

# Influence of orthodontic labial movement of mandibular Incisors on the level of gingival margin- a retrospective case Study

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## ABSTRACT

**Aim:** To evaluate the association between labial movement of lower incisors and the level of gingival margin

**Material and methods:** 30 subjects between the age group of 14-25 years with class-I crowding and class-II div.1 cases indicated for non-extraction treatment with fixed functional appliance or class II mechanics. Pre and post-treatment intra-oral casts, photographs and cephalograms were used for the study.

Pre and post-treatment intra-oral casts and photographs were used to record the level of gingival margin from the CEJ. Pre and post-treatment cephalograms were used to determine the skeletal and dental relationship

**Results:** all the pre and post categories are statistically significant because the p value of all is less than 0.05

## Introduction

Incisor inclination is closely related to both sagittal and vertical jaw relationship and provides guidelines for orthodontic treatment<sup>1,2</sup>. Several researchers claim that the position of the incisors is the key to achieve good facial esthetics<sup>3,4</sup>. Hence they advocate labial movement or sagittal expansion of mandibular incisors when they are behind the ideal position. But, when the incisors are proclined and the space is needed, the premolars have to be sacrificed and the incisors retracted to obtain treatment goals.

Unfortunately, correction of an overjet does not always lead to an improvement in facial esthetics. Transverse expansion or proclination of incisors are valid alternatives to extraction in cases of crowding. But, lack of stability and development of bony dehiscence causing gingival recession have been demonstrated as side effects subsequent to anterior displacement of lower incisors<sup>5,6</sup>.

Based on the above observations, the present study was undertaken:

- to investigate the association between orthodontic labial movement of the lower incisors in non-extraction class I and class II div 1 cases and prevalence of gingival recession
- to compare the reliability of gingival recession recordings using orthodontic casts and intra-oral slides

The null hypothesis was that the labial movement of lower incisors in non-extraction class I and class II div 1 cases can be considered as a risk for the development of gingival recession.

## Materials and methods

The sample comprised of 30 pre and post treated orthodontic casts, intra-oral slides and cephalograms of non-extraction class-I and class-II div 1 subjects. The mean age group was 19 years, ranging from 13 -25 years, inclusive of both the sexes.

Class-II div 1 cases were selected with class-I cases non-extraction cases because, in these cases the incisors are further proclined to correct the overjet.

All the recordings on the casts (figs.1 and 2) and slides (figs.3-6) were made using a digital caliper with 1/100th mm scale.

The intra-oral slides were taken with a Nikon camera from a distance of 6 feet. Each intra-oral slide was measured at a distance of 2 meters the measurements were carried on to the nearest millimeter.

Gingival recession on the slides as well as the casts was measured at the mid-labial site of each of the four lower incisors, as the distance between the gingival margin and the CEJ.

When the CEJ was visible, the digital caliper (fig 9), set at 0 reading is placed on the CEJ, and then slowly slid to the marginal gingiva. The distance covered gives the amount of gingival recession.

Pre and post treatment cephalograms gives an idea of the skeletal and dental relationships before and after treatment (figs 7 and 8)

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Table-I: Comparison difference between the pre and post category of the data

Data	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (p)
				Lower	Upper			
Pair 1 42 pre-photo - 42 post-photo	-.3503	.5200	9.494E-02	-.5445	-.1562	-3.690	29	.001
Pair 2 41 pre-photo - 41 post-photo	-.6223	.6829	.1247	-.8773	-.3673	-4.991	29	.000
Pair 3 31 pre-photo - 31 post-photo	-.5570	.5680	.1037	-.7691	-.3449	-5.371	29	.000
Pair 4 32 pre-photo - 32 post-photo	-.4503	.7033	.1284	-.7130	-.1877	-3.507	29	.001
Pair 5 42 pre-cast - 42 post-cast	-.3077	.4875	8.900E-02	-.4897	-.1256	-3.457	29	.002
Pair 6 41 pre-cast - 41 post-cast	-.5913	.6913	.1262	-.8495	-.3332	-4.685	29	.000
Pair 7 31 pre-cast - 31 post-cast	-.5770	.5677	.1036	-.7890	-.3650	-5.567	29	.000
Pair 8 32 pre-cast - 32 post-cast	-.4800	.5809	.1061	-.6969	-.2631	-4.526	29	.000
Pair 9 A-PoG pre - A-PoG post	-2.39	2.80	.51	-3.44	-1.35	-4.690	29	.000
Pair 10 LI-MP pre-LI-MP post	-6.37	5.23	.96	-8.33	-4.42	-6.672	29	.000
Pair 11 LI-NB pre - LI-NB post	-5.90	4.20	.77	-7.47	-4.33	-7.701	29	.000
Pair 12 LI-NB pre in mm - LI-NB post in mm	-2.6067	1.0622	.1939	-3.0033	-2.2100	-13.441	29	.000

**Results**

The subjects considered for the study were all between the age group 14-25 years and the comparison of independent variables obtained from the casts, photographs and cephalograms confirmed the validity of the design of the study.

Since we were comparing the pre and post effect of the collected data, the test of significance was done using the paired 't' test. Significance was denoted by p value less than 0.05 (p<0.05). In this study, we see that all the pre and post categories are statistically significant because the p value of all are less than 0.05. Therefore, we can conclude that there is significant difference between the pre and post values. (Table-1)

The test of significance for the comparison between the pre photo - pre cast and post photo - post cast values was done using chi-square test. There was a statistically significant difference between the pre photo and pre cast values of tooth 42. All other comparisons were not statistically significant. Therefore, we can conclude that there is no significant difference between the pre photo - pre cast and post photo - post cast values. (Table-2)

**Discussion**

A retrospective analysis of class-I and class-II division

1 non-extraction orthodontic cases were done using both pre and post-treatment casts, intra-oral photographs and cephalograms to evaluate the amount of gingival recession as a result of labial movement of lower incisors. This study is relevant as labial movement of incisors is the only alternative to extraction of teeth or surgical advancement of lower arch in order to increase the arch length.

The drawbacks of increasing arch length by labial movement lower incisors have been referred (Walter 1953<sup>1</sup>, Mills 1966<sup>2</sup>, Glen et al 1987<sup>3</sup>, Ngan et al<sup>4</sup>), however the literature has rarely been evidence based.

The present study was designed as a retrospective case study comprising of the age group 14-25 years that were identified as class-I and class-II division 1 cases with a treatment plan of non-extraction fixed or class-2 functional mechanics.

The number of cases investigated was determined on the basis of a pilot study wherein prevalence and mean of gingival recession in the adolescent population was determined. Hence, a sample size of 30 was chosen which was good enough to give significant statistical result even in the absence of clinically significant results.

Incisor proclination was assessed using pre and post cephalograms. Gingival recession was studied using both

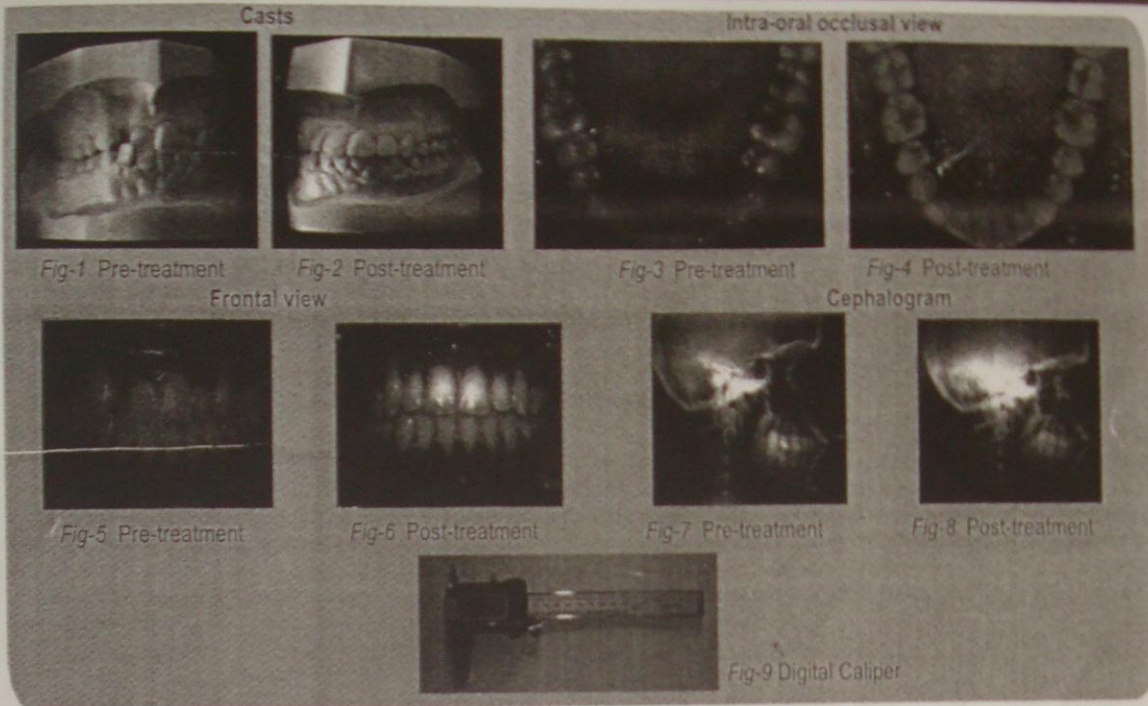


Table II: Comparison between the pre photos – pre casts and post photos – post casts in relation to the collected data.

	Chi-Square Value (X <sup>2</sup> )	df	Significance (p)
42 pre photo *42 pre cast	26.097	12	0.10
42 post photo *42 post cast	107.74	182	1.00
41 pre photo *41 pre cast	0.93	12	1.00
41 post photo *41 post cast	146.53	480	1.00
31 pre photo *31 pre cast	1.42	18	1.00
31 post photo *31 post cast	130.78	378	1.00
32 pre photo *32 pre cast	9.56	18	0.95
32 post photo *32 post cast	99.25	306	1.00

pre and post treated casts and intra-oral photographs that were standardized for differences in magnification. A possible bias of the photograph measurement due to differences in orientation caused by inclination was excluded as no significant difference was established between cast and slide measurement (Allais, 2000)<sup>5</sup>.

Here, the question was, to what extent the periodontium has altered due to proclination wherein it was considered as an alternative to extraction. The proclination

undertaken in these cases were expressed as an increase in arch length.

It is well known that gingival recession is an age related problem (baelum et al, 1997<sup>6</sup>). The influence of age in this study was eliminated by taking a younger age group (14-25years). The cases taken into consideration represented the typical malocclusion namely class-1 and class-2 division1 indicated for non-extraction orthodontic treatment. The effect of incisor proclination in class2 division1 has been studied longitudinally by arthun and krogstad, 1987<sup>7</sup>, who found that proclination generated modest recessions.

The present study demonstrated a significant increase in the prevalence of individuals exhibiting gingival recession of lower incisors, especially the central incisors where the recession was more pronounced.

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