https://doi.org/10.29309/TPMJ/2023.30.10.7688

The Professional Medical Journal
www.theprofesional.com
2023, Volume, 30 Issue, 10

ORIGINAL ARTICLE

The cephalometric evaluation of the position of maxillary 1st permanent molar in class II division I malocclusion.

Vishal Dherwani[1], Neeraj Dherwani[2], Sana Javed[3], Hafiz Mahmood Azam[4], Qasim Khalid[5], Muhammad Aqeel Aslam[6]

Article Citation: Dherwani V, Dherwani N, Javed S, Azam HM, Khalid Q, Aslam MA. The cephalometric evaluation of the position of maxillary 1st permanent molar in class II division I malocclusion. Professional Med J 2023; 30(10):1334-1338. https://doi.org/10.29309/TPMJ/2023.30.10.7688

ABSTRACT… Objective: To conclude the sagittal position of the maxillary 1st permanent molar in class II division I malocclusion patients from lateral cephalogram. **Study Design:** "Descriptive" ("Cross-sectional study"). **Setting:** Dental OPD "Department of Orthodontics, University College of Medicine and Dentistry, The University of Lahore". **Study Period:** 1st December 2021, till 30th May 2022. **Material & Methods:** A total of 160 patients ensuring the confidentiality of their diagnostic data, lateral cephalometric was exposed and cephalometric tracing was done by placing mate acetate paper for evaluation of sagittal and vertical dysplasia. For the selected sample, the distance between the distal cusps of the "Maxillary" 1st permanent molar to the PTV line (Pterygoid Vertical) was assessed (PTV-U6). Distance between the PTV lines (Pterygoid Vertical) to the Maxillary Centroid was also calculated. To compare the mean of the variables i.e. PTV-U6 and PTV-Maxillary molar Centroid a student t-test was applied with a P-value ≤ 0.05 as significant. **Results:** The mean age of patients was 23.69 ± 3.72 years with minimum and maximum ages of 18 and 30 years. There were 73(45.62%) male and 87(54.38%) female cases with a higher female-to-male ratio. The mean PTV-U6 was 20.83 mm ± 2.14 mm with minimum and maximum values as 17 mm and 24.50 mm. The mean PTV-molar centroid value was 28.70 mm ± 0.88 mm with smallest and extreme values of 27.10 mm and 30.10 mm. **Conclusion:** It was concluded that the sagittal station of maxillary 1st perpetual molar in class II division I malocclusion patients from lateral cephalogram was found, hence by keeping these values of the local population the strategies can be designed as it may be helpful for the patients that many unwanted extractions can be avoided and treatment will be planned as no extraction.

Key words: Class II Division, Lateral Cephalogram, Malocclusion, Permanent Molar, Sagittal Position.

INTRODUCTION

Sagittal Skeletal Dysplasia is a common dentofacial concern that occurs due to deformation of maxillary or mandibular development that can have an impact on the eruption and positioning of teeth.[1] Sagittal skeletal dysplasia has been classified as skeletal class I, class II, and class III. Skeletal class II results from an anteroposterior imbalance in the location of jaws, either due to prognathic (forward position) maxilla or retrognathic (backward position) mandible, and is also because of the combination of the forward position of the maxilla and backward position of the mandible which is termed as composite.[2] Khan in his study has shown a high incidence of skeletal class II malocclusion.[3] There are various factors that cause the development of skeletal class II such as genetics, environmental factors, syndromes, the position of the hyoid bone, etc.[4]

The malocclusion is related entirely to the dental aspect, such as dental class II malocclusion in which the "mesiobuccally cusp of the maxillary first molar" is rested on the "buccal channel of the mandibular first molar" and the skeletal base is in class I. Class II Partition I malocclusion can be treated by extraction or molar distalization. Molar distalization can be achieved by headgears.[5] In addition to headgears, numerous immovable distaining applications such as "nickel titanium" (NiTi) magnets, springs, pendulums, jones jig, distal jets, and implant-supported distalizers have

1. BDS, CHPE, FCPS-II Training Orthodontics, Registrar, Muhammad Dental College, Mirpurkhas.
2. BDS, CHPE, FCPS-II Training Orthodontics, Registrar, University College of Medicine & Dentistry, The University of Lahore.
3. BDS, M.Phil (Oral Biology), Assistant Professor, Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro.
4. BDS, M.Phil, C.H.P.E, Associate Professor, Science of Dental Materials Muhammad Medical and Dental College, Mirpurkhas.
5. BDS, MOrth RCSEd, Senior Registrar, Avicenna Medical and Dental College,
6. BDS, MFDS RCSEd, MFDS RCPSG, FCPS, CHPE, Professor, Muhammad Dental College, Mirpurkhas.

Correspondence Address:
Dr. Vishal Dherwani
Department of Orthodontics
Muhammad Dental College, Mirpurkhas.
vishaldherwani007@gmail.com

Article received on: 17/05/2023
Accepted for publication: 31/07/2023

been introduced for the handling of "Class II division I malocclusion".[6,7] Class II molar relation can be seen in mandibular retrognathism, maxillary dental protrusion maxillary prognathism, mandibular dental extrusion or grouping. Question of importance is to know whether class II molar relation is due to maxillary dental protrusion or not.[8] This can be analyzed on lateral cephalograms through sagittal molar position indicators i.e. distance between PTV (Pterygoid Vertical) and the distal surface of maxillary 1st permanent molar (PTV-U6). The normal value in class I malocclusion is 21 mm ± 3 mm, a value exceeding 24 mm then it represents class II malocclusion.[9] Another method to analyze the space for molar distalization is between PTV (Pterygoid Vertical) and maxillary 1st permanent molar Centroid. The normal value in class I malocclusion is 21.7 mm ± 3.9 mm, a value exceeding 25.6 mm represents class II.[10] If the molar relation is said to be in class II due to the molar forward position, it might help in deciding between extractions versus no extraction.[11] Moreover, it may be helpful for the patients that unwanted extractions can be avoided and treatment done via distalization which is non-invasive and patient satisfaction achieved. Limited evidence is available in this topic.[12] Irfan et al have studied the amount of distalization using these parameters, however, they have not related to these sagittal molar position indicators. By these above studies, molar distalization can be done smoothly without any need for extractions.

MATERIAL & METHODS

This descriptive cross-sectional learning was conceded at the Department of Orthodontics, University College of Dentistry, The University Lahore. This study was conducted from 1st December 2021, till 30th May 2022 after ethical approval from the Ethical and review committee University College of Dentistry, The University Lahore (REU:42645/29.11.21).

Knowledgeable approval was taken from the selected 160 patients ensuring the confidentiality of their diagnostic data. Cephalometric Tracing was done by placing matte acetate tracing paper over the lateral cephalogram for evaluation of sagittal and vertical dysplasia. Confounding variables such as age, sagittal pattern, vertical dysplasia, carious and restored molars have been managed through appropriate selection criteria. Demographic history i.e name, age, gender and outcome variables i.e. PTV-U6 value and PTV-maxillary molar centroid value was recorded in a "pre-designed proforma" (attached).

The composed data was examined using "Statistical Package for Social Sciences" (SPSS-20). Descriptive statistic was calculated. Quantitative variables like age and PTV-U6 and PTV-molar centroid were obtainable as mean ± S.D. Qualitative variables like gender were obtainable as frequency and proportion. Data was stratified for gender and age. Student t-test was applied ("post-stratification with p-value ≤ 0.05 considered as significant").

RESULTS

A total of 160 patients were enrolled in this learning, there were 73(45.62%) male and 87(54.38%) female cases with a higher female-to-male ratio. The mean age of patients was 23.69 ± 3.72 years with minimum and maximum ages of 18 and 30 years.

Variable	Frequency	Percentage
Male	73	45.62%
Female	87	54.38%
Total	160	100%

Table-I. Demographical features of patients

The study results also elaborated that the mean PTV-U6 (Prescription Target Volume-U6) is 20.83±2.14 mm. The minimum value observed is 17 mm, and the maximum value observed is 24.50 mm. The mean PTV-molar centroid value was 28.70 mm ± 0.88 mm with smallest and extreme value as 27.10 mm and 30.10 mm.

The mean PTV-U6 value in 18-24 years old cases was 20.65 mm ± 2.05 mm and in 25-30 years old cases was 21.09 mm ± 2.24 mm with no significant difference, p-value > 0.05 (As shown in Table-II).

The study results also elaborated that the mean PTV-U6 (Prescription Target Volume-U6) is

20.83±2.14 mm. The minimum value observed is 17 mm, and the maximum value observed is 24.50 mm. The mean PTV-molar centroid value was 28.70 mm ± 0.88 mm with smallest and extreme value as 27.10 mm and 30.10 mm.

The mean PTV-U6 value in 18-24 years old cases was 20.65 mm ± 2.05 mm and in 25-30 years old cases was 21.09 mm ± 2.24 mm with no significant difference, p-value > 0.05 (As shown in Table-II).

The mean PTV-molar centroid value in 18-24 years old cases was 28.66 mm ± 0.93 mm and in 25-30 years old cases was 28.75 mm ± 0.81 mm with no important variance, p-value > 0.05.

The mean PTV-U6 value in male cases was 20.56 mm ± 2.13 mm and in female cases was 21.07 mm ± 2.13 mm with no important alteration, p-value > 0.05. The mean PTV-molar centroid value in male cases was 28.66 mm ± 0.89 mm and in female cases was 28.73 mm ± 0.88 mm with no substantial variance, p-value > 0.05.

DISCUSSION

Researchers have shown that patients in Class II, division 1, had a more protruding maxilla and a jawbone of typical dimensions and position. Class II skeletal pattern, according to another study, results from the simultaneous development of a prominent maxilla and a retracted mandible. The craniofacial traits of the Class II pattern appear to have been influenced by the racial or ethnic makeup of the sample employed in various studies. Studies using cephalometry have shown that there is some wiggle room in where these teeth sit in relation to the facial bones. Only a small number of research have looked at what factors influence whether the maxillary first molar is positioned sagittally or vertically. Age, sagittal size, inter-jaw angle, temporomandibular plane angle, and palatal plane angle were found to affect the sagittal position of the first permanent molar in the maxilla. Those with greater lower anterior face height and inter-jaw angle had greater dento-alveolar heights in their maxillary molars.

Researchers have shown that patients in Class II, partition 1, had a more protruding maxilla and a jawbone of typical dimensions and position. Class II musculoskeletal pattern, according to another study, results from the simultaneous development of a prominent maxilla and a retracted mandible. The morphological traits of the Class II pattern appear to have been influenced by the racial or ethnic makeup of the sample employed in various studies. Studies using cephalometry have shown that there is some wiggle room in where these teeth sit in relation to the facial bones. Only a small number of research have looked at what factors influence whether the maxillary first molar is positioned sagittally or vertically.

		Mean	S.D	Minimum	Maximum	t-test	P-Value
PTV-U6	18-24	20.65 mm	2.05	17.00 mm	24.40 mm	-1.294	0.197
	25-30	21.09 mm	2.24	17.00 mm	24.50 mm		
	Total	20.84 mm	2.14	17.00 mm	24.50 mm		

Table-II. Comparison of mean PTV-U6 in different age groups (years)

		Mean	S.D	Minimum	Maximum	t-test	P-Value
PTV-U6	Male	20.56 mm	2.13	17.10 mm	24.40 mm	-1.511	0.133
	Female	21.07 mm	2.13	17.00 mm	24.50 mm		
	Total	20.83 mm	2.14	17.00 mm	24.50 mm		

Table-III. Assessment of mean PTV-U6 in both gender

		Mean	S.D	Minimum	Maximum	t-test	P-Value
PTV-Molar Centroid	Male	28.66 mm	0.89	27.10 mm	30.00 mm	-.462	0.645
	Female	28.73 mm	0.88	27.10 mm	30.10 mm		
	Total	28.70 mm	0.88	27.10 mm	30.10 mm		

Table-IV. Comparison of mean PTV-molar centroid in both gender

Age, maxillary size, inter-jaw angle, temporomandibular plane angle, and palate plane angle were found to affect the sagittal position of the first persistent molar in the maxilla. Those with greater lower frontal face height and inter-jaw angle had greater dento-alveolar heights in their mandibular molars.[13]

Class II division 1 patients were found to have a prognathic maxilla compared to the anterior cerebral base. The jaw was often set at a right angle to the front of the skull. Both the upper and bottom incisors were in their typical positions, however, the upper ones were proclined. There was no difference in the base of the skull angle between the two groups. This leads us to the conclusion that Class II partition 1 "malocclusion" in the western part of Saudi Arabia displays certain unique features.[14] Handling of "Class II division 1 malocclusion" in Western Saudis may be best served by headgear therapy rather than functional appliances due to the prevalence of prognathic maxilla in this cohort. Another study was conducted to examine the vertical and sagittal cephalometric skeletal and dental features associated with class II division 1 malocclusion. One hundred male and female patients were analyzed using lateral cephalograms to identify the features of class II div 1 malocclusion or SPSS 11 for Windows was used to create the database. Class II div 1 malocclusion was characterized by a greater retrognathic mandible in the sagittal plane. Patients in class II, division 1, had proclaimed upper incisors. Class II div 1 malocclusion was characterized by proclined lower incisors. More of a retrognathic jaw and proclined lower and upper incisors are signs of class II div 1 malocclusion. Lower posterior facial elevation and retroclined upper incisor are features of class II/2 malocclusion.[15]

CONCLUSION

It is concluded that "sagittal position of maxillary" 1st permanent molar in class II partition I malocclusion patients from lateral cephalogram is found as i.e. mean PTV-U6 was 20.83 mm ± 2.14 mm and mean PTV-molar centroid was 28.70 mm ± 0.88 mm. Hence by keeping these values of local population the strategies can be designed as it may helpful for the patients that many unwanted extractions can be avoided.

REFERENCES

1. Joshi N, Hamdan AM, Fakhouri WD. **Skeletal malocclusion: A developmental disorder with a life-long morbidity.** J Clin Med Res. 2014; 6(6):399-408.
2. Caprioglio A, Cafagna A, Fontana M, Cozzani M. **Comparative evaluation of molar distalization therapy using pendulum and distal screw appliances.** Korean J Orthod. 2015; 45(4):171-9.
3. Khan A, Hussain U, Ayub A, Iqbal N. **Patterns of skeletal class II in patients reporting to Khyber College of Dentistry.** Pak Ortho J. 2013; 5(1):19-22.
4. Howe SC. **Phenotypic characterization of Class II malocclusion,** http://ir.uiowa.edu/etd/2896. Uni Lowa. 2012:1-88.
5. Graber LW, Vanarsdall RL, Vig KW, Huang GJ. **Orthodontics-e-book: current principles and techniques: Elsevier Health Sciences; 2016.**
6. Marure PS, Patil RU, Reddy S, Prakash A, Kshetrimayum N, Shukla R. **The effectiveness of pendulum, K-loop, and distal jet distalization techniques in growing children and its effects on anchor unit: A comparative study.** J Indian Soc Pedod Prev Dent. 2016; 34(4):331-40.
7. Haq A-U, Waheed-Ul-Hamid M, Chaudhry NA, Latif R. **Effects of distal jet appliance in class-II molar correction.** Pak Oral Dent J. 2010; 30(1):146-53.
8. Burhan AS. **Combined treatment with headgear and the Frog appliance for maxillary molar distalization: A randomized controlled trial.** Korean J Orthod. 2013; 43(2):101-9.
9. Jacobson A, Jacobson R. **Radiographic cephalometry: From basics to 3-D imaging 2nd Ed.** Chicago; 2006.
10. Cozzani M, Pasini M, Zallio F, Ritucci R, Mutinelli S, Mazzotta L, et al. **Comparison of maxillary molar distalization with an implant-supported distal jet and a traditional tooth-supported distal jet appliance.** Int J Dent. 2014; 2014(9):1-8.
11. Wins SM, Antonarakis GS, Kiliaridis S. **Predictive factors of sagittal stability after treatment of Class II malocclusions.** Angle Orthod. 2015; 86(6):1033-41.

12. Kannan A, Sathyanarayana HP, Padmanabhan S. **Effect of functional appliances on the airway dimensions in patients with skeletal class II malocclusion: A systematic review.** J Orthod Sci. 2017; 6(2):54-64.

13. Kapoor D, Garg D. **Cephalometric characteristics of Class II division 1 malocclusion in a population living in the Chitwan District of Nepal.** IJCMR. 2017; 4(4):947-9.

14. Hassan AH. **Cephalometric characteristics of Class II division 1 malocclusion in a Saudi population living in the western region.** Saudi Dent J. 2011; 23(1):23-7.

15. Amar CR, Rasheed N, Latif S. **Cephalometric characteristics of Class II division 1 and Class II division 2 malocclusion.** Pak Oral Dental J. 2010; 30(1):138-41.

AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Vishal Dherwani	Patients selection, Data collection, Cephalometric interpretation.	
2	Neeraj Dherwani	Data analysis, Data interpretation, Cephalometric interpretation.	
3	Sana Javed	Study design, Proforma design, Literature search.	
4	Hafiz Mahmood Azam	Resutls analysis and Discussion.	
5	Qasim Khalid	Proofreading, Drafting in literature search.	
6	Muhammad Aqeel Aslam	Drafting discussion chapter, Data analysis drafting the manuscript.	