THE EFFECT OF EXTRACTION AND NON-EXTRACTION ORTHODONTIC TREATMENT ON ARCH WIDTH – A RETROSPECTIVE STUDY

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ABSTRACT

This study was designed to examine whether the extraction and non-extraction orthodontic treatment therapy influences the dental arch width dimension. The present study is a retrospective study consisting of four study groups of 25 samples in each group. The groups were divided on the basis of extraction and non-extraction as well as pretreatment and post treatment. Theintercanine arch width and intermolar arch width measurement was done in the maxilla and in the mandible in all the four study groups.The data obtained were analysed by using Student's 't' test and paired 't' test.

INTRODUCTION

Dental arch width and form are important factors for determining the success and stability of Orthodontic treatment.Some researchers have maintained that arch size as well as form are determined at an early age and cannot thereafter be permanently changed.On the other hand there has been those who avowed that a crowded or otherwise deformed arch did not represent its true size or form and that both might be altered by treatment and be expected to be stable if normal function were established.

For more than a century," to extract or not to extract has been a key question in planning of orthodontic treatment. Angle believed that each individual had the potential for normal growth and development with orthodontic therapy , stating that "The best balance , the best harmony , the best proportions of the mouth in itsrelation to the other features, requires that they shall be made to occupy its normal position in normal growth."

Some researchers have documented that arch dimensional changes occur both with the orthodontic treatment after the extraction of teeth and with the non extraction therapy. Perhaps stability after arch dimensional changes due to orthodontic treatment is one of the most disputed subjects

of Orthodontics. Steiner, McCauley, Strang,King, and Hechteretal concludes that the mandibular intercanine width and intermolar width dimensions show a strong tendency to relapse and should be considered inviolate.Shapiro and Hechter have reported that some increase in intermolar width can be maintained in non-extraction cases.

Aims: The aim of our study was to find the dimensional changes of the dental arch after orthodontic treatment with and without extraction.

Materials and Methods:

This is a retrospective study consisting of four study groups of sample:

Group I: 25 pretreatment, extraction study cast.

Group II: 25 post treatment, extraction study cast.

Group III: 25 pretreatment, non-extraction study cast.

Group IV: 25 post treatment, extraction study cast.

The above sample has been randomly selected from the department of Orthodontics, Regional Dental College,Guwahati ,Assam.

SELECTION CRITERIA:

- All patients selected were with Angle's Class I malocclusion and treated by fixed appliance therapy.
- The mean age of the study group was 18±5yrs for both extraction and non-extraction group.
- All patients had all permanent teeth erupted except for 3rd molar.
- The treatment involved extraction of four 1st premolar as a part of a comprehensive treatment plan.

EXCLUSION CRITERIA:

-Patients with Class II and Class III malocclusions were excluded.

-Patients with missing permanent teeth, congenitally absent teeth or in whom any adjunctive appliances were used were excluded.

Patients Carey's analysis was done on pretreatment study cast of both the groups to see the tooth material-arch length discrepancy. Findings were as follows:

In the maxillary arch, the tooth material-arch length discrepancies were 6.919±2.429mm for extraction group and -2.472±1.394mm for non-extraction group.

In the mandibular arch,the tooth material-arch length discrepancies were 8.018±2.795mm in extraction group and -3.183±1.277mm in non-extraction group.

METHODS

In the maxilla, the intercanine arch width and intermolar arch width measurement was done by placing the caliper at right angle to the palatalsuture, from the most labial aspect of buccal surface of the canines and molars.

In the mandible, the intercanine arch width and intermolar arch width measurement was done by placing the caliper at right angle to the line bisecting the incisor segment, from the best estimate of the most labial aspects of the buccal surface of the canines and molars.

TABLE 1:PRETREATMENT AND POST TREATMENT MAXILLARY AND MANDIBULAR INTERCANINE AND INTERMOLAR ARCH WIDTH (mm) OF EXTRACTION GROUP.

	Pretreatment (n=25)		Post treatment (n=25)		Statistical signi-ficant(p value)
	Mean	SD	Mean	SD	
Maxillary inte-rcanine width	19.17	.94	19.84	.76	**
Maxillary inte-rmolar width	27.78	1.39	26.82	1.08	**
Mandibular inter- canine arch width.	15.24	1.15	15.79	0.77	**
Mandibular intermolar arch width	25.67	1.32	24.42	0.99	**

TABLE 2:PRETREATMENT AND POST TREATMENT MAXILLARY AND MANDIBULAR INTERCANINE AND INTERMOLAR ARCH WIDTH (mm) OF NON EXTRACTION GROUP.

	Pretreatment (n=25)		Post treatment (n=25)		Statistical signi-ficant(p value)
	Mean	SD	Mean	SD	
Maxillary intercanine width	19.00	.90	19.18	.90	NS
Maxillary intermolarwidth	28.13	1.14	28.03	1.08	NS
Mandibular inter- canine arch width.	15.22	0.77	15.10	0.47	NS
Mandibular intermolar arch width	26.17	0.17	26.28	0.20	NS

The average data obtained from 25 pairs of pretreatment and 25 pairs of post-treatment study cast of maxillary and mandibular dental arch for extraction and nonextraction groups are tabulated as follows. In all these groups the mean and standard deviation were calculated.The data obtained were analysed by using Student's 't' test and paired 't' test.

DISCUSSION:

This study was designed to examine whether the extraction and non-extraction orthodontic treatment therapy influences the dental arch width dimension. No control group was included in this study since the study was based on individual landmark (intercanine and intermolar) changes occurring during treatment. The samples were selected from previously treated cases from the department of Orthodontics , Regional Dental College , Guwahati, Assam.

For years , the use of extraction therapy in orthodontic treatment of malocclusion has been discussed with both the pro- and anti-extraction groups arguing the case for their treatment plans. Some authors such as

Bishara et al have concluded that extraction groups and non-extraction groups show similar overall trends in some width parameters (intercanine) and different trends in other parameters (intermolar).In

the study of Boley at al, the interarch changes of four first premolar extraction cases were evaluated. According to their findings, maxillary intercanine widths increased by 1mm and corresponding mandibular intercanine width increased by 1.7mm during treatment. Maxillary and mandibular intermolar widths decreased by 1.7 and 2.1 mm respectively.

The findings of above studies are similar to the result obtained in the present study for the extraction group.

Douglas C. Walter in his study showed that the intercaninewidth was increased in both the groups. The intermolar width was increased in the non-extraction group and decreased in the extraction group.

Gardener SD et al did a study on the clinical records of 103 cases , of which 74 were treated by non-extraction and 29 were treated with extraction of four first premolars.the results of the study showed that the intercanine width was increased in both the groups. Theintermolar distance was increased in the non-extraction group but decreased in the extraction group.

CONCLUSION:

Pretreatment and post treatment comparisions of both extraction and non-extraction groups showed the following result:

EXTRACTION GROUP

1. Highly significant increase in maxillary intercanine arch width.
2. Highly significant decrease in maxillary and mandibular intermolar arch width.
3. Significantly increase in mandibular intercanine arch width.

NON EXTRACTION GROUP

1. The increase in maxillary intercanine arch width and the decrease in mandibular intercanine arch width was statistically insignificant.
2. The decrease in maxillary intermolar arch width and the increase in mandibular intermolar arch width was not significant statistically.

Further studies need to be done with larger sample size to investigate the effects of archwire shape in a particular type of individuals existing archform in a homogenous malocclusion and treatment mechanics along with the effect of growth in arch width during treatment.

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