DENTO-FACIAL CHANGES

DURING STAGE 1 ORTHODONTIC TREATMENT

WITH THE BEGG APPLIANCE

A report submitted in partial fulfilment for

the degree of Master of Dental Surgery

by

Kurupin Chaowakitcharoen

Orthodontic Unit

Department of Dentistry

Faculty of Dentistry

University of Adelaide

South Australia

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SUMMARY

The present study observed the dento-facial changes of Class II division 1 malocclusion patients treated by Begg appliance from pre-treatment until stage 1.

All of the 85 patients displayed Class II division 1 malocclusions and were treated with the Begg appliance in the Orthodontic Post-graduate Course at the University of Adelaide. The female patients were aged between 10.5 to 16.0 years, and the males between 12.2 to 15.5 years. The average age of subjects was 13.6 years, implying that some would have experienced their adolescent growth spurt during the treatment period and therefore some of the observed changes were related to rapid growth superimposed on treatment effects.

The sample was divided into 15 male-extraction, 17 male-nonextraction, 29 female-extraction, and 24 female-nonextraction groups according to the type of treatment performed. Each was further subdivided according to face type by using the ratio of the posterior face height to the total anterior face height.

The cephalometric analysis was completed with care and caution. The data were transferred by electronic digitizer in association with a program for computerized cephalometry. All measurements were adjusted to allow for radiographic enlargement (8.8%). Some points located on a smooth curve, such as, superior labial sulcus (sls), soft tissue pogonion (pos), pogonion (pog), displayed significant errors along the y-axis. The images of landmarks of the molar teeth on the lateral cephalograms were also poorly resolved and made determination of their positions difficult. This caused all of the variables that involved the molar teeth and the occlusal planes to be associated with relatively large errors in location.

Basic descriptive statistics were computed for all variables to summarize the data, and ANOVA was used to compare the mean values between groups. Correlation analysis quantified the strength of the association between each variable to the face type (long, average, and short face types).

Many pre-treatment variables showed statistically significant differences at $p < 0.05$ level between males and females, for example :

- the angle of the lower incisor to the mandibular plane was more proclined in females than in males;
- the perpendicular distance from the lower incisal edge to the mandibular plane was larger in males than in females;
- overbite was deeper in males than in females;
- maxillary and mandibular length was longer in males than in females;
- upper anterior face height and total anterior face height were longer in males than in females;

- the distance from the tip of nose to the soft tissue chin was longer in males than in females;

- the hard tissue chin point along y-axis, pogonion (pog-y), was longer in males than in females;

- the distance from the lower lip, sll, along the y-axis was longer in males than in females.

This indicates that males have a facial skeletal size larger than females, and also that the lower incisors in males are less proclined than in females. Although the ages of males and females in the present study were quite similar and normally females in this age are close to adult size, males still showed a larger cranio-facial skeleton size.

Male-extraction and male-nonextraction groups showed statistically significant differences at $p<0.05$ for the following pre-treatment variables :

- upper incisor inclination in the male-extraction group was more proclined than in the male-nonextraction group;

- the nasolabial angle in the male-extraction group was more obtuse than in the male-nonextraction group. However, the nasolabial angle was one of the variables that showed relatively large errors;

- the interlabial gap in the male-extraction group was larger than in the male-nonextraction group.

Female-extraction and female-nonextraction groups showed statistically significant differences at $p<0.05$ level for the following pre-treatment variables:

- the inclination of the lower incisor to mandibular plane in the female-extraction group was more proclined than in the female-nonextraction group;

- mandibular length (co-gn) in the female-extraction group was shorter than in the female-nonextraction group.

Treatment from banding until the end of stage 1 produced a reduction of the interlabial gap in both male-extraction and female-extraction groups. This was statistically significant at $p<0.05$ level only in the male-extraction group where the interlabial gap was reduced by an average of 2.72 mm. The relatively large variation in interlabial gap reduction between individuals (sd = 2.2mm) may have been partly due to some patients not having their lips completely relaxed at the time when the radiographs were taken.

Patients were divided into groups according to their face type by using the ratio of the posterior face height to total anterior face height. This ratio was low in long-faced patients, and high in short-faced patients. Correlation analysis was then used to quantify the strength of association between the change of each variable with face type. The results of this analysis showed that in the male-nonextraction group, the change of the perpendicular distance from lower incisal edge to mandibular plane was negatively correlated ($r = -0.66$) with the face height ratio. This indicates that long-faced patients tended to display a greater change in this variable than short-faced patients.

In the male-extraction group, the steepness of the mandibular plane angle to sn plane had a significant negative correlation (r = -0.65) with face height ratio. This indicates that long-faced patients, who normally have steep mandibular plane angles, tended to have more mandibular plane opening than short-faced patients from pre-treatment until stage 1 in Begg treatment technique. The change in posterior face height showed a positive correlation with face height ratio. This indicated that long-faced patients tended to have a smaller increase in the posterior face height than short-faced patients.

In the female-nonextraction group, the change in the ratio of posterior face height to total anterior face height, the change of the perpendicular distance from lower incisal edge to mandibular plane, and the change of the nasolabial angle, all showed negative correlations with face height ratio. This means that long-faced patients tended to have a smaller increase in posterior face height or a greater increase in the anterior face height than short-faced patients. On the other hand, short-faced patients had a larger increase in posterior face height and smaller increase in the anterior face height than long-faced patients. The nasolabial angle in long faced-patients was larger, and had a greater increase due to treatment than occurred in short-faced patients.

In the female-extraction group, the steepness of maxillary plane showed a significant negative correlation (r = -0.43) with the face height ratio. This means that long-faced patients tended to show greater change in the steepness of the maxillary plane than short-faced patients.

The Begg treatment technique during stage 1 also produced a reduction in the interlabial gap in the male-extraction patients in the present study. Males and females showed statistically significant differences in some variables, especially skeletal size. The different treatment groups, extraction and nonextraction, also responded differently to treatment. The results from correlation analysis indicated that the treatment responses of some variables depended upon the face type. The results from ANOVA confirmed that the changes in each face type group were different.

The results from the present study rejected the null hypothesis that treatment responses are independent of face types. It can be concluded that each face type (short, average, and long faced patients) responds differently to the Begg treatment stage 1. This result is quite similar to the findings of Leighton and Hunter (1982) who found that the spacing and crowding of the mandibular teeth are associated with the face type and that severely crowded patients are likely to have a steep mandibular plane angle and short posterior face height. The findings of the present study and that of Leighton and Hunter (1982) contrast with the findings of Bishara et al. (1994), who could not find any significant difference in post-treatment change in each face type.

The further study of the treatment responses in Begg treatment technique during stage 2, stage 3, and post-treatment in different face types would be interesting and a useful study.

STATEMENT

This thesis contains no material which has been accepted for the award of any other degree or diploma in any University. To the best of my knowledge and belief, it contains no material previously published or written by another person except where due reference has been made in the text of the thesis.

I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

Kurupin Chaowakitcharoen

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