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"Radiographic Assessment of Third Molar in Premolar Extraction and Non-Extraction Cases"

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Abstract: *Ironically called the ''wisdom teeth,'' third molars are commonly blamed for a variety of complicationsand so are advice for extraction. Probably the excessive high rate of asymptomatic third molar extraction in orthodontic patients is due to a lack of reliable and simple predictive tools and unavailability of facts that how orthodontic treatment is going to affect its position.*

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I. Introduction

The developmental path of third molars in human beings is very irregular and the formation, calcification timing, position and course of eruption of these teeth show great variability. Developing third molars continually change their angular positions and undergo important pre-eruptive rotational movements. These rotational movements take place when the third molar bud comes into close proximity to the second molar. Unsatisfactory uprighting during completion of root formation may therefore be a common cause of third molar impaction and occur more frequently in the mandible than in the maxilla. Approximately 43 per cent of third molar impactions may be classified as mesial in the mandible, while about 25 per cent may be classified as distal in the maxilla**.**

The mandibular third molar is a most frequently impacted tooth. One explanation for the high impaction rate might be insufficient development of the retromolar space. If the remodelling resorption at the anterior mandibular ramus is limited, the eruption of the mandibular third molars could be blocked. The variation in resorption is correlated with the direction of condylar growth; vertical condylar growth is associated with reduced resorption at the anterior aspect of the ramus and forward growth rotation of the mandible, whereas more backward-directed growth at the condyles is associated with increased resorption and posterior growth rotation.

The dilemma with third molar is whether these teeth will erupt or become impacted, whether they will cause crowding of the mandibular anterior teeth and whether the extraction of other teeth will prevent crowding and influence their eruptionor growth rotation**.**

The main points to be decided are whether these teeth will erupt or become impacted, whether they will cause crowding of the mandibular anterior teeth and whether the extraction of other teeth will prevent crowding and influence their eruption.

It is often difficult to predict the fate of the third molars, since the second molars of an average 12-year-old orthodontic patient have not yet erupted and the third molars have a limited amount of calcification at that time. Because this is usually considered the optimum age for treatment of most malocclusions, it is important to know whether and how the third molars are developing before formulating an orthodontic treatment plan.

II. Material And Methods

Source Of Data:

Subject reporting to Department of Orthodontics and Dentofacial Orthopaedics, Institute of Dental Sciences, Bareilly requiring fixed orthodontic treatment were included in the study. The appropriate data was collected from pre-treatment and post-treatment panoramic radiograph of the patients who had been treated by the extraction of all first premolar and those who had been treated with non-extraction were included. The study was approved by the ethical committee of Institute of Dental Sciences, Bareilly.

Inclusion Criteria:
1. Bilaterally unerupted third molars which could be seen on a panoramic radiograph.
2. Not more than two thirds of the root development of third molars should have been taken place.
3. Mild skeletal and dental class I malocclusion.
4. Extraction cases with full closure of the extraction spaces.
5. High-quality pre-treatment and post-treatment panoramic radiograph without any magnification and distortion errors with a clear anterior nasal spine, nasal septum and the projected shadow of the palatal plane were clearly visible.
6. Total treatment time not less than 20 months.
7. The age range of the patients were 12 – 19 years.

Exclusion Criteria:
1. Dental class II malocclusion.
2. Patient with any missing tooth were excluded from the study.
3. Presence of any craniofacial anomalies cleft lip and palate.

Patient Records:

After patient selection on the basis of above-mentioned criteria, routine records of all patient such as detailed case history, study models, extra and intra oral photograph, lateral cephalogram were taken. Panoramic radiograph was acquired at 2 different stage at i.e. T0 (before starting fixed orthodontic treatment) and T1 (after completion of fixed orthodontic treatment). The patients were divided into two groups.

Table 1: Group allocation and distribution of patients

Treatment/Intervention	**Group**	**No of patients (n=48) (%)**
Extraction	Group I	24 (50.0)
Non-extraction	Group II	24 (50.0)

Collection Of Data:

Panoramic Radiographs

The panoramic radiographs were taken using Allengers Smart Pan machine (2K15030009-D9 **Fig 1**). Orthopantomogram was taken with the film size of 10X12 inch. The radiograph was taken with standardized positioning of frankfort horizontal plane parallel to floor. Marks were used to orienting the horizontal marker of machine to the ala-tragus line of the patient.

Radiographs obtained were checked for good quality and structures clearly discernible. Panoramic radiographs were taken just before fixed orthodontic treatment (T0) and after completion of fixed orthodontic treatment(T1).

The outline of mandibular Ist IInd and IIIrd molars were traced on a 0.003-inch lead acetate paper, with 3H lead pencil and land marks were identified. All tracing were checked to verify the accuracy.

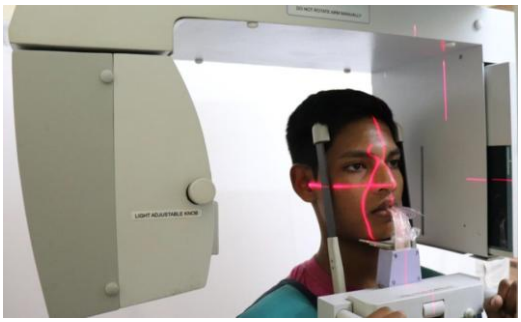

Figure 1. Allengers Smart Pan (2K15030009-D9) panoramic radiographs machine

Methods:

Pre and post treatment panoramic radiograph were taken, and tracing was done on a lead acetate paper. The reference point used in this study was a modification of midline reference plane as used by **Elsey & Rock**. The nasal septum and anterior nasal spine were traced on a orthopantomogram and were joined. A perpendicular line was then drawn to this midline bisector that extended through the palatal shadow bilaterally. The constructed plane was termed as the horizontal reference plane (HRP).

After construction of horizontal reference plane, the outline of Ist, IInd and IIIrd molar were traced and then long axis were marked.

The outlines of the mandibular first, second and third molars and their long axis were drawn on the tracing sheet. The long axis of the first and second molar were traced from the midocclusal point through the midpoint of the root bifurcation. The long axis of the third molar buds were drawn by the line bisecting the line connecting the mesial and distal outlines of the cervical areas. (**Fig 2)**

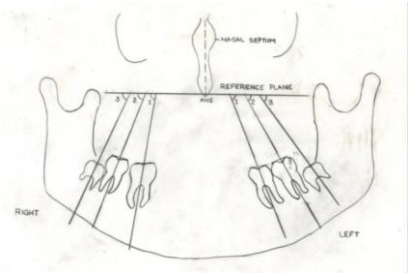

Figure 2. Angulation measurements

(**6 to HRP**,**7 to HRP** &**8 to HRP**)

Analysis Of Data:

The pre and post treatment OPG were traced at T0 and T1 and the following angular measurements were taken:

- The outer angles formed by the first molar axis to the horizontal reference plane (HRP) on both the right and left sides (6 to HRP [right and left]).
- The outer angles formed by the second molar axis to the horizontal reference plane (HRP) on both the right and left sides (7 to HRP [right and left]).
- The outer angles formed by the third molar axis to the horizontal reference plane (HRP) on both the right and left sides (8 to HRP [right and left]).
- An increase in the angle of the third molar to the horizontal reference plane (HRP), which would indicate an improvement in the position of the third molar.
- An decrease in the angle of the third molar to the horizontal reference plane (HRP), which would indicate an worsening in the position of the third molar.

Statistical Analysis:

Data were summarised as Mean ± SD (standard deviation). Two independent groups were compared by independent Student's t test. Non-normal pre and post (intra group) groups were compared by Wilcoxon signed rank (W) test whereas pre to post change (inter group) between two independent groups were compared by Mann-Whitney U test. Discrete (categorical) groups were compared by chi-square ($\chi 2$) test. A two-tailed ($\alpha=2$) $p<0.05$ was considered statistically significant. Analysis were performed on SPSS software (Windows version 17.0).

The treatment change for each measurement were calculated by subtracting the pre–treatment and post–treatment measurements of third molar in premolar extraction and non-extraction cases.

+ve value: A positive value for change in angular measurement indicates uprighting of mandibular molar.

-ve value: A negative value for change in angular measurement indicates mesial tipping of mandibular molar.

III. Results and Observations

The present study deals with radiographic assessment of third molar in premolar extraction and non-extraction cases. Panoramic radiographs of 48 patients were selected those who were treated with extraction (Group I, n=24) and non-extraction (Group II, n=24) methods. The outcome measures were angular measurements assessed at first, second and third molar (right and left). The assessment of outcome measures were done at pre-treatment and post-treatment and measured in degree (0). The horizontal reference plane (HRP) was used to measure and compare the changes in the angles of the developing mandibular third molars. The objective of the study was to compare the outcome measures between the two groups.

Demographic characteristics

The demographic characteristics (age and sex) of two groups is summarised in Table 2 and also depicted in Fig. 4 and 5, respectively. The age of both Group I and Group II ranged from 12-19 yrs. with mean (± SD) 15.08 ± 2.28 yrs. and 15.67 ± 1.83 yrs. respectively and median 15 and 16 yrs. respectively. The mean age of Group II was slightly higher than Group I. Comparing the mean age of two groups, Student's t test showed similar age between the groups (15.08 ± 2.28 vs. 15.67 ± 1.83, t=0.98, p=0.334) i.e. did not differ

significantly. Further, In Group I, there were 13 (54.2%) females and 11 (45.8%) males whereas in Group II, it was 15 (62.5%) and 9 (37.5%) respectively. The study population was female predominance with higher being in Group II. Comparing the sex proportions (M/F) of two groups, $\chi 2$ test showed similar sex proportion between the two groups ($\chi 2$=0.34, p=0.558) i.e. also not differ significantly.
In other words, subjects of two groups were age and sex matched and thus comparable and hence may not influence the study outcome measures.

Table 2: Demographic characteristics (age and sex) of two groups

Variable	Group I (n=24) (%)	Group II (n=24) (%)	t/$\chi 2$ value	P value
Age (yrs.)	15.08 ± 2.28	15.67 ± 1.83	0.98	0.334
Sex: Female Male	13 (54.2) 11 (45.8)	15 (62.5) 9 (37.5)	0.34	0.558

Age of two groups were summarised as Mean ± SD and compared by Student's t test whereas sex were summarised in number (n) and percentage (%) and compared by $\chi 2$ test.

Duration of treatment

The duration of treatment of two groups is summarised in Table 3. The duration of treatment of Group I and Group II ranged from 21-36 month and 20-36 month respectively with mean (± SD) 27.00 ± 4.14 month and 24.21 ± 3.45 month respectively and median 27 and 24 month respectively. The mean duration of treatment of Group I was comparatively higher than Group II. Comparing the mean duration of treatment of two groups, Student's t test showed significantly different and higher (10.3%) duration of treatment of Group II as compared to Group I (27.00 ± 4.14 vs. 24.21 ± 3.45, t=2.54, p=0.015).

Table 3: Duration of treatment (months) of two groups

Group I (n=24) (%)	Group II (n=24) (%)	t value	p value
27.00 ± 4.14	24.21 ± 3.45	2.54	0.015

Duration of treatment of two groups were summarised as Mean ± SD and compared by Student's t test.

Outcome Measures:

Right Mandibular Third Molar

The pre and post treatment change in right third molar in group I and group II is summarised in Table 4 and also depicted in Fig. 7. In group I and group II, the mean in right third molar in right third molar increased comparatively at post and the increase was evident higher in Group I than Group II.

For each group, comparing the pre and post mean (median) right third molar , Wilcoxon signed rank showed significant increase in right third molar at post as compared to pre in Group I [43.29 ± 9.04° vs. 48.29 ± 11.82°, mean change=5.00 ± 6.85°, W=213.0, p=0.002] whereas insignificant change in Group II [42.00 ± 8.53° vs. 43.00 ± 8.63° , mean change=1.00 ± 3.01°, W=40.0, p=0.217] (Table 4).

Further, comparing the pre to post mean (median) change or increase in right third molar between in group I and group II, Mann-Whitney U test showed significantly different and higher change or increase (80.0%) in Group I as compared to Group II[5.00 ± 6.85° vs. 1.00 ± 3.01°, U=123.0, p<0.001] (Table 5).

Table 4: Pre and post treatment change right third molar (degree) in group I and group II.

Group	Pre (n=24)	Post (n=24)	Mean change (Post-Pre)	W value	p value
Group I	43.29 ± 9.04°	48.29 ± 11.82°	5.00 ± 6.85°	213.0	0.002
Group II	42.00 ± 8.53°	43.00 ± 8.63°	1.00 ± 3.01°	40.0	0.217

Pre and post right third molar in group I and group II were summarised as Mean ± SD (median) and compared by Wilcoxon signed rank (W) test.

Table 5: Pre to post treatment change in right third molar (degree) in group I and group II

Group	Mean change (Post-Pre)	U value	
Group I	5.00 ± 6.85°	123.0	<0.001
Group II	1.00 ± 3.01°		

Pre to post treatment change in right third molar in group I and group II were summarised as Mean ± SD (median) and compared by Mann-Whitney U test.

Left Mandibular Third Molar

The pre and post treatment change in left third molar in group I and group II is summarised in Table 6 and also shown in Fig. 9. Like right, the mean left third molar angle also increased comparatively at post in both groups and the increase was evident higher in Group I than Group II.

For each group, comparing the pre and post mean (median) change in left third molar, Wilcoxon signed rank showed significant increase in left third molar at post as compared to pre in Group I [43.00 ± 7.86° vs. 49.08 ± 10.97°, mean change=6.08 ± 6.41°, W=239.0, p<0.001] whereas insignificant increase/change in Group II [44.83 ± 8.97° vs. 46.63 ± 10.91°, mean change=1.79 ± 6.32, W=82.0, p=0.156] (Table 6).

Further, comparing the pre to post mean (median) change or increase in left third molar between group I and group II, Mann-Whitney U test showed significant change/increase (70.5%) in Group I as compared to Group II [6.08 ± 6.41° vs. 1.79 ± 6.32° , U=191.0, p=0.047] (Table 7).

Table 6: Pre and post treatment change in left third molar (degree) in group I and group II.

Group	Pre (n=24)	Post (n=24)	Mean change (Post-Pre)	W value	p value
Group I	43.00 ± 7.86°	49.08 ± 10.97°	6.08 ± 6.41°	239.0	<0.001
Group II	44.83 ± 8.97°	46.63 ± 10.91°	1.79 ± 6.32°	82.0	0.156

Pre and post treatment change in left third molar in group I and group II were summarised as Mean ± SD (median) and compared by Wilcoxon signed rank (W) test.

Table 7: Pre to post treatment change in left third molar in group I and group II.

Group	Mean change (Post-Pre)	U value	p value
Group I	6.08 ± 6.41°	191.0	0.047
Group II	1.79 ± 6.32°		

Pre to post treatment change in left third molar in group I and group II were summarised as Mean ± SD (median) and compared by Mann-Whitney U test.

Right Mandibular Second molar

The pre and post treatment change in right second molar in group I and group II is summarised in Table 8 and also shown in Fig. 11. In Group I, the mean change in right second molar increased comparatively at post whereas it decreased slightly in Group II.

For each group, comparing the pre and post mean (median) in right second molar, Wilcoxon signed rank showed significant increase in right second molar at post as compared to pre in Group I [63.54 ± 6.70° vs. 65.63 ± 7.14°, mean change=2.08 ± 4.21°, W=140.0, p=0.023] whereas insignificant decrease/change in Group II [63.58 ± 6.40° vs. 63.13 ± 7.71°, mean change=-0.46 ± 3.28°, W=22.0, p=0.638] (Table 8).

Further, comparing the pre to post mean (median) change in right second molar between in group I and group II, Mann-Whitney U test showed significantly different and higher change or increase (122.0%) in Group I as compared to Group II [2.08 ± 4.21° vs. -0.46 ± 3.28°, U=159.0, p=0.008] (Table 9).

Table 8: Pre and post treatment change in right second molar (degree) in group I and group II.

Group	Pre (n=24)	Post (n=24)	Mean change (Post-Pre)	W Value	p value
Group I	63.54 ± 6.70°	65.63 ± 7.14°	2.08 ± 4.21°	140.0	0.023
Group II	63.58 ± 6.40°	63.13 ± 7.71°	-0.46 ± 3.28°	22.0	0.638

Pre and post treatment change in right second molar in group I and group II were summarised as Mean ± SD (median) and compared by Wilcoxon signed rank (W) test.

Table 9: Pre and post treatment change in right second molar in group I and group II.

Group	Mean change (Post-Pre)	U value	p value
Group I	2.08 ± 4.21°	159.0	0.008
Group II	-0.46 ± 3.28°		

Pre and post treatment change in right second molar in group I and group II were summarised as Mean ± SD (median) and compared by Mann-Whitney U test

Left Mandibular Second Molar

The pre and post treatment change in left second molar in group I and group II is summarised in Table 10 and also shown in Fig. 13. In contrast of right, the mean of left second molar increased at post in both groups and the increase was evident higher in Group I than Group II.

For each group, comparing the pre and post mean (median) left second molar, Wilcoxon signed rank showed significant increase in left second molar at post as compared to pre in Group I [65.17 ± 7.08° vs. 67.42 ± 8.75° , mean change=2.25 ± 5.50° , W=139.0, p=0.048] whereas insignificant increase/change in Group II [64.00 ± 7.62° vs. 64.42 ± 6.66°, mean change=0.42 ± 2.67°, W=67.0, p=0.177] (Table 10).

Further, comparing the pre to post mean (median) change or increase in left second molar between in group I and group II, Mann-Whitney U test showed significantly different and higher (81.5%) increase in Group I as compared to Group II [2.25 ± 5.50° vs. 0.42 ± 2.67°, U=178.0, p=0.023] (Table 11)

Table 10: Pre and post treatment change in left second molar (degree) in group I and group II.

Group	Pre (n=24)	Post (n=24)	Mean change (Post-Pre)	W value	p value
Group I	65.17 ± 7.08°	67.42 ± 8.75°	2.25 ± 5.50°	139.0	0.048
Group II	64.00 ± 7.62°	64.42 ± 6.66°	0.42 ± 2.67°	67.0	0.177

Pre and post treatment change in left second molar in group I and group II were summarised as Mean ± SD (median) and compared by Wilcoxon signed rank (W) test.

Table 11: Pre and post treatment change in left second molar (degree) in group I and group II.

Group	Mean change (Post-Pre)	U value	P Value
Group I	2.25 ± 5.50°	178.0	0.023
Group II	0.42 ± 2.67°		

Pre and post treatment change in left second molar of in group I and group II were summarised as Mean ± SD (median) and compared by Mann-Whitney U test.

Right Mandibular First Molar

The pre and post treatment change in right first molar in group I and group II is summarised in Table 12 and also shown in Fig. 15. In both groups, the mean of right first molar decreased comparatively at post and the decrease was evident higher in Group I than Group II.

For each group, comparing the pre and post mean (median) in right first molar, Wilcoxon signed rank showed significant decrease in right first molar at post as compared to pre in Group I [71.33 ± 6.70° vs. 67.33 ± 6.43°, mean change= -4.00 ± 4.68°, W=198.0, p=0.001] whereas insignificant decrease/change in Group II [67.00 ± 5.88° vs. 66.50 ± 5.81°, mean change=-0.50 ± 4.28°, W=36.0, p=0.564] (Table 12).

To find out efficacy of one group over other, the pre to post mean (median) change in right first molar in group I and group II were further compared by Mann-Whitney U test and summarised in Table 5 and also depicted in Fig. 8. Comparing the pre to post mean (median) change or decrease in right first molar between in group I and group II, Mann-Whitney U test showed significantly different and higher change or decrease (87.5%) in Group I as compared to Group II [-4.00 ± 4.68° vs. -0.50 ± 4.28°, U=167.0, p=0.013] (Table 13)

Table 12: Pre and post treatment change in the right first molar (degree) in group I and group II.

Group	Pre (n=24)	Post (n=24)	Mean change (Post-Pre)	W value	p value
Group I	71.33 ± 6.70°	67.33 ± 6.43°	-4.00 ± 4.68°	198.0	0.001
Group II	67.00 ± 5.88°	66.50 ± 5.81°	-0.50 ± 4.28°	36.0	0.564

Pre and post treatment change in the right first molar in group I and group II were summarised as Mean ± SD (median) and compared by Wilcoxon signed rank (W) test.

Table 13: Pre to post treatment change in the right first molar (degree) in group I and group II.

Group	Mean change (Post-Pre)	U value	P Value
Group I	-4.00 ± 4.68°	167.0	0.013
Group II	-0.50 ± 4.28°		

Pre to post treatment change in the right first molar in group I and group II were summarised as Mean ± SD (median) and compared by Mann-Whitney U test.

Left Mandibular First Molar

The pre and post treatment change in left first molar in group I and group II is summarised in Table 14 and also depicted in Fig. 17. Like right, the mean left first molar also decreased comparatively after the treatment in both groups and the decrease was evident higher in Group I than Group II.

For each group, comparing the pre and post mean (median) in left first molar, Wilcoxon signed rank showed significant decrease in left first molar at post as compared to pre in Group I [72.17 ± 5.90° vs. 68.71 ± 6.48°, mean change=-3.46 ± 6.06° , W=169.0, p=0.016] whereas insignificant decrease/change in Group II [66.33 ± 5.93° vs. 65.50 ± 6.90°, mean change=-0.83 ± 4.22° , W=58.0, p=0.349] (Table 14).

Further, comparing the pre to post mean (median) change or decrease in left first molar between in the group I and group II, Mann-Whitney U test showed similar change or decrease between the in group I and group II [-3.46 ± 6.06° vs. -0.83 ± 4.22°, U=198.0, p=0.063] though the decrease was 75.9% higher in Group I than Group II (Table 15)

Table 14: Pre and post treatment change in the left first molar (degree) in group I and group II.

Group	Pre (n=24)	Post (n=24)	Mean change (Post-Pre)	W value	p value
Group I	72.17 ± 5.90°	68.71 ± 6.48°	-3.46 ± 6.06°	169.0	0.016
Group II	66.33 ± 5.93°	65.50 ± 6.90°	-0.83 ± 4.22°	58.0	0.349

Pre and post treatment change in the left first molar in group I and group II were summarised as Mean ± SD (median) and compared by Wilcoxon signed rank (W) test.

Table 15: Pre to post treatment change in left first molar in group I and group II.

Group	Mean change (Post-Pre)	U value	p value
Group I	-3.46 ± 6.06°	198.0	0.063
Group II	-0.83 ± 4.22°		

Pre and post treatment change in the left first molar in group I and group II were summarised as Mean ± SD (median) and compared by Mann-Whitney U test.

IV. Discussion

The subjects of this study ranged in age from 12 to 19 years, with a mean age of about 15.08 ± 2.28 years; during this time, the third molar bud is developing and is undergoing important rotational pre-eruptive movements. Rotational movements take place when the third molar bud comes into close proximity to the second molar. The initial angulations of third molars may also influence their subsequent eruption. Therefore, patients in this age group were selected to determine whether the treatment technique (extraction or non-extraction) had any favorable effect on the rotational and uprighting movement taking place at that time.

The duration of treatment in group I was (27.00 ± 4.14) months & group II was (24.21 ± 3.45) months respectively, which varied significantly on comparison. The reason suggested for the increased duration oftreatment in group I was that since group I comprises of extraction cases so more time was taken for complete closure of extraction space in group I.

A total 48 patients, were selected 24 cases that were treated with extraction of first premolar in maxillary and mandibular arches having age between 12 to 19 years mean age (15.08 ± 2.28) years. 24 cases that were treated with non-extraction of either sex having age between 12 to 19 years with a mean age of (15.67 ± 1.83) years were included in the study as per inclusion criteria. Radiographs obtained were checked for good quality and structures clearly discernible. Panoramic radiographs were taken just before fixed orthodontic treatment (T0) and after completion of fixed orthodontic treatment (T1) to evaluate the change in position of mandibular first, second and third molar on panoramic radiograph before and after fixed orthodontic treatment in first premolar extraction cases and non-extraction cases.

To check the difference in angulation of Ist, IInd, & IIIrd molars of extraction & non-extraction group at T0 & T1, the long axis of the molars were marked as previously described and the outer angle formed by the long axis of molar and the true horizontal plane (THP) was checked at T0 & T1. The THP taken for the study was the modification of the horizontal plane given by **Elsay & Rock**

On analysing the pre & post treatment change in the right IIIrd molar degree (0) in group I & group II, it was seen that mean change of (5.00 ± 6.85)° in IIIrd molar angulation was seen related to THP in group I from its pre-treatment values of (43.29 ± 9.04)° to post-treatment value (48.29 ± 11.82)° indicating a significant uprighting of IIIrd molar . While on comparing the pre & post treatment values in group II a mean change of (1.00 ± 3.01)° in IIIrd molar angulation was seen on right side indicating a non-significant uprighting of mandibular right IIIrd molar from its pre-treatment values of (42.00 ± 8.53)° to post-treatment value (43.00 ± 8.63)°.

On analysing the pre & post treatment change in the left IIIrd molar degree (0) in group I & group II, it was seen that mean change of (6.08 ± 6.41)° in IIIrd molar angulation was seen related to THP in group I from its pre-treatment values of (43.00 ± 7.86)° to post-treatment value (49.08 ± 10.97)° indicating a significant uprighting of IIIrd molar . While on comparing the pre & post treatment values in group II a mean change of (1.79 ± 6.32)° in IIIrd molar angulation was seen on left side indicating a non-significant uprighting of mandibular left IIIrd molar from its pre-treatment values of (44.83 ± 8.97)° to post-treatment value (46.63 ± 10.91)°.

On comparing the change in IIIrd molar angulution on right and left side in group I vs group II, it was seen that a significant uprighting of IIIrd molar was seen in group I on right and left side at T1 while a non-significant uprighting was seen in group II.

On analysing the pre & post treatment change in the right IInd molar degree (0) in group I & group II, it was seen that mean change of (2.08 ± 4.21)° in IInd molar angulation was seen related to THP in group I from its pre-treatment values of (63.54 ± 6.70)° to post-treatment value (65.63 ± 7.14)° indicating a significant uprighting of IInd molar . While on comparing the pre & post treatment values in group II a mean change of (-0.46 ±3.28)° in IInd molar angulation was seen on right side indicating a non-significant mesial tipping of mandibular right IInd molar from its pre-treatment values of (63.58 ± 6.40)° to post-treatment value (63.13 ± 7.71)°.

On analysing the pre & post treatment change in the left IInd molar degree (0) in group I & group II, it was seen that mean change of (2.25 ± 5.50)° in IInd molar angulation was seen related to THP in group I from its pre-treatment values of (65.17 ± 7.08)° to post-treatment value (67.42 ± 8.75)° indicating a significant uprighting of IInd molar. While on comparing the pre & post treatment values in group II a mean change of (0.42 ± 2.67)° in IInd molar angulation was seen on left side indicating a non-significant uprighting of mandibular left IInd molar from its pre-treatment values of (64.00 ± 7.62)° to post-treatment value (64.42 ± 6.66)°.

While comparing the pre and post treatment change in IInd molar angulation on right side and left side, a significant uprighting was seen in IInd molar in group I when compared to group II.

On analysing the pre & post treatment change in the right Ist molar degree (0) in group I & group II, it was seen that mean change of (-4.00 ± 4.68)° in Ist molar angulation was seen related to THP in group I from its pre-treatment values of (71.33 ± 6.70)° to post-treatment value (67.33 ± 6.43)° indicating a statistically significant mesial tipping of Ist molar at the end of orthodontic treatment While on comparing the pre & post treatment values in group II a mean change of (-0.50 ± 4.28)° in Ist molar angulation was seen on right side indicating a non-significant mesial tipping of mandibular right Ist molar from its pre-treatment values of (67.00 ± 5.88)° to post-treatment value (66.50 ± 5.81)°.

On analysing the pre & post treatment change in the left Ist molar degree (0) in group I & group II, it was seen that mean change of (-3.46 ± 6.06)° in Ist molar angulation related to THP in group I from its pre-treatment values of (72.17 ± 5.90)° to post-treatment value (68.71 ± 6.48)° indicating a statistically significant

mesial tipping of Ist molar, while on comparing the pre & post treatment values in group II a mean change of (-0.83 ± 4.22)° in Ist molar angulation was seen on left side indicating a non-significant mesial tipping of mandibular left Ist molar from its pre-treatment values of (66.33 ± 5.93)° to post-treatment value (65.50 ± 6.90)°.

On comparing the change in Ist molar angulution on right side in group I vs group II, it was seen that significant change in Ist molar angulution was seen in group I when compared to group II on right side, suggesting a significant mesial tipping in the extraction group when compared to non-extraction group. While on comparing the change in Ist molar on left side in group I vs group II it was seen that mesial tipping took place on left side, however the tipping was statistically not significant.

V. Conclusion

The result of the study led to the following conclusions:

1. A significant uprighting was seen in mandibular IIIrd molar on right and left side in extraction group showed a positive influence on developing mandibular third molar angulations and these improved angulations might favour third molar eruptions later in life. Non-significant uprighting was observed in mandibular IIIrd molar on right & left side in non-extraction group.
2. A significant uprighting was seen in mandibular IInd molar on right and left side in extraction group and non-significant mesial tipping was seen in mandibular IInd molar on right side & non-significant uprighting was seen in mandibular IInd molar on left side in non-extraction group.
3. A significant mesial tipping was seen in mandibular Ist molar on right and left side in extraction group and non-significant mesial tipping was seen in mandibular Ist molar on right and left side in non-extraction group.

The result of our study suggested that IIIrd molar angulation should also be considered while planning treatment in the borderline cases as extraction of premolar might result in proper eruption /uprighting of IIIrd molar in a more favourable position.

References

[1]. Gohilot A, Pradhan T, Keluskar KM. Effects of first premolar extraction on maxillary and mandibular third molar angulation after orthodontic therapy. J Oral Biol Craniofac Res. 2012;2(2):97-104.
[2]. Jain S, Valiathan A. Influence of first premolar extraction on mandibular third molar angulation. The Angle Orthod. 2009;79(6):1143-8.
[3]. Årtun J, Thalib L, Little RM. Third molar angulation during and after treatment of adolescent orthodontic patients. The Eur J Orthod. 2005;27(6):590-6.
[4]. Golovcencu L, Zegan G, Geleţu G. Comparative analysis regarding two methods for predicting lower third molar impaction. Romanian Journal of Oral Rehabilitation 2012;4(1):22.
[5]. Patel AK, Deshmukh SV, Naik CR, Jethe S, Patel KA. Radiographic assessment for predicting the mandibular third molar eruption after orthodontic treatment in first premolar extraction group and non-extraction group: a-retrospective study. Int J Dent.2015;1:1-6.
[6]. Richardson ME. The early developmental position of the lower third molar relative to certain jaw dimensions. The Angle Orthod. 1970;40(3):226-30.
[7]. Gallas-Torreira MM, Valladares-Durán M, López-Ratón M. Comparison between two radiographic methods used for the prediction of mandibular third molar impaction. Revista Portuguesa de Estomatologia, Medicina Dentária e Cirurgia Maxilofacial 2014;55(4):207-13.
[8]. Staggers JA, Germane N, Fortson WM. A comparison of the effects of first premolar extractions on third molar angulation. The Angle Orthod. 1992 ;62(2):135-8.
[9]. Cavanaugh JJ. Third molar changes following second molar extractions. The Angle Orthod. 1985;55(1):70-6.
[10]. Richardson ME. The effect of mandibular first premolar extraction on third molar space. The Angle Orthod.1989;59(4):291-4.
[11]. Larheim TA, Svanaes DB. Reproducibility of rotational panoramic radiography: mandibular linear dimensions and angles. Am J Orthod Dentofacial Orthop.1986;90(1):45-51.
[12]. Forsberg CM. Tooth size, spacing, and crowding in relation to eruption or impaction of third molars. Am J Orthod Dentofacial Orthop.1988;94(1):57-62.
[13]. Forsberg CM, Vingren B, Wesslen U. Mandibular third molar eruption in relation to available space as assessed on lateral cephalograms. Swedish Dental Journal 1989;13(1-2):23-31.
[14]. Gooris CG, Joondeph DR. Eruption of mandibular third molars after second-molar extractions: a radiographic study. Am J Orthod Dentofacial Orthop. 1990 ;98(2):161-7.
[15]. Ventä IL, Turtola L, Murtomaa H, Meurman J, Ylipaavalniemi P. Assessing the eruption of lower third molars on the basis of radiographic features. Br J Oral Maxillofac Surg. 1991;29(4):259-62.
[16]. Richardson ME. Changes in lower third molar position in the young adult. Am J Orthod Dentofacial Orthop. 1992;102(4):320-7.
[17]. Ganss C, Hochban W, Kielbassa AM, Umstadt HE. Prognosis of third molar eruption. Oral Surg Oral Med Oral Pathol Oral Radiol. 1993;76(6):688-93.
[18]. Hattab FN. Positional changes and eruption of impacted mandibular third molars in young adults: a radiographic 4-year follow-up study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1997;84(6):604-8.
[19]. Forsberg CM. Tooth size, spacing, and crowding in relation to eruption or impaction of third molars. Am J Orthod Dentofacial Orthop. 1988;94(1):57-62.
[20]. Ventä I, Turtola L, Ylipaavalniemi P. Change in clinical status of third molars in adults during 12 years of observation.J Oral Maxillofac Surg. 1999;57(4):386-9.
[21]. Elsey MJ, Rock WP. Influence of orthodontic treatment on development of third molars. The British Journal of Oral & Maxillofacial Surgery 2000 ;38(4):350-3.

[22]. Stramotas S, Geenty JP, Darendeliler MA, et al. The reliability of crown–root ratio, linear and angular measurements on panoramic radiographs. Clinical orthodontics and research 2000;3(4):182-91.
[23]. Ong HB, Woods MG. An occlusal and cephalometric analysis of maxillary first and second premolar extraction effects. The Angle Orthod. 2001;71(2):90-102.
[24]. Mckee IW, Glover KE, Williamson PC, et al. The effect of vertical and horizontal head positioning in panoramic radiography on mesiodistal tooth angulations. The Angle Orthod. 2001;71(6):442-51.
[25]. Kruger E, Thomson WM, Konthasinghe P. Third molar outcomes from age 18 to 26: findings from a population-based New Zealand longitudinal study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2001;92(2):150-5.
[26]. Orton-Gibbs S, Crow V, Orton HS. Eruption of third permanent molars after the extraction of second permanent molars. Part 1: assessment of third molar position and size. Am J Orthod Dentofacial Orthop. 2001;119(3):226-38.
[27]. Gungormus M. Pathologic status and changes in mandibular third molar position during orthodontic treatment. J Contemp Dent Pract. 2002;3(2):1-9.
[28]. Mckee IW, Williamson PC, Lam EW,et al . The accuracy of 4 panoramic units in the projection of mesiodistal tooth angulations. Am J Orthod Dentofacial Orthop. 2002;121(2):166-75.

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