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Panel Perception of Profile Attractiveness after Prediction of Orthodontic Treatment (EXT vs Non EXT)

Majid Mahmoudzadeh[1], Mahdi Akbarzadeh[2], Somayeh Karami[3]*

[1]Assistant Professor, Orthodontic Department, Dental School, Hamadan University of Medical Sciences, Hamadan, Iran
[2]PhD in Biostatistics, Department of Community Medicine and Modern Epidemiology Research Center, School of Medicine, AJA University of Medical Sciences, Tehran, Iran
[3]Postgraduate Student, Orthodontic Department, Dental School, Hamadan University of Medical Sciences, Hamadan, Iran

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ABSTRACT

This study aimed to compare the perceived facial profile attractiveness of borderline class I malocclusion patients after simulated first premolar extraction and non-extraction orthodontic treatment from the perspective of Iranian orthodontists, general dentists and laypersons. Seven borderline class I patients were chosen and the outcome of orthodontic treatment with and without extraction of the four premolars was simulated using lateral cephalograms. Images showing the outcomes of extraction and non-extraction treatments were placed next to each other pairwise and were shown to 12 Iranian orthodontists, 10 general dentists and 21 laypersons. The observers were asked to score the images as 0 (least attractive) and 10 (most attractive) the data were analyzed by ANOVA statistical analysis. The results demonstrated that the orthodontists did not observe any difference in the profile attractiveness between extraction and non-extraction treatments however, the general dentists and laypersons found the non-extraction profile more attractive. There was a significant difference between the three observer groups regarding the profile attractiveness. The present study may assist in understanding the demands of orthodontic patients to further meet their esthetic expectations.

Keywords: Extraction, Non-Extraction, Profile Attractiveness

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Corresponding author: Somayeh Karami
e-mail✉ dr.karami5@gmail.com
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INTRODUCTION

There is a general belief that orthodontic treatment can affect facial profile attractiveness. However, no consensus has been reached on the best treatment modality to achieve ideal esthetics [1]. Angle, in the early 20th century, only believed in non-extraction orthodontic treatment [2]. He believed that a balanced occlusion would lead to facial adaptation and balance and presumed that orthodontic appliances would reinforce bone growth and there would be no need for tooth extraction [3]. On the contrary, Case [4] believed that new bone formation cannot exceed its predetermined growth potential, and tooth extraction is required for certain types of malocclusion. This controversy led to the "extraction debate 1911" [1]. In the mid-1930, the outcome of non-extraction orthodontic treatment in some patients discouraged the clinicians and they opted for extraction orthodontic treatment [5]. However, this debate is still ongoing.

In general, the critics of premolar extraction reason that premolar extraction compromises facial esthetics, leads to a dished-in profile and makes the nose appear bigger. They also believe that this treatment compromises the condyles or

even causes condylar pathologies in many cases [1, 6]. According to Bowbeer, first premolar extraction results in vertical dimension loss and subsequent temporomandibular joint dysfunction [6]. Nonetheless, extraction orthodontic treatment is well accepted in several cases due to the long-term stability of results [7, 8]. According to Bowman and Johmston [9], non-extraction treatments are accompanied by several disadvantages such as instability, inefficiency and procumbency. Hence, this treatment protocol may not be advantageous in several cases.

Facial esthetic is the major concern of patients seeking orthodontic treatment therefore the clinicians should consider this point upon treatment planning (extraction vs non-extraction) [10, 11]. However, achieving this goal is challenging. Although there are several certain criteria for selection of extraction or non-extraction orthodontic treatment plan, several patients represent a borderline status and selecting either of the treatments is challenging. Another challenging issue is the judgment about facial esthetics and attractiveness. Some studies in this respect have evaluated variables related to decision making for tooth extraction and soft tissue changes without addressing the changes as positive or negative [3]. Some other studies [12-16]have focused on perception of facial attractiveness. Some people are generally attractive but there is diversity in the definition of esthetic [17]. It is crucial to determine the disparity between the definition of esthetics between the clinicians and patients to increase the acceptance of treatment by patients and their satisfaction with the results[18]. Dentists and orthodontists generally rely on criteria provided by the literature to define esthetic. Thus, there is a possibility that their perception may differ from that of laypeople since the perception of laypeople is influenced by the culture, race and ethnicity. On the other hand, by the advances in the media coverage and increased accessibility of satellite TV especially in the Middle Eastern countries, people in these regions might have become more familiar with the popular faces in the western world and this may decrease the possible disagreements between the laypeople and clinicians in terms of facial attractiveness. Considering all the above, this study sought to compare the outcome of premolar extraction and non-extraction orthodontic treatment in terms of facial profile esthetic of borderline class I malocclusion patients, as the most common type of malocclusion [19], between the Iranian orthodontists, general dentists and laypeople.

MATERIALS AND METHODS

The sample of this study comprised of 12 orthodontists, 10 general dentists and 21 laypersons [20]. The records (radiographs, photographs and casts) of six patients with borderline class I malocclusion were randomly selected from the patients of Department of Orthodontics at Hamadan University, Hamadan, Iran. Diagnosis of borderline class I malocclusion in all the six patients was verified by five orthodontists at the Department of Orthodontics at Hamadan University and they all qualified for both extraction and non-extraction treatments. A borderline malocclusion was defined for a case once 2-3 of 5 orthodontists considered the non-extraction treatment while the rest considered the extraction treatment for that case so the patient qualified for both treatments. Inclusion criteria was having borderline class I malocclusion, qualifying for classic orthodontic treatment and complete clinical records. Informed consent was obtained from all the patients.

Lateral cephalograms and photographs of facial profiles of the patients were scanned and analyzed using Dolphin software (Imaging and Management, Chatsworth, CA, USA). Lateral cephalograms were traced and 54 landmarks were identified on them (40 hard tissue and 14 soft tissue landmarks). On profile photographs, four soft tissue landmarks were identified. Superimposition of photographs and lateral cephalograms was performed. Next, treatment simulation was performed and a final image was generated.

Images of simulated outcome of extraction and non-extraction treatment for each patient were placed next to each other in a sequence. Patient information and the footnotes of the treatment course were masked and the final images were printed on laminated papers. Figure 1 shows the two images of one of the patients. The images were provided to the observers (orthodontists, general dentists and laypersons) and were asked to score the patients 0 (least esthetic) to 10 (most esthetic). The scores of three observer groups were compared with ANOVA statistical analysis and SPSS 16.0 software (SPSS, IBM, USA).

Figure 1: Simulated facial profile of a patient subjected to extraction and non-extraction orthodontic treatment

RESULTS

The data demonstrated that there was a significant difference among the three observer groups regarding the effect of extraction and non-extraction treatment on profile esthetic (p=0.014). According to the data in table 1, generally it can be concluded that there was a significant difference in patients' profile with different treatments (p<0.0001). The analysis of groups and subject interaction demonstrated that subjects within each group are not consistent and demonstrated a significant difference (P<0.0001).

Table 1: AVOVA summary for facial attractiveness by rater category

Source	Numerator DF	Denominator DF	F	P-value
Patient	6	546	13.240	<0.001*
Group	2	39.958	0.175	0.84
Treatment	1	546	25.912	<0.001*
Group* treatment	2	546	4.321	0.014*

DF, Degrees of freedom
**p-value <.05*

Table 2: Mean facial attractiveness by later category

	Orthodontist	Dentist	Layperson
EXT mean	5.11	4.6	4.4
SE	0.21	0.17	0.13
Non EXT Mean	5.35	5.33	5.6
SE	0.21	0.17	0.13

The results demonstrated that orthodontists did not perceive any significant difference in patients' profile in extraction or non-extraction treatment of class I borderline patients (p=0.422). On the contrary, these two treatments had different outcomes for general dentists and laypeople (p=0.004 and p<0.001 respectively). the esthetic score for non-extraction was higher than extraction treatment (5.333 and 4.607 respectively) for general dentists and also the laypeople (5.684 for non-extraction versus 4.442 for extraction)Table 2.

DISCUSSION

Effect of four premolar extraction or non-extraction treatment on perceived attractiveness of facial profile

Assessment of facial profile attractiveness after orthodontic treatment with numerical standards may be different from the perceived attractiveness by different individuals [21-23]. Thus, one objective of this study was to evaluate the perception of patients and clinicians of facial profile attractiveness after extraction and non-extraction orthodontic treatment. The results showed that extraction and non-extraction treatments lead to significantly different outcomes in patients'facial profile however this difference was not significant for orthodontists and they found the facial profiles similar between the two treatments. On the contrary, the general dentists and laypeople preferred the profile of non-extraction treatment. Accordingly, it is assumed that non-extraction treatments look more esthetic to patients and society since their perception of beauty stems from culture and media, on the contrary, orthodontists consider both outcomes in normal ranges based on the literature and scientific sources. To illustrate, currently the laypeople prefer to have more procumbent lips which may be one explaination why they prefer non-extraction treatments. General dentists did not demonstrate any preference to any of the groups and their scores were midpoint between the laypeople and orhodontists so it might be concluded that their perception is influenced by both scientific evidences and society.

Despite the vast literature on this topic, yet there is controversy in this regard. Despite that several studies support extraction methods [9, 13, 21, 23-26] and some others recommend non-extraction treatment [27], some studies have not detected any difference between the outcomes of these two treatments [8, 22, 25, 28-32]. It is noteworthy that observer's perception of esthetics stems from the society and ethnicity which makes the comparison

of different studies more challenging and this may be a limitation in the present study. Kiekens *et al* [20] demonstrated that people's perception of esthetic is influenced by gender, age, professional background and geographic region; hence comparison of different studies in different countries may not be applicable. This limitation may be eliminated by using panels of observers from different nationalities and background. Another limitation of this study was related to the use of computerized simulation for prediction of facial attractiveness after treatment. By doing so, it was not possible to assess the effects of growth and development of the chin and nose on the results after orthodontic treatment; although these effects have been reported to be minimal and insignificant [23]. The advantage of the present study is that both treatments were compared in each individual and not in two sets of samples and the outcomes were not biased by the samples' characteristics and variability however, the samples with more attractive features may have received a higher esthetic score regardless of the treatment.

Comparison of observers in terms of perceived attractiveness of facial profile:

Assessment of people about facial esthetic may be variable depending on their social and ethnic backgrounds [21, 28]. Thus, the results of this study can be valuable for Iranian orthodontists since it compared the perception of three Iranian groups. The results of this study showed that the three groups had a different perception of facial profile esthetic (p=0.014) and orthodontists did not detect any difference between the two treatments while general dentists and laypeople preferred non-extraction treatments' profile. Accordingly, it is suggested to consider society's general perception of esthetics in addition to scientific evidences in orthodontic treatment.

CONCLUSION

The present study demonstrated that orthodontists do not observe any difference in esthetic outcomes of extraction and non-extraction orthodontic treatments in borderline class I patients but general dentists and laypeople found esthetic outcomes of non-extraction treatments more favorable. It is noteworthy that this study focused on borderline class I malocclusion and the results cannot be interpolated to cases that extraction is mandatory such as dental crowding.

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Ethical approval

The research protocol was approved by the Institutional Ethics Committee of the Vice Chancellor of Research, Hamadan University of Medical Sciences (IR.UMSHA.REC.1396.371)

Informed consent

Informed consent was obtained from all individual participants included in the study.

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REFERENCES

1. Bishara SE, Cummins DM, Jakobsen JR. The morphologic basis for the extraction decision in Class II, division 1 malocclusions: a comparative study. American Journal of Orthodontics and Dentofacial Orthopedics. 1995; 107(2):129-35.
2. Angle EH. Treatment of Malocculsion of the Teeth. SS White dental manufacturing Company, 1907.
3. Burrow, S.J. The impact of extractions on facial and smile aesthetics. in Seminars in Orthodontics. WB Saunders, 2012.
4. Case CS. The question of extraction in orthodontia. American Journal of Orthodontics. 1964; 50(9):660-91.
5. Tweed, C.H., Was the development of the diagnostic facial triangle as an accurate analysis based on fact or fancy? Mosby, 1962.
6. Bowbeer GR. The 6th key to facial beauty and TMJ health. The Functional orthodontist. 1987; 4(4):10.
7. Franklin GS, Rossouw PE, Woodside DG. A longitudinal study of dental and skeletal parameters associated with stability of orthodontic treatment. American Journal of Orthodontics and Dentofacial Orthopedics. 1995; 108(4):452-53.

8. Basciftci FA, Usumez S. Effects of extraction and nonextraction treatment on class I and class II subjects. The Angle Orthodontist. 2003; 73(1):36-42..
9. Bowman SJ, Johnston Jr LE. The esthetic impact of extraction and nonextraction treatments on Caucasian patients. The Angle Orthodontist. 2000; 70(1):3-10..
10. Wędrychowska-Szulc B, Syryńska M. Patient and parent motivation for orthodontic treatment—a questionnaire study. The European Journal of Orthodontics. 2009; 32(4):447-52.
11. Cox NH. Van der Linden.". Facial harmony" Am J Orthod. 1971;60:175-83.
12. Cochrane SM, Cunningham SJ, Hunt NP. A comparison of the perception of facial profile by the general public and 3 groups of clinicians. The International journal of adult orthodontics and orthognathic surgery. 1999; 14(4):291-5.
13. Lim HJ, Ko KT, Hwang HS. Esthetic impact of premolar extraction and nonextraction treatments on Korean borderline patients. American Journal of Orthodontics and Dentofacial Orthopedics. 2008; 133(4):524-31..
14. Soh J, Chew MT, Wong HB. A comparative assessment of the perception of Chinese facial profile esthetics. American Journal of Orthodontics and Dentofacial Orthopedics. 2005; 127(6):692-99.
15. Maple JR, Vig KW, Beck FM, Larsen PE, Shanker S. A comparison of providers' and consumers' perceptions of facial-profile attractiveness. American Journal of Orthodontics and Dentofacial Orthopedics. 2005; 128(6):690-96.
16. Eslami N, Omidkhoda M, Shafaee H, Mozhdehifard M. Comparison of esthetics perception and satisfaction of facial profile among male adolescents and adults with different profiles. Journal of Orthodontic Science. 2016; 5(2):47-51.
17. Alley TR, Hildebrandt KA. Determinants and consequences of facial aesthetics. TR Alley (Ed.), Social and applied aspects of perceiving faces, 1988.
18. Jørnung J, Fardal Ø. Perceptions of patients' smiles: a comparison of patients' and dentists' opinions. The Journal of the American Dental Association. 2007; 138(12):1544-53.
19. Proffit WR, Fields HW, Sarver DM. Contemporary Orthodontics-E-Book. Elsevier Health Sciences, 2014.
20. Kiekens RM, Maltha JC, van 't Hof MA, Straatman H, Kuijpers-Jagtman AM. Panel perception of change in facial aesthetics following orthodontic treatment in adolescents. The European Journal of Orthodontics. 2008; 30(2):141-6.
21. Kocadereli I. Changes in soft tissue profile after orthodontic treatment with and without extractions. American Journal of Orthodontics and Dentofacial Orthopedics. 2002; 122(1):67-72.
22. Young TM, Smith RJ. Effects of orthodontics on the facial profile: a comparison of changes during nonextraction and four premolar extraction treatment. American Journal of Orthodontics and Dentofacial Orthopedics. 1993; 103(5):452-58.
23. Drobocky OB, Smith RJ. Changes in facial profile during orthodontic treatment with extraction of four first premolars. American Journal of Orthodontics and Dentofacial Orthopedics. 1989; 95(3):220-30.
24. Scott SH, Johnston LE. The perceived impact of extraction and nonextraction treatments on matched samples of African American patients. American Journal of Orthodontics and Dentofacial Orthopedics. 1999; 116(3):352-58.
25. Stephens CK, Boley JC, Behrents RG, Alexander RG, Buschang PH. Long-term profile changes in extraction and nonextraction patients. American journal of orthodontics and dentofacial orthopedics. 2005; 128(4):450-7.
26. Bravo LA. Soft tissue facial profile changes after orthodontic treatment with four premolars extracted. The Angle orthodontist. 1994; 64(1):31-42.
27. Shafiee R, Korn EL, Pearson H, Boyd RL, Baumrind S. Evaluation of facial attractiveness from end-of-treatment facial photographs. American Journal of Orthodontics and Dentofacial Orthopedics. 2008; 133(4):500-8.
28. Boley, J., et al., Facial changes in extraction and nonextraction patients. The Angle Orthodontist, 1998; 68(6): p. 539-546.
29. Xu TM, Liu Y, Zhang HP, Lin JX. Changes of profile prominence in borderline cases with extraction and non-extraction orthodontic treatment. West China Journal of Stomatology. 2004; 22(5):384-86.

30. Erdinc AE, Nanda RS, Dandajena TC. Profile changes of patients treated with and without premolar extractions. American Journal of Orthodontics and Dentofacial Orthopedics. 2007; 132(3):324-31.
31. Işıksal E, Hazar S, Akyalçın S. Smile esthetics: perception and comparison of treated and untreated smiles. American Journal of Orthodontics and Dentofacial Orthopedics. 2006; 129(1):8-16.
32. Iared W, da Silva EM, Iared W, Macedo CR. Esthetic perception of changes in facial profile resulting from orthodontic treatment with extraction of premolars: A systematic review. The Journal of the American Dental Association. 2017; 148(1):9-16.