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Original Research

Soft tissue profile changes in borderline patients treated with extraction VS non extraction protocol

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ABSTRACT:

Back ground: Extraction versus non-extraction is long debated topic. Decline of extraction in orthodontic treatment is observed over years. Impact of extraction and non extraction in soft tissue has been investigated for long. **Aim:** To study soft tissue profile changes in borderline patients treated with extraction vs. non extraction protocol. **Method:** 50 patients were selected for the study. Patients were divided into two groups. Group 1 consist of 25 patients treated with four first premolar extractions and group 2 consist of 25 patients treated without extraction. The pretreatment and post treatment radiographs were analyzed digitally, and seven measurements were assessed for vertical skeletal changes. **Result:** Mean duration of treatment observed in extraction group was 2.66 ± 1.11 where as in non extraction group it was found to be 1.9 ± 0.61 . So in current study result showed that extraction treatment lasted significantly longer than non-extraction treatment ($P < 0.01$). The mean difference in Nasolabial angle observed between two groups was found to be significant (< 0.005). The mean difference in Z angle observed between two groups was found to be highly significant (< 0.001).

Conclusion: significant soft tissue change was observed in extraction group.

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INTRODUCTION:

People undergo orthodontic treatment mainly to improve esthetics.^{1,2} Crowding and spacing both constitutes to malocclusion. However crowding requires extraction whereas spacing doesn't. Researchers have been widely investigating on extraction or non extraction orthodontic treatment however they have failed to reach a finish line and the controversies continue.^{3,4} Sometimes in patients with increased facial height it becomes important for an orthodontist to go for extraction.

Based on wedge hypothesis, the extraction of four premolars or molars and the subsequent protraction of the posterior teeth lead to a counterclockwise rotation of the mandible, thus maintaining or increasing the overbite.^{5,6} However according to the literature researchers have failed to reach a consensus whether or not extractions have a definite effect on the vertical dimension.^{7,8} Some studies

have raised concern that premolar extractions might cause greater lip retrusion and impair the resulting profile more than treatment without extractions.^{9,10} So in present study we aimed to study soft tissue profile changes in borderline patients treated with extraction vs. non extraction protocol.

Aim:

To study soft tissue profile changes in borderline patients treated with extraction vs. non extraction protocol.

MATERIALS AND METHODS:

This randomized controlled crossover clinical study was carried out in the department of orthodontics and dentofacial orthopaedic. Ethical committee approval was obtained from the Institutional Ethics Committee. A written informed consent was obtained from the parents/guardian. The patients visiting the department of orthodontics in need

of orthodontic correction were screened and 50 patients with following inclusion Criteria were included for the present study.

INCLUSION CRITERIA:

- 1) Class I dental and skeletal malocclusion,
- 2) Both extraction and non extraction were included.

EXCLUSION CRITERIA:

- Patients suffering from any systemic diseases.
- Physically and mentally challenged children

Pretreatment and post treatment cephalograms, with teeth occluding in centric occlusion and lips relaxed, were gathered from the retention files of the parent sample. The selected 50 children were divided in two groups based on type of treatment.

Group 1: extraction group (n=25)

Group 2: non extraction group (n=25)

Standardized discriminate score was calculated for all the 50 patients. The optimal cutting score was obtained using the formula for critical cutting score value for unequal group sizes.¹¹

Statistical Analysis:

The values obtained during each session will be assessed, tabulated and subjected to appropriate statistical analysis. Paired t-tests were performed to test the null hypothesis that no differences exist within the same treatment group between the onset and the end of treatment in the cephalometric measurements. The levels of significance tested were $P < .05$ and $P < .01$.

RESULTS:

A total of 50 patients in need of orthodontic treatment were selected for the current study. 50 patients were divided in different group based on the type of treatment used. Group

1 was extraction group it consist of 25 patients and group 2 was non extraction group it consist of 25 patients (graph 1) Table 1 represents the extraction and non extraction group demographic characteristics. Mean age in extraction group was found to be 14.43 ± 4.07 , whereas mean age in non extraction group was found to be 15.29 ± 4.68 . The difference observed was not significant. Mean duration of treatment observed in extraction group was 2.66 ± 1.11 where as in non extraction group it was found to be 1.9 ± 0.61 . So in current study result showed that extraction treatment lasted significantly longer than non-extraction treatment ($P < 0.01$)

Mean differential change in Z angle observed in extraction group was 2.09 ± 3.27 , whereas for non extraction group was 1.44 ± 2.27 . The difference observed in extraction group was found to be highly significant (< 0.001) where as non extraction group was significant (< 0.005) The mean change values for Sulcus superius E line in extraction group was 1.34 ± 1.53 and was found to be significant, Whereas in non extraction group was not found to be significant. The mean change values for Sulcus inferius E line in non extraction group was -0.58 ± 1.24 and was found to be significant (< 0.001) Whereas in extraction group it was not found to be significant. Mean change in Stml- ILS in extraction group was 1.41 ± 1.26 and was found to be highly significant (< 0.001). Mean change in Stml-Stmi in extraction group was -1.91 ± 1.46 , which was found to be highly significant (Table 2).

Mean Nasolabial angle in extraction group post treatment was found to be 5.31 ± 3.79 and in non extraction group it was 1.29 ± 7.99 . The mean difference in Nasolabial angle observed between two groups was found to be significant (< 0.005). Mean Z angle in extraction group post treatment was found to be 5.24 ± 3.38 and in non extraction group it was 1.09 ± 2.26 . The mean difference in Z angle observed between two groups was found to be highly significant (< 0.001) (Table 3).

GRAPH 1: DISTRIBUTION OF GROUP

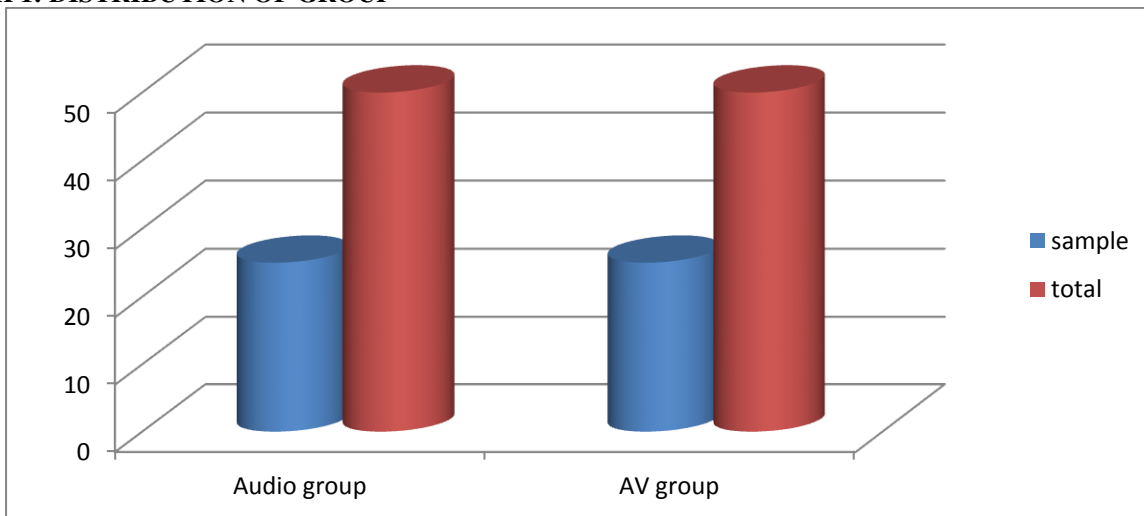


Table 1: Extraction and non extraction group demographic characteristics and cephalic measurement

Variables	Extraction	Non extraction	p value**
Age	14.43±4.07	15.29±4.68	0.28
Duration	2.66±1.11	1.9±0.61	0.001

Table 2: Soft tissue analysis of extraction and non extraction group

Variables	Extraction group				Non Extraction group			
	Pre treatment	Post treatment	Change mean	P value	Pre treatment	Post treatment	Change mean	P value
Nasolabiale angle	108.33±8.19	114.74±6.67	5.34±3.82	<0.001	103.36±10.79	104.11±12.99	1.28±8.82	NS
Mentolabial	112.32±14.35	117±13.49	4.35±11.66	NS	111.42±14.38	106.11±16.55	5.25±18.45	NS
Z angle	63.68±7.1	65.45±6.88	2.09±3.27	<0.001	69.38±5.88	71.12±6.65	1.44±2.27	<0.005
N-Sn-Pog	154.52±6.89	155.59±6.09	1.11±3.45	NS	160.18±4.89	161.39±4.67	1.32±2.82	NS
Sul-sup E line	3.83±1.55	5.43±1.33	1.34±1.53	<0.001	8.89±1.55	9.73±2.63	0.42±1.77	NS
Sul- inf E line	4.36±1.77	4.82±1.88	0.29±1.98	NS	6.92±2.25	6.45±1.75	-0.58±1.24	<0.005
Ito LS	12.66±2.78	12.85±1.99	1.26±2.11	<0.005	15.32±2.11	16.22±2.28	-0.21±1.99	NS
I to Li	13.26±2.11	12.96±1.98	0.41±2.96	NS	14.94±2.11	15.22±1.28	-0.51±1.99	NS
Sn-Stms	19.26±2.88	20.32±2.98	0.57±1.16	0.005	19.14±1.81	19.67±1.96	-0.49±1.99	NS
Stml- ILS	15.66±1.88	16.92±2.98	1.41±1.26	0.001	14.94±1.41	15.67±1.96	-0.21±1.22	NS
Stml-Stmi	3.66±2.08	1.92±1.38	-1.91±1.46	0.001	1.94±1.91	1.67±1.06	-0.19±1.22	NS

Table 3: STATISTICS OF MEAN VALUE DIFFERENCE POST TREATMENT

Variables	Extraction	Non extraction	P value
Nasolabiale angle	5.31±3.79	1.29±7.99	<0.005
Mentolabial	4.02±11.05	-5.21±16.59	NS
Z angle	5.24±3.38	1.09±2.26	<0.001
N-Sn-Pog	1.11±3.79	1.39±3.07	NS
Sul-sup E line	1.43±1.55	0.38±1.63	NS
Sul- inf E line	0.26±2.17	-0.57±1.75	NS
Ito LS	1.26±2.08	-0.11±1.58	<0.005
I to Li	0.41±2.88	-0.46±1.98	NS
Sn-Stms	0.81±1.28	0.53±1.26	NS
Stml- ILS	1.36±1.28	0.67±1.26	NS
Stml-Stmi	-1.96±1.48	-0.97±1.26	NS

DISCUSSION:

The main purpose of this study was to study the soft tissue profile changes in borderline patients treated with extraction vs. non extraction protocol. Three variables that were unique in their ability to discriminate between the two different treatment approaches were considered for the current study. In majority of the cases clinicians plan their treatment based upon the crowding observed in patients (lower tooth arch discrepancy). One of the most common concerns faced by clinician and patients is facial esthetics, which involves lower lip to E-plane. Third variable includes the angle formed by the lower incisor long axis and Frankfort Horizontal (FMIA).

In present study a total of 50 subjects were divided in different group based on the type of treatment used. Group 1 was extraction group it consist of 25 patients and group 2 were non extraction group it consist of 25 patients. Based on the result of current study we found that Mean age in extraction group was found to be 14.43±4.07, whereas mean age in non extraction group was found to be 15.29±4.68. The difference observes was not signification. Mean duration of treatment observed in extraction group was 2.66±1.11 where as in non extraction group it was

found to be 1.9±0.61. So in current study result showed that extraction treatment lasted significantly longer than non-extraction treatment (P < 0.01). Similar result was observed by Beit et al.¹² Kim et al in their study reported a mean treatment time of 2.3 years for extraction therapy with four first premolars; however, there was no control group treated without extractions.¹³ Whereas Mavericks et al in their study reported longer treatment time for extraction therapies.¹⁴

In current study the mean differential change in Z angle observed in extraction group was 2.09±3.27, whereas for non extraction group was 1.44±2.27. The difference observed in extraction group was found to be highly significant (<0.001) where as non extraction group was significant (<0.005). Verma et al in their study found significant increase in nasolabial angle and Z angle.¹⁵ Finnoy et al in their study observed mean change as 6.5 in Nasolabial angle.¹⁶ Bishara et al. in their study found that the upper and lower lips became significantly more retruded in relation to the esthetic line between 15 and 25 years of age and the same trends continued between 25 and 45 years of age.¹⁷

The mean change values for Sulcus superius E line in extraction group was 1.34 ± 1.53 and was found to be significant, Whereas in non extraction group was not found to be significant. The mean change values for Sulcus inferius E line in non extraction group was -0.58 ± 1.24 and was found to be significant (<0.001) Whereas in extraction group it was not found to be significant. Mean change in Stml- ILS in extraction group was 1.41 ± 1.26 and was found to be highly significant (<0.001). Mean change in Stml-Stmi in extraction group was -1.91 ± 1.46 , which was found to be highly significant. Drobocky and Smith in their study suggested that upper and lower lips moved back an average of 3.4 mm and 3.6 mm relative to the E line in a sample of 160 patients after the removal of 4 first premolars.¹⁸ Calpan and Shivpuja in their study mentioned that there decrease in upper and lower lip thickness in non extraction group.¹⁹

CONCLUSION:

Within the limits of our study we conclude that judgment of extraction or non extraction in orthodontist patients influence vertical skeletal dimension. In present study we observed duration of treatment was significantly higher in extraction patients as compared to non extraction. Significant difference was observed in Nasolabial and Z angle between two groups. Better understanding of soft tissue changing can help the orthodontist to achieve success.

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