

## CHAPTER VI CONCLUSION

Cephalograms of thirty females (average age of 16.8) and eleven males (average age of 17.7) were analysed for skeletal and soft tissue changes subsequent to orthodontic treatment. All of the samples used were dental class I malocclusion with extraction of four first premolars followed by Edgewise Technique therapy. All of them were treated by the staff of the Department of Orthodontics, Faculty of Dentistry, Chiang Mai University. Pretreatment and posttreatment lateral cephalograms were taken at relaxed lips and teeth occluded in centric occlusion with no orthodontic appliance in place. Distance changes between pretreatment and posttreatment lateral cephalograms were measured in linear measurements parallel to CFH line (perpendicular to SV line). Consequently, analyses were performed into three main parts; sexes difference of distance changes, skeletal and soft tissue changes, and correlation analyses including simple regression and stepwise multiple regression. Thus, the conclusions were drawn according to these parts.

### **Part I Sexes difference of distance changes.**

No significant sex differences were found in all of variable changes. As a result, both sexes were pooled into one group.

### **Part II Skeletal and soft tissue changes in all samples**

Following incisor retractions, it was found that

1. No significant change of hard tissue point A.
2. Significant change of hard tissue point B with the mean change  $0.811 \pm 1.994$  mm..
3. Significant change of soft tissue point A' with the mean change  $0.579 \pm 1.828$  mm..

4. Significant change of soft tissue point B' with the mean change  $1.598 \pm 2.364$  mm..

5. Significant change of upper lip with the mean change  $1.707 \pm 2.604$  mm..

6. Significant change of lower lip with the mean change  $2.878 \pm 3.174$  mm..

### Part III Correlation between skeletal, dental and soft tissue changes.

There were strong and significant correlations between skeletodental changes and soft tissue changes demonstrated as followed:

1. The change of hard tissue point A was found to be correlated with the change of upper incisor apex and upper incisor with the ratios and correlation coefficients as shown in Table 31.

Table 31 Correlation between  $\Delta A$  and  $\Delta UIa$ ,  $\Delta UI$ .

related variable	ratios	correlation coefficients
$\Delta A - \Delta UIa$	~ 0.5 : 1	0.710***
$\Delta A - \Delta UI$	~ 0.2 : 1	0.525***

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

2. The change of hard tissue point B was found to be correlated with the change of lower incisor apex and lower incisor with the ratios and correlation coefficients as shown in Table 32.

Table 32 Correlation between  $\Delta B$  and  $\Delta LIa$ ,  $\Delta LI$ .

related variable	ratios	correlation coefficients
$\Delta B - \Delta LIa$	~ 0.6 : 1	0.730***
$\Delta B - \Delta LI$	~ 0.5 : 1	0.614***

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

3. Soft tissue point A' decreased significantly following the decreased of point A and upper lip with ratios and correlation coefficients as demonstrated in Table 33.

Table 33 Correlation between  $\Delta A'$  and  $\Delta A$ ,  $\Delta UL$ .

related variable	ratios	correlation coefficients
$\Delta A' - \Delta A$	~0.6 : 1	0.592***
$\Delta A' - \Delta UL$	~0.5 : 1	0.801***

\* p < .05, \*\* p < .01, \*\*\* p < .001

4. Soft tissue point B' decreased significantly following the decreased of point B, lower incisor apex and lower lip with ratios and correlation coefficients as demonstrated in Table 34.

Table 34 Correlation between  $\Delta B'$  and  $\Delta B$ ,  $\Delta LIa$  and  $\Delta LL$ .

related variables	ratios	correlation coefficients
$\Delta B' - \Delta B$	~ 0.9 : 1	0.817***
$\Delta B' - \Delta LIa$	~ 0.7 : 1	0.772***
$\Delta B' - \Delta LL$	~ 0.6 : 1	0.813***

\* p < .05, \*\* p < .01, \*\*\* p < .001

5. Upper lip decreased significantly following the decreased of upper incisor, lower incisor, lower lip and soft tissue point A' with ratios and correlation coefficients as demonstrated in Table 35.

Table 35 Correlation between  $\Delta UL$  and  $\Delta UI$ ,  $\Delta LI$ ,  $LL$  and  $\Delta A'$ .

related variables	ratios	correlation coefficients
$\Delta UL - \Delta UI$	~ 0.6 : 1	0.668***
$\Delta UL - \Delta LI$	~ 0.5 : 1	0.531***
$\Delta UL - \Delta LL$	~ 0.6 : 1	0.832***
$\Delta UL - \Delta A'$	~ 0.1 : 1	0.801***

\* p < .05, \*\* p < .01, \*\*\* p < .001

6. Lower lip decreased significantly following the decreased of lower incisor, upper lip and soft tissue point B' with ratios and correlation coefficients as demonstrated in Table 36.

Table 36 Correlation between  $\Delta LL$  and  $\Delta LI$ ,  $\Delta UL$  and  $\Delta B'$ .

related variables	ratios	correlation coefficients
$\Delta LL - \Delta LI$	~ 1 : 1	0.798***
$\Delta LL - \Delta UL$	~ 1 : 1	0.813***
$\Delta LL - \Delta B'$	~ 1 : 1	0.798***

\* p < .05, \*\* p < .01, \*\*\* p < .001

7. The prediction equations were also significantly constructed and demonstrated as followed:

$$\Delta A = .359320 (\Delta UIa) + .183678 (\Delta UI) - .561220$$

$$\Delta B = .458056 (\Delta LIa) + .227110 (\Delta LI) - .570350$$

$$\Delta A' = .263583 (\Delta A) + .476347 (\Delta UL) - .279009$$

$$\Delta B' = .406963 (\Delta B) + .289678 (\Delta LL) + .252796 (\Delta LIa) + .116281$$

$$\Delta UL = .614314 (\Delta A') + .583937 (\Delta LL) - .471666 (\Delta LI) + .250051 (\Delta UI) + .175263$$

$$\Delta LL = .547531 (\Delta UL) + .542925 (\Delta LI) + .298023 (\Delta B') - .459592$$

These prediction equations should be used in the Population who had the same criteria as this study, that is, dental class I malocclusion treated by extraction of four first premolars and followed by Edgewise Technique therapy.

8. Findings revealed a complex interaction between dental movement, skeletal structures and perioral soft tissue structures including anatomic interrelations between soft tissue of lips. Hence, facial esthetic requires consideration of soft tissue factors in addition to hard tissue structures. Complex anatomy of the lip factor could not be analysed by means of the cephalometric radiographs for soft tissue evaluation. Thus, the prediction equations were an improvement over simple ratio or correlation coefficient reported in predicting soft tissue response in patients who dental class I malocclusion treated by extraction of four first premolars followed by Edgewise Technique therapy.



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