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Comparison of extraction versus non-extraction orthodontic treatment outcomes for borderline cases in the Indian population

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Abstract

Introduction: The purpose of this study was to assess orthodontic treatment outcomes in Indian patients with borderline problems treated with and without extractions.

Methods: Records of 25 borderline patients treated at the Orthodontic & Dentofacial Orthopaedics Department M.A. Rangoonwala Dental College, Pune were evaluated retrospectively by 5 associate professors. Each judge evaluated the post-treatment records independently for tooth alignment, overbite, overjet, midline symmetry, lateral occlusion, and facial profile, and rated them on a scale from 1 to 5.

Results: The only statistically significant difference between the extraction and non-extraction groups was for facial profile, with the judges preferring the extraction profiles. When profile changes from pretreatment to post-treatment were examined, significant differences in treatment-associated changes between extraction and non-extraction groups were all related to the lower lip and chin.

Conclusions: In this sample of Indian borderline orthodontic patients, these clinicians had a statistically significant preference for the facial profiles of the extraction patients, but no statistically significant preferences for tooth alignment, overbite, overjet, midline symmetry, or posterior occlusion.

Keyword: Borderline patients, Extraction, Non-extraction, Facial profiles.

Introduction

Facial appearance of an individual governs the decision to extract teeth as a part of orthodontic treatment. Some investigators have informed a remarkable regularity in the criteria for facial attractiveness across cultures and ethnic groups,[1-7] but others have reached different conclusions.[8-10] Our perception of beauty is related to attractiveness, and facial attractiveness in particular is an important physical attribute. An attractive facial appearance invites positive social responses, which have a profound effect on a person's self-esteem and capacity for social adjustment. Orthodontists have the ability to change a patient's facial features and subsequently impact his or her life. Hence, there is a need for orthodontists to understand the esthetic standards for an attractive face. The main reason a patient undergoes orthodontic treatment, is primarily to improve ones facial profile and increase the attractiveness. The extraction has been condemned because of its alleged detrimental effect on facial esthetics.[11] Attention to physical appearance, particularly of the face, has become a very important issue in modern society.[12-14]

The purpose of this study was to evaluate preferences of Indian orthodontic specialists for treatment outcomes related to tooth alignment, overbite, overjet, midline symmetry, lateral occlusion, and facial profile in a sample of Indian population who underwent fixed-appliance extraction or non-extraction orthodontic treatment.

Material and Methods

The study was conducted in the Orthodontic & Dentofacial Orthopaedics Department M.A. Rangoonwala Dental College, Pune The sample comprised of 25 patients classified as "borderline" by the following method: 5 associate professors who had 15-20 years of experience in the field, evaluated the pretreatment records (study casts, facial photographs), of patients who had started treatment 2 years ago. The observers classified the samples shown to them individually into three groups by using a method modified from that of Baumrind et al (15): extraction, non-extraction, or borderline. If it was an unanimous decision, the observers would rate (5 to 0) or if it's a clear majority they would rate from (4 to 1). By calculating the observations of all the judges, the samples were divided into either the extraction or the non-extraction category. If the judges were unanimous or had a clear majority for the borderline classification, or if more than 3 judges failed to agree on extraction or non-extraction, those subjects were assigned to the borderline group. In this way, 25 patients were chosen as our borderline sample. The distributions by extraction or non-extraction assignment, age, sex, and Angle classification was done. Pretreatment models (Fig. 1), facial photographs (Fig. 2) were shown to the panel members, and a proforma to be filled before inclusion of 25 borderline cases was done by the panel members (Table 3). Then the post treatment models (Fig. 4) and facial photographs (Fig. 5) of the chosen 25 borderline patients were shown to the panel members and a proforma to evaluate post treatment

records was circulated amongst the panel members (Table 6)

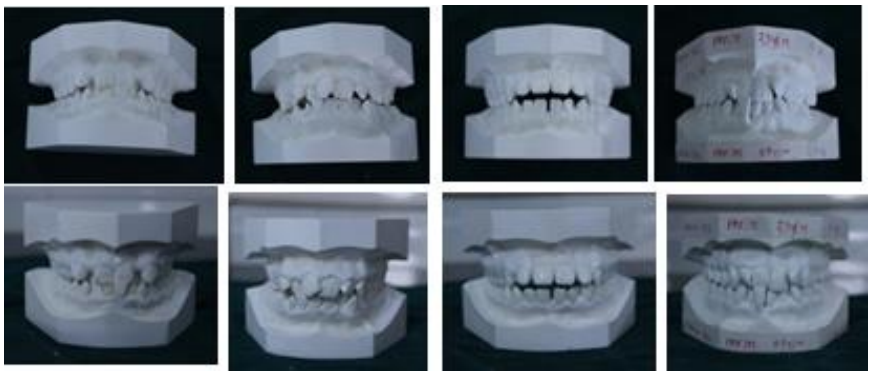


Fig. 1: Pretreatment models

Fig. 2: Pretreatment facial profile photographs

Table. 3: Proforma to be filled before inclusion of patients in our study

Name	Extraction	Non-Extraction	Borderline
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			

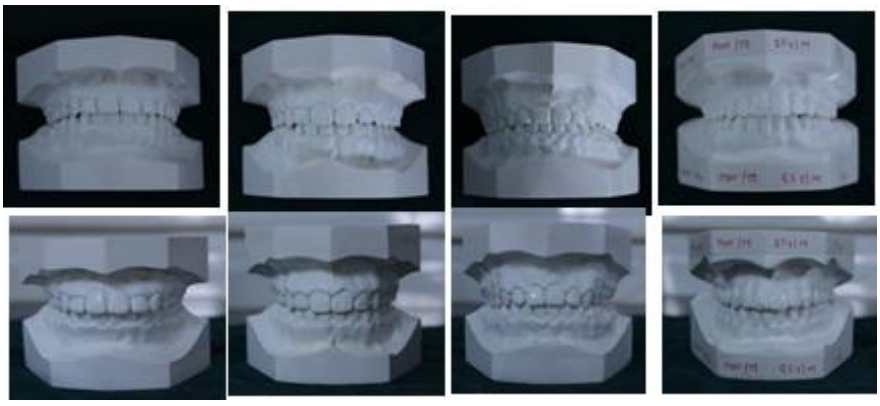


Fig. 4: Post treatment casts

Fig. 5: Post treatment facial profile photographs

Table. 6: Proforma to be filled to evaluate post treatment records

Borderline Patients	Thooth Alignment	Overjet & Overbite	Midline Symmetry	Lateral Occlusion	Facial Profile

The judges' decisions were based purely on the examination of pretreatment records. The orthodontists were also full-time faculty members in the department. Each orthodontist was blinded with respect to the judges' decisions, and on the basis of the orthodontist's treatment decision, each patient was treated with full fixed appliances solely.

After treatment, the 3 faculty judges evaluated the post-treatment records of each patient autonomously according to an analog scale from 1 to 5 for tooth alignment, overbite and overjet, midline symmetry, lateral occlusion, and facial profile. Three of the 5 judges had been members of the classifying panel; the other 2 judges had not previously participated in the study were full-time associate professors. The scores from different groups were compared with the Mann-Whitney U test and P-value by Chi-square test (Fisher's exact probability test) was done.

The distributions by extraction or non-extraction assignment, age, sex, and Angle classification for these 25 patients are shown in (Table 1, 2 and 3).

Independent Mann-Whitney U test were used for comparison between extraction and non-extraction groups, and between the 2 extraction patterns.

Demographic distribution of 25 borderline subjects

Table 1: Age distribution of the borderline cases studied (n=25)

Age (years)	Non Extraction (n=10)	Extraction (n=15)	P-value
Mean ± SD	12.27 ± 1.23	12.34 ± 1.27	0.847^{NS}

P-value by Mann-Whitney U test. P-value<0.05 is considered to be statistically significant. NS: Statistically Non-Significant.

Table 2: Sex distribution of the borderline cases studied (n=25)

Sex	Non Extraction (n=10)	Extraction (n=15)	P-value
Male	6 (60.0)	10 (66.7)	0.999^{NS}
Female	4 (40.0)	5 (33.3)	
Total	10 (100.0)	15 (100.0)	

Values are n (% of cases). P-value by Chi-square test (Fisher's exact probability test). P-value<0.05 is considered to be statistically significant. NS: Statistically Non-Significant.

Table 3: Distribution of Angles classification of the borderline cases studied (n=25)

Angle of classification	Non Extraction (n=10)	Extraction (n=15)	P-value
Class I	3 (30.0)	8 (53.3)	0.802^{NS}
Class II	4 (40.0)	5 (33.3)	
Class III	3 (30.0)	2 (13.4)	
Total	**10 (100.0)**	**15 (100.0)**	

Values are n (% of cases). P-value by Chi-square test. P-value<0.05 is considered to be statistically significant. NS: Statistically Non-Significant.

Result

The average treatment period, and the scoring of treatment results on tooth alignment, overbite and overjet, midline symmetry, lateral occlusion, and facial

profile, of the 25 subjects are summarized in (Table 4). Comparison of the extraction and non-extraction groups showed that the extraction group had a higher score than the non-extraction group only on facial profile (Table 4). The rank sum test among the 4 first premolar (4PM1) extraction group, the 4 second-premolar (4PM2) extraction group, and the non-extraction group showed no statistically significant differences except for facial profile between the 4PM1 extraction group and the non-extraction group, and between the 4PM2 extraction group and the non-extraction group. The 4PM2 extraction group received the highest score, and the non-extraction group received the lowest score. Comparison of treatment results across three groups non-extraction, 4 first premolar extraction and 4 second premolar extraction is shown in (Table 5).

Graph 1: Comparison of treatment results across two groups (n=25)

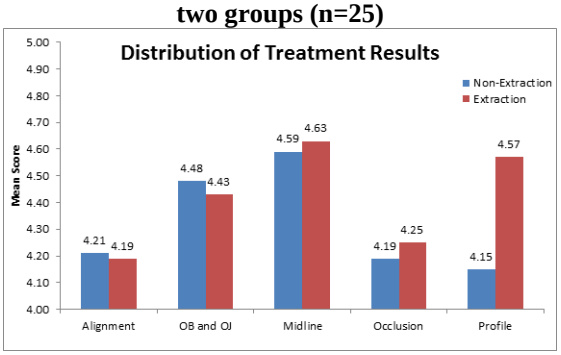


Table 4: Comparison of treatment results across two groups (n=25)

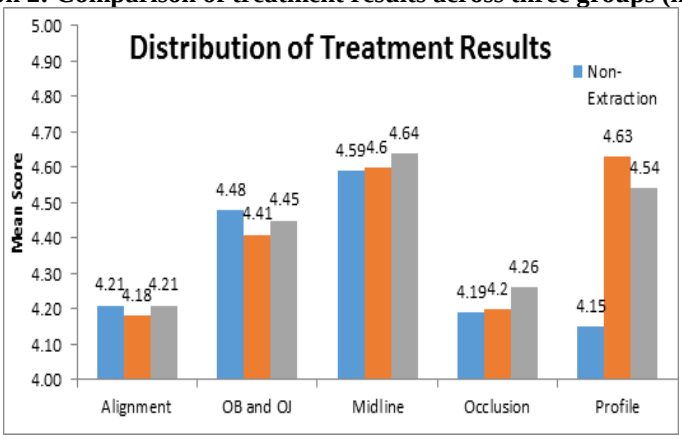
Parameters	Non Extraction (n=10)	Extraction (n=15)	P-value
Alignment	4.21 ± 0.23	4.19 ± 0.22	0.880^{NS}
OB and OJ	4.48 ± 0.28	4.43 ± 0.29	0.874^{NS}
Midline	4.59 ± 0.31	4.63 ± 0.30	0.746^{NS}
Occlusion	4.19 ± 0.23	4.25 ± 0.24	0.679^{NS}
Profile	4.15 ± 0.24	4.57 ± 0.20	0.008**

Table 5: Comparison of treatment results across three groups (n=25)

Parameters	Non Extraction (n=10)	4PM1 Extraction (n=10)	4PM2 Extraction (n=5)	P-values (Inter-Group Comparisons)		
				Non Extraction v 4PM1	Non Extraction v 4PM2	4PM1 v 4PM2
Alignment	4.21 ± 0.23	4.18 ± 0.20	4.21 ± 0.22	0.901^{NS}	0.918^{NS}	0.981^{NS}
OB and OJ	4.48 ± 0.28	4.41 ± 0.27	4.45 ± 0.31	0.789^{NS}	0.740^{NS}	0.909^{NS}
Midline	4.59 ± 0.31	4.60 ± 0.28	4.64 ± 0.30	0.845^{NS}	0.841^{NS}	0.999^{NS}
Occlusion	4.19 ± 0.23	4.20 ± 0.26	4.26 ± 0.22	0.876^{NS}	0.860^{NS}	0.987^{NS}
Profile	4.15 ± 0.24	4.63 ± 0.22	4.54 ± 0.21	0.007**	0.027*	0.745^{NS}

Values are Mean ± SD. P-values by Mann-Whitney U test P-value<0.05 is considered to be statistically significant. **P-value<0.01, NS: Statistically Non-Significant.

Graph 2: Comparison of treatment results across three groups (n=25)



Discussion

The concept of the borderline patient has been extensively discussed in orthodontics, but few attempts have been made to define the term exactly. Carey, 16 who was probably among the first to use the term in the literature, used it in a somewhat different sense from that in which it is used today. He suggested that patients with arch-length discrepancies of less than 2.5 mm should be treated by non-extraction, whereas those with discrepancies of more than 5 mm should be treated by extraction of the 4 first premolars. Intermediate, or borderline, patients with 2.5 to 5 mm of discrepancy were to be treated by extraction of the 4 second premolars.

With enhanced understanding, orthodontists now believe that the decision of whether to extract is multifactorial, depending also on such additional factors as incisor protrusion, arch width, curve of Spee, growth pattern and potential, facial profile, stability, and the clinician's education or training. Also, in modern usage, borderline now refers to patients for whom it is ambiguous as to whether extractions should be executed.

With a somewhat similar line of reasoning, Baumrind et al[(11)] pointed out that any clinician planning treatment for a patient must ultimately decide either to extract or not to extract. Hence, they believed that borderline suitably refers to patients for whom some skilled clinicians, each given all appropriate diagnostic information, would be likely to make opposite decisions. To our knowledge, our study is the first in our institution which reviewing clinicians have been asked to identify borderline patients. It provides a new method for comparing clinical controversies.

In the group of borderline subjects, the pretreatment soft-tissue morphology of the 4PM2 patients was similar to that of the non-extraction group; the soft-tissue morphology of the 4PM1 group was different from the other 2 groups.

Conclusions

The treatment of borderline patients, whether by extraction or non-extraction, achieved generally comparable results for tooth alignment, overbite and overjet, midline symmetry, and lateral occlusion as judged by Indian clinicians in this Indian sample.

In this sample of Indian borderline orthodontic patients, Indian clinicians had a statistically significant preference for the facial profiles of the extraction patients, but no statistically significant preferences for tooth alignment, overbite, overjet, midline symmetry, or posterior occlusion.

In the group of borderline subjects, extraction of either 4 first premolars or 4 second premolars resulted in facial profiles that were favored by a group of Indian orthodontists, compared with non-extraction treatment, as less protrusive facial profiles were preferred by the Indian clinicians.

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