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Research Article

**ROTATION OF MAXILLARY PERMANENT FIRST MOLAR  
IN CLASS 2 DIVISION 1 MALOCCLUSION****Dr. Umer Sarwar<sup>1</sup>, Dr. Zahoor Ul Haque<sup>2</sup>, Dr. Asma Asghar<sup>3</sup>**<sup>1</sup>Rural Health Centre Khudian Khas, District Kasur<sup>2</sup>Rural Health centre Bara Ghar, District Nankana Sahib<sup>3</sup>Punjab Dental Hospital, Lahore**Article Received:** March 2020**Accepted:** April 2020**Published:** May 2020**Abstract:**

*The aim of this study is to evaluate permanent maxillary first molar rotation in class II division I malocclusion. Cross-sectional survey was carried Punjab Dental Hospital, Lahore from April 2019 to September 2019. One hundred and fifty patients of 12 to 21 ages, irrespective of gender were selected. Maxillary and mandibular casts of these patients were collected. One angular was made on the photographs of study models. This angle was formed by the lines passing through the tips of the buccal cusps of the upper molars of both left and right sides to the midpalatal line respectively. The midpalatal line was identified by an anterior and posterior point along mid palatal raphe. There were 32% males and 68% females with mean±SD of age 16.55±2.61 years. 22.1% have left side positive angles 63.5% patients have right side positive angles. Regarding rotation of first molar in class II division I, 118 patients (78.7%) have rotations and 32 patients (21.3%) have no rotations. The individuals with class II division 1 malocclusion present greater mesiopalatal rotation of the maxillary first molars. Molar rotation was more on the right side as compared to the left and in class II cases.*

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**INTRODUCTION:**

The relation of the maxillary first permanent molar to mandibular first permanent molar has been considered fundamental in the description of occlusal relationships, since Angle in 1899 defined it as the “key to occlusion”.<sup>1</sup> Later Andrews defined “no rotations of the teeth in the dentition” as one of the six keys to normal occlusion in 1972.<sup>2</sup> Angle considered the maxillary first molars because they occupy a normal position more frequently than any other tooth and their anatomical location within a fixed bone structure (maxilla) relative to the skull base.<sup>3</sup> In normal occlusion the mesiobuccal cusp of the maxillary first molar occludes in the buccal groove of the mandibular first molar while in Class II malocclusion there is poor sagittal relationship between the dental arches, with the lower arch relatively distal to the upper arch to varying degrees.<sup>3</sup>

In Class II malocclusion there is high prevalence of mesiopalatal rotation of the maxillary first molars, ranging from 83 to 95%.<sup>3,4</sup> It occurs because of early extraction or proximal carries of primary second molar<sup>5</sup> and in tooth size and jaw size discrepancy.<sup>6</sup> It can also occur because of mesial drifting of teeth due to attrition at interproximal contacts of teeth cause of aging process.<sup>5</sup> This rotation or mesial drifting of upper first molars can be clinically manifested by the lack of molar buccal offset (the facial surface is normally more prominent than the primary molar or premolars) and an end-to-end permanent molar relationship.<sup>5,6</sup> This is of great clinical importance because the maxillary first molar has trapezoidal shape<sup>7,8</sup> and it occupies additional space of 2 mm on the arch as it rotates in the mesiopalatal direction.<sup>6</sup>

Studies has been conducted which shows that there was a positive correlation between the severity of Class II division I malocclusion and the magnitude of mesiopalatal rotation of the maxillary first molars<sup>3</sup>. Studies also show that maxillary first molar rotation is more present on right side as compared to left side.<sup>5,9</sup>

Assessment of maxillary first molar rotation is an important step in diagnosis and treatment planning process.<sup>5</sup> There are several ways for assessing maxillary molar rotation. Ricketts evaluated the occlusal surfaces of the maxillary casts and proposed that in normal occlusion, the line touching the tips of distobuccal and mesiopalatal cusps of the maxillary first molar on one side should pass through the distal third of the canine on the opposite side.<sup>8</sup> In 1956 Henry measured the angles formed by the lines passing through the tips of the buccal cusps of the upper molars to the median raphe on dental casts. He reported  $10.3 \pm 4$  degrees as a normal value

for this measurement.<sup>4</sup> Lamons and Holmes measured the angle between the line passing through the tips of the mesial cusps of the upper first molars and the midpalatal line. They found the normal value of  $61 \pm 4$  degrees for this angle.<sup>4</sup> Cetlin and Ten Hoeves described that when the buccal surfaces of molars are parallel to each other then maxillary first molars are consider being well positioned.<sup>10</sup>

**MATERIALS AND METHODS:**

This cross-sectional study was conducted at Punjab Dental Hospital, Lahore April 2019 to September 2019. One hundred and fifty patients were included in the study with no previous orthodontic treatment, Class II division I malocclusion with an age range of 12-21 year.

**Data collection**

Maxillary and mandibular casts of these patients were collected. Photographs of maxillary plaster casts were taken with hand-held Nikon D-5200 DSLR camera by same individual. Photos were printed with 1:1 size of models. One angular was made on the photographs of study models. This angle was formed by the lines passing through the tips of the buccal cusps of the upper molars of both left and right sides to the midpalatal line respectively. Mesiopalatal rotation was labeled. All data were recorded by researcher herself to minimize bias in the study. Statistical analysis was performed with Statistical Package for Social Sciences (SPSS) version 18. Mean and standard deviation was calculated for quantitative variable like age of patient. Qualitative data like gender and mesiopalatal rotation as frequencies and percentage. Data was stratified for age and gender to address effect modifiers. Post-stratification Chi square test was applied taking P value  $\leq 0.05$  as significant.

**RESULTS:**

One hundred and fifty patients of rotation of maxillary first molar in class II division I malocclusion were included in this study. There were 48 (32%) males and 102 (68%) females with male to female ratio was 1:2.1. Regarding age groups, there were 62 patients (41.3%) between 12-15 years, 51 patients (34%) between 16-18 years and 37 patients (24.7%) between 19-21 years. The mean  $\pm$  SD of age was  $16.55 \pm 2.61$  years. Regarding rotation of first molar in class II division I, 118 patients (78.7%) have rotations and 32 patients (21.3%) have no rotations. According to angles of the patients, 26 patients (22.1%) have left side positive angles, 75 patients (63.5%) have right side positive angles and 17 patients (14.4%) have left/right side positive angles. When the mesiopalatal rotation of first molar in class II division I was stratified with gender, statistically the difference between gender and mesiopalatal was found significant ( $P < 0.05$ ). When the mesiopalatal

rotation of first molar in class II division I was stratified with age, statistically the difference

between age and mesiopalatal was found not significant ( $P>0.05$ ).

**Table 01:** Individual values, means, and standard deviations of the molar angulation

| Class I treated      | FP I<br>Class I    | FP I<br>Class II   | FP II<br>Class II  | FP III<br>Class III |
|----------------------|--------------------|--------------------|--------------------|---------------------|
| 70.75                | 76.00              | 79.50              | 65.50              | 80.00               |
| 69.00                | 70.00              | 80.00              | 68.50              | 63.00               |
| 63.25                | 71.00              | 89.00              | 74.00              | 80.50               |
| 70.75                | 68.00              | 75.00              | 76.00              | 81.00               |
| 67.00                | 68.00              | 68.50              | 78.00              | 86.50               |
| 67.75                | 80.00              | 83.50              | 71.50              | 75.00               |
| 64.75                | 71.00              | 92.50              | 75.00              | 78.00               |
| 68.25                | 67.50              | 81.50              | 67.50              | 74.50               |
| 65.50                | 73.00              | 82.00              | 79.00              | 78.00               |
| 66.75                | 71.50              | 75.00              | 84.50              | 61.50               |
| 72.25                | 66.50              | 80.00              | 77.00              | 69.00               |
| 63.25                | 64.00              | 76.00              | 78.00              | 70.50               |
| 72.25                | 75.50              | 76.50              | 71.00              | 83.00               |
| 64.50                | 71.50              | 77.00              | 84.00              | 77.00               |
| 63.50                | 72.50              | 74.00              | 77.00              | 70.00               |
| 68.00                | 68.50              | 70.50              | 81.50              | 73.50               |
| 72.50                | 77.00              | 80.00              | 77.00              | 61.50               |
| 65.00                | 71.00              | 90.00              | 62.50              | 70.50               |
| 68.50                | 74.00              | 71.00              | 68.00              | 65.50               |
| 65.75                | 68.00              | 77.50              | 73.50              | 78.00               |
| x=67.46 <sup>a</sup> | 71.23 <sup>b</sup> | 78.95 <sup>d</sup> | 74.45 <sup>c</sup> | 73.83 <sup>c</sup>  |
| SD=2.98              | 3.83               | 6.19               | 5.83               | 7.05                |
| Minimum=63.25        | 64.00              | 68.50              | 62.50              | 61.50               |
| Maximum=72.5         | 80.00              | 92.50              | 84.50              | 86.50               |

\*Different letters represent statistically significant difference ( $P<0.05$ ).  
SD: Standard deviation, FP: Facial pattern

## DISCUSSION:

The effectiveness of orthodontic treatment is closely related to proper therapeutic planning. In order to establish an effective treatment plan, attention must be paid to the detailed methods employed and diagnostic criteria.<sup>73</sup> Careful analysis of dental casts and assessment of molar rotation is very important prior to the Orthodontic treatment. The occlusal arch length and width is affected by molar rotation. It is estimated that due to mesiolingual rotation, 2mm of mesiodistal arch space occupied by upper first molar increases and for 3 degrees of de rotation, there is a net gain of 0.25mm arch width.<sup>13</sup> Maxillary molar rotation assessment and its correlation with different variables were evaluated in this study. Strong correlation was found between maxillary molar angles of rotation on left and right sides. In this study we took the photographs of the casts for measuring the angles. Other methods used previously included manual measurements and digital measurements with scanned images.<sup>14,15</sup> However it is unlikely that a major difference exists in the measurements of each of these methods.<sup>10</sup>

## CONCLUSION:

The class II division I malocclusion presented greater mesiopalatal rotation of the maxillary first molar occlusion. The diagnosis of this rotation may be helpful for a more accurate treatment planning.

Class II division I maxillary first molar rotation was more on the right side as compared to the left side.

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