

Measuring Palatal Height in Normal Occlusion and Malocclusions

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Statement of Problem: Due to the appearance of palatal height difference in orthodontic patients we decided to carry out this study.

Purpose: The purpose of this research was to determine palatal height in persons with normal occlusion and different malocclusions (class I, II Div I and III) and comparing them with each other.

Materials and Methods: In this cross sectional research, 240 subjects were selected. Sixty cases (30 girls and 30 boys) with normal occlusion within 16-18 years old were selected in random cluster sampling from high schools in Mashhad. Examination technique was direct observation, lateral cephalometric radiography, impression and preparing study model for measuring. For every kind of malocclusion 60 young patients, 30 females and 30 males, within the range of 16-20 years old attended orthodontic treatment in private dental offices or Orthodontics Department of Mashhad Dental School. The examination technique was indirect observation, using lateral cephalometry selected of 5395 lateral cephalograms and related study models for measuring. Mean, minimum and maximum and height of the palate was initially determined and then normal occlusion was compared with every kind of malocclusion using SPSS statistical software. One way analysis of variance (ANOVA) and t-test (independent groups), and also Duncan test were used for comparison.

Results: The ANOVA test showed that there were no statistically significant differences between females in normal occlusion and different malocclusions ($P=0.486$). In boys the palatal height was significantly higher in class III males than class II and class I malocclusions and the height of palate for normal boys is significantly higher than class I malocclusion ($P<0.05$). Comparison of other groups was not significantly different. In each group height of palate was significantly lower in females than males ($P<0.001$).

Conclusion: From this research we concluded that palatal height is different in females and males in normal occlusion and class III. The difference in palatal height between normal occlusion, class I, class II and class III malocclusions with each other in boys ($P=0.003$) was due to the difference between class I and class III, class II and III class I and normal. In comparison palatal height in the males the difference between normal occlusion and Class I malocclusion, also class III malocclusion were significant.

Key Words: Palatal height, malocclusion, normal occlusion.

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Because of observing difference in palatal height during examination and also lack of gaining an exact shape in some cases during impression, we decided to carry out a study in order to compare the palatal height in patients

with normal occlusion and different classes of malocclusion.

In 1970, Linder-Aronson mentioned abnormal palatal height in patients with mouth breathing.⁽¹⁾

In a 15-year study, Ballard and Gwynne in 1952

remarked that adenoid patients have high palates.⁽²⁾ McKenzie in 1979 studied on 222 children with large adenoids and found that more than 40% of these children had a natural palatal form.⁽³⁾

Arey in 1947 remarked that the tonsil and adenoid hyperplasia which results in mouth breathing, will over time, result in dome palatal abnormality.⁽⁴⁾ Klein in 1971 said that finger sucking in children might result in dome palatal abnormality if it continues after two years of age.⁽⁵⁾

Cleall in 1965 and Brossman in 1972 said that maxillary growth disorders are problems that are not only important in width but also in depth and height^(6,7).

In a study by Pillane and McNamara in 1995, 162 patients underwent rapid maxillary expansion of the upper jaw in the beginning of mixed dentition. The statistical results of that study showed that treatment is more stable in patients who have orthopedic expansion at the end of mixed dentition.⁽⁸⁾ Tortman and co. workers in 1997 reported association of lip posture and the dimensions of the tonsils and airway with dentofacial morphology.⁽⁹⁾

In a study by Hamdalman and his colleagues in 2000 on 47 adults and 47 children, it was shown that palatal height increased about 18% in distance between adult molars and 56% in children.⁽¹⁰⁾

The purpose of this study is to determine and compare palatal height in males and females with normal occlusion and class I, class II div I and class III malocclusions.

Materials and Methods

In this cross sectional research, 240 subjects were selected. Sixty cases (30 girls and 30 boys) with normal occlusion within 16-18 years old were selected among students in various educational areas of Mashhad high schools through cluster random sampling method. 180 patients with malocclusion from orthodontic clinic of Mashhad dental school and dental

offices (aged between 16-20 years) were selected. Examination technique for normal occlusion was direct observation, lateral cephalometric radiography, impression and preparing study model for measuring palatal height. For every kind of malocclusion 60 young patients, 30 females and 30 males, within the range of 16-20 years old were selected. The examination was indirect observation, using lateral cephalogram selected from 5395 lateral cephalograms and related study models for measuring palatal height. The data were analyzed using SPSS statistical software.

The reason for selecting the above range of age was to complete the palatal height according to growth.

The criteria for selection of cephalograms were clearness and proper slopiness of anterior cranial base. All of them had been or were taken by an experienced technician in radiology department of Mashhad dental school.

In case history, subjects had had no previous history of mouth breathing, thumb sucking, adenoid or orthodontic treatment.

Persons with normal occlusion had the following characteristics:

- 1- Mesio-buccal cusp of the upper first molar was in mesiobuccal fissure of lower first molar.
- 2- Disto-buccal cusp of upper first molar was in the embrasure between first and second molars.
- 3- Mesio lingual cusp of the upper first molar was in central fossa of the lower first molar.
- 4- Cusp of Upper canine was between lower canine and first premolar.
- 5- Overbite 2mm.
- 6- Overjet 2 mm.

In all of the subjects the casts had the following conditions:

- 1- All of the first molars were present.
- 2- Canine teeth had complete grown .
- 3- Casts were suitable from the viewpoint of quality, had no bubble or vast repair, etc.
- 4- Type of malocclusion was defined upon Angle's classification.
- 5- Casts with hyperplastic teeth, vast repair, or

restoration type Class II were omitted from this study. SPSS statistical software was used for data analysis. T-test (independent groups) and One-way Analysis of Variance and also Duncan multiple comparisons were used.

Results

The palatal height in each gender and occlusion groups are shown in table I. The ANOVA test showed that there were no statistically significant differences between females in normal occlusion and different malocclusions ($P=0.486$).

In boys the palatal height was significantly higher in class III males than class II and class I malocclusions and the height of palate for normal boys is significantly higher than class I malocclusion ($P<0.05$). Comparison of other groups was not significantly different.

In each group height of palate was significantly lower in females than males ($P<0.001$) (Fig. 1) (Table I).

Discussion

Total mean of the palatal height in normal occlusion was 20.61 mm, 19.53 mm in young females and 21.84 mm in young males, (2.3 mm more than young females) and the difference was significant. This is due to gender.

It was clear that even though the palatal height in Class I malocclusion (20.43 mm) was less than Normal (20.61 mm), in class II Div.I malocclusion (20.65 mm) and class III (21.19 mm) was more than normal. There was no significant difference in palatal height between normal occlusion and various groups of malocclusion. But the mean of palatal height in class III was more than all of them. This may be due to lower position of the tongue in skeletal class III malocclusion and exterior pressure of cheek muscles and lower position of mandible during sleep at night.

Palatal height in class III malocclusion was more in males than females significantly. This is due to type of malocclusion and gender.

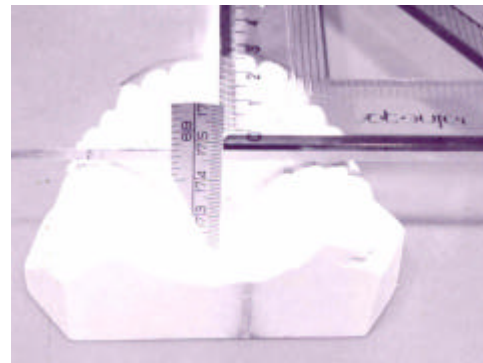


Fig. 1- The way to measure palatal height

In Males comparing with normal occlusion and various kind of malocclusion (I, II, III) the difference in palatal height was significant between class I and class III, class II and class III and class I and normal. In females it was not significant.

In Males, palatal height in normal occlusion and various types of malocclusion was more than females. This is due to gender.

Because of lack of researches, articles and other sources in the literature concerning palatal height measurement, we could not compare our results with others.

Conclusion

From this research we concluded that palatal height is different in females and males in normal occlusion and class III malocclusion being significantly more in males than in females. The difference in palatal height between normal occlusion, class I, class II and class III malocclusions with each other in males ($P=0.003$).

Table I- Max, Min, Mean and SD for height of palate in normal occlusion and malocclusions, according to sex

Occlusion type	Sex	Max	Min	Mean \pm SD
Normal	Male	25	17.5	21.84 \pm 2.075
	Female	22.5	16	19.53 \pm 1.788
Class I	Male	23.5	15.5	20.43 \pm 2.460
	Female	23.8	17.5	20.42 \pm 2.164
Class II Div I	Male	26	17	20.98 \pm 1.979
	Female	24	17	20.35 \pm 2.249
Class III	Male	27.5	19.5	22.42 \pm 2.173
	Female	26	16	19.96 \pm 2.716

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