

CHAPTER III

MATERIALS AND METHODS

Materials

Materials used in this investigation consisted of standardized lateral cephalograms of samples. The samples were selected from the adult Thai patients who had been treated by the staff of the Department of Orthodontics, Faculty of Dentistry, Chiang Mai University.

1. Sample criteria

- 1) Thai female patients at least 14 years old, Thai male patients at least 16 years old.
- 2) Dental class I malocclusion with all teeth present except the third molars.
- 3) Treated by extraction of four first premolars followed by Edgewise Technique therapy.
- 4) Extraoral force was not used.
- 5) No abnormal oral habits such as tongue thrusting, lip biting, mouth breathing habit, etc.

2. Cephalometric radiograph criteria

Both pretreatment and posttreatment cephalograms had to exhibit

- 1) well defined of skeletal, dental, and soft tissue landmarks,
- 2) teeth occluded in centric occlusion,
- 3) relaxed lips,
- 4) no orthodontic appliances in place,
- 5) cephalograms had been made from the same X-ray machine. The electric potential difference was about 75-80 KVP and the electric current was about 20 mA. The exposure factors were set according to the size of a head and the density of the subjects, thus, exposure time varied from 1.2 to 1.6 seconds. The distance from the X-ray focus tube to the film was 60 inches (5 feet) and the distance from

midsagittal plane of head to the film was 15 cm.. Each subject's head was fixed in the upright position with cephalostat during X-ray exposure.

Methods

Cephalometric analysis

Pretreatment and posttreatment lateral cephalograms of each patient were used. The radiographs were traced on good quality tracing 8" x 10" acetate paper with a sharp-edged 0.3 millimeter pencil. All points and planes used are drawn. The hard and soft tissue profiles from pretreatment and posttreatment lateral cephalograms of each patient were traced two times by the same investigator. The second tracing were done two weeks after the first tracing so that the first tracing would have no influence on the second one.

Measurement

Linear measurements were used in this investigation (measured in millimeters).

The changes in position of the cephalometric landmarks between the pretreatment and posttreatment tracings were measured using a Cartesian coordinate system.

Figure 14 shows reference points and lines used in this investigation, which are:

Skeletal points:

- Sella (S) - Center of the contour of sella turcica
- Nasion (N) - Most anterior point of the nasofrontal suture in the midsagittal plane
- Point A (A) - Deepest point on the anterior contour of the alveolar process of the maxilla
- Point B (B) - Deepest point on the anterior contour of the alveolar process of the mandible

Dental points:

UIa - The upper incisor apex

LIa - The lower incisor apex

UI - The most anterior point on the labial surface of the upper incisor

LI - The most anterior point on the labial surface of the lower incisor

Soft tissue points:

A' - The deepest point on the anterior contour of the upper lip

UL - The most anterior point on the convexity of the upper lip

B' - The deepest point on the anterior contour of the lower lip

LL - The most anterior point on the convexity of the lower lip

Horizontal reference line (CFH) constructed by drawing a line at point S 7 degrees inferior to the SN line was used as the X-axis. The CFH line is the reference line used in cephalometric computerized analysis of the University of Connecticut. This investigation uses CFH as reference line because of problems with reproduction of the conventional Frankfort horizontal (FH) plane. (Rains and Nanda, 1982).

Vertical reference line (S vertical or SV) in the sagittal plane passing through sella and perpendicular to CFH line serves as the Y-axis (Rains and Nanda, 1982).

The distances that were measured were the perpendicular distances from the reference points mentioned above which are parallel with CFH line (X-axis) to S vertical (Y-axis).

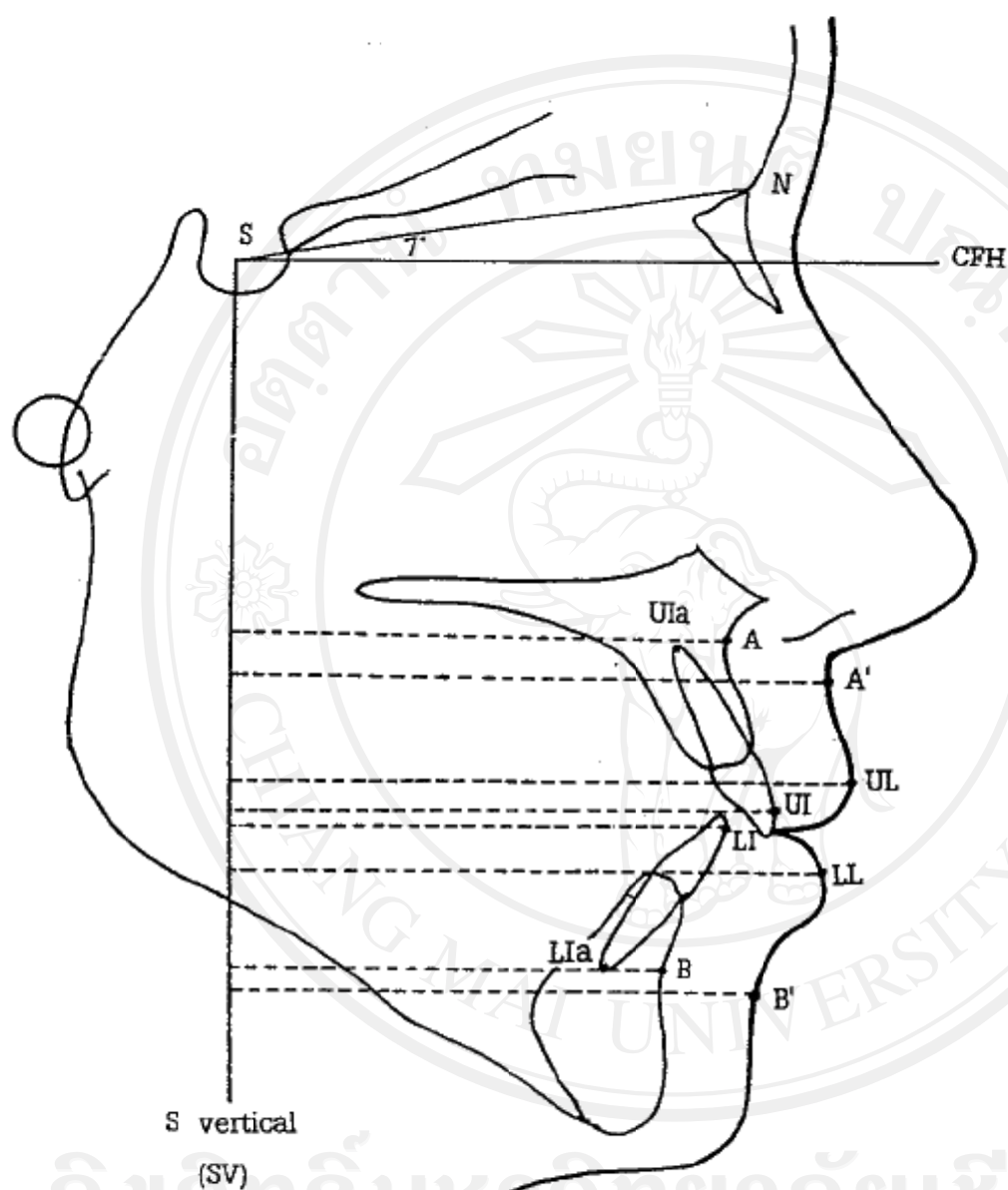


Figure 14 Landmarks, reference points and lines used in this investigation.

Method of measurement

Lateral cephalograms were measured using an Ormco plastic template; all measurements were made 2 times by the same investigator. The distances were measured twice, the mean value of the two was used (the difference between the first and the second measurement was within 0.5 millimeter). The differences between distances of pretreatment and posttreatment were the amount of changes, which were:

- Δ UIa was the difference between the pretreatment and posttreatment distance from point UIa to the SV line.
- Δ A was the difference between the pretreatment and posttreatment distance from point A to the SV line.
- Δ A' was the difference between the pretreatment and posttreatment distance from point A' to the SV line.
- Δ UL was the difference between the pretreatment and posttreatment distance from point UL to the SV line.
- Δ UI was the difference between the pretreatment and posttreatment distance from point UI to the SV line.
- Δ LI was the difference between the pretreatment and posttreatment distance from point LI to the SV line.
- Δ LL was the difference between the pretreatment and posttreatment distance from point LL to the SV line.
- Δ LIa was the difference between the pretreatment and posttreatment distance from point LIa to the SV line.
- Δ B was the difference between the pretreatment and posttreatment distance from point B to the SV line.
- Δ B' was the difference between the pretreatment and posttreatment distance from point B' to the SV line.

If the pretreatment distance was longer than the posttreatment distance, the result value would be positive.

If the pretreatment distance was shorter than the posttreatment distance, the result value would be negative.

Statistical analysis

1) The measurement of central tendency of the changes in distance between pretreatment and posttreatment were calculated separately for the male sample and the female sample.

2) The measurement of central tendency of the changes in distance were examined for significant differences between male and female samples by using the t-test.

3) The correlation between changes in distance of measurements were calculated by using Pearson's product moment correlation.

4) Multiple regression was used to predict soft tissue profile change. A stepwise multiple regression analysis was performed for each of the soft tissue measurements investigated.

5) Construct the multiple regression equation in the form of :

$$Y=B_0+B_1(X_1)+B_2(X_2)+B_3(X_3).....B_n(X_n) \text{ with } B_0 \text{ as a constant value.}$$

This formula was used to predict the amount of change of the dependent variable Y due to changes of the independent variables X at the level of significance desired. The 0.05 level of significance of difference was used in this investigation.

Statistical analysis was analysed by SPSS for Window Released 6.0 program.