile soft tissue with a negligible amount of the attachment which is sensitive to trauma and inflammation. On other hand thick gingival biotype is has dense, fibrous soft tissues with enormous attachment tissue.⁷Thin gingival tissue is responsible for predisposing to recession of the marginal tissues during orthodontic movement. Appropriate clinical assessment of gingival biotypes makes certain accurate decision during incisors retraction.⁸

Alteration in tooth inclination or position have strong effects on the gingival attachment due to occlusal prematurity, food stagnation and may results in gingival problems. Lower incisor inclination is of utmost importance to stability as well as periodontal health.⁹Gingival recession is closely related with the inclination of the tooth particularly mandibular incisors.¹⁰Many investigations have been reported that tooth movements beyond the limits of the alveolar bone resulting from increased inclination predisposes to a loss of gingival attachment typically on facial side, which leads to recession of gingiva.^{11,12}

In orthodontic patients, before treatment it is of great importance to evaluate lower incisor inclination and gingival health which define the soft tissue limitation and further tooth movement across alveolar bone. Thus, the aim of this study was to determine the correlation between lower incisors inclination with type of gingival recession/ gingival biotype in patients reporting for orthodontic treatment.

Material and Methods

This cross-sectional study consisted of orthodontic patients seeking orthodontic treatment at department of Orthodontics, Peshawar dental college, Peshawar. The sample size was calculated by "sample size

calculator" putting correlation co-efficient ($r=0.67$) between gingival biotype and IMPA from previous study¹³. The calculated sample size was 15 but we took 50 cases to increase reliability of the study.

Written consent was taken from patient. Patients with history of prior orthodontic treatment or periodontal surgical procedure, hypodontia in anterior region of mouth, gingivitis, large restorations, pregnant females, using medicines with known effects on periodontal soft tissues (e.g., Phenytoin), requiring antibiotics were excluded from this study.

Gingival recession and gingival biotype of the participants were recorded from the intraoral photographs and clinical examination. To determine the gingival recession intra-oral color photographs were viewed on the screen in a dark room and classified according to Miller Classification.¹³The gingival biotype was assessed using Michigan periodontal probe having graduated colored markings. The gingival biotype was recorded as thin if the periodontal probe was visible through gingiva and thick for vice versa. Lateral cephalometric radiographs were taken using Kodak 9000C cephalometric digital radiographic system. All cephalometric radiographs were obtained in natural head position. The cephalometric radiographs were placed on acetate papers and were manually traced for mandibular incisor inclination (The angle formed by the intersection of a line drawn along the mandibular plane and long axis of the mandibular central incisor. Lower incisor to mandibular plan angle (IMPA) was measured and classified as normal ($90^{\circ}\pm 5^{\circ}$), proclined ($> 95^{\circ}$) retroclined ($<85^{\circ}$).

Data were entered and analyzed using the SPSS (version 20.0). The frequency was calculated for categorical variables like gender and gingival biotype. Mean and SD was computed for numerical variable like age. The correlation between the gingival recession, gingival biotype and IMPA was assessed using the Spearman correlation co-

efficient test. $P \leq 0.05$ was considered to be statistically significant.

Results

Of total 50 patients 23(46%) were males and 27(54%) were females. The mean age was 21.3 ± 3.45 years. There was no significant difference in Miller's classes of gingival recession and gingival biotype in both male and female, (Table I, II).

The gingival recession and biotype had weak and negative but statistically significant correlation with the IMPA (Table III).

Table I: Comparison of gingival recession according to Miller's classification between males and females

Gender	Gingival Recession	Gingival Recession	Gingival Recession Type III	P-value*
	Type I	Type II		
Male (n=23)	22(95.65%)	0(0%)	1(4.44%)	0.65
Female (n=27)	25(92.6%)	0(0%)	2(7.4%)	

*chi-square test value=0.206; df=1

Table II: Comparison of gingival biotype between males and females

Gender	Thin Biotype	Thick Biotype	P-value*
Male (n=23)	20(86.95)	3(13.05)	0.711
Female (n=27)	22(81.48%)	5(18.51%)	

*chi-square test value=0.277; df=1

Table III: Correlation between IMPA with gingival recession and gingival biotype

	IMPA	P value
Gingival recession	-.023	.042*
Gingival biotype	-.025	.034*

* $P \leq 0.05$

Discussion

The result of the study showed that lower incisor proclination was weak but negative correlated with gingival biotype as well as gingival recession. The results were statistically significant ($P < 0.05$). So thin gingival biotype can be a risk factor for periodontal health; it may lead to loss of periodontal tissue attachment but strength of evidence is low. So great care should be taken before commence of orthodontic treatment.¹⁴Ciavarella et al¹⁵ carried out a research on Italy population on 22 participants. They reported a weak and negative but statistically significant correlation between lower incisor inclination and gingival recession. These results are in consistent with the current results. Renkema et al¹⁶ conducted a retrospective study in Netherlands on gingival labial recessions and the post-treatment proclination of mandibular incisors. They concluded that the proclination of mandibular incisors did not increase a risk of development of gingival recession during five-year observation in comparison non-proclined teeth. In this study a very weak correlation between gingival recession and mandibular incisors was found. So the findings of Renkema et al¹⁶ are comparable to our study.

Ruf et al¹⁸ evaluated Class II adolescents treatment with the Herbst appliance affect the gingival recession. They reported that proclination of lower incisors about 9° did not lead to the gingival recession. In addition, the comparison of maximal (16.4°) and minimal proclination (2.7°) did not show any significant differences for the incidence of recession sites between the groups.

Further studies to test this concept should be undertaken. The limitation of this study was its cross-sectional nature and therefore gives no information on the sequence of events. Another limitation was that the sample was drawn from a pool of patients from one center and may affect the conclusions.

Conclusions

There weak and negative correlation between lower incisor inclination and gingival biotype and recession. Although correlation is weak but statistically significant, this warrants great care during changing inclination of lower incisor.

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