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Ratio of extraction vs non-extraction decision on profile based orthodontic treatment planning

Waheed Ullah Khan[a], Afeef Umar Zia[b], Salman Aziz[c], Amna Shahzad[d], Anum Iftikhar[e], Saira Shahzad[f]

Abstract

Introduction: Facial appearance is a prime consideration when planning orthodontic treatment. Studies have been conducted to know the ratio of orthodontic extraction in different communities. The objective of this cross-sectional study was to evaluate the decision frequency of profile based extractions, negating other parameters for doing so at Department of Orthodontics, Islamabad Dentals Hospital, Bhara Kahu, Islamabad.

Material and Methods: One hundred thirty five patients were randomly selected from the diagnostic database fulfilling the inclusion criteria. These records included history, lateral cephalogram and casts for each patient.

Results: 41.5% of the total sample was treated with extraction protocol where as 58.5% was treated non-extraction. Profile based distribution of the sample were; 57% convex, 41.5% straight and 1.5% with concave profiles. Out of 41.5% extraction cases, 67% extraction decisions were carried out on the basis of profile and 32.1% on arch length discrepancy as a predominant factor.

Conclusion: There was high percentage of patients having convex and straight profile and more than half of the extraction decisions were based on profile. Arch length discrepancy was the second most important decision influencing extraction protocol decision. Hence in accordance to the 'soft tissue paradigm' such a decision during the treatment planning should be paramount in making treatment decisions.

Keywords: Soft tissue paradigm; facial profile; angle of convexity

Introduction

Facial appearance is always a prime consideration when planning orthodontic treatment.[1] Facial soft tissues are affected by a variety of variables including skeletal relationships, dental positions, soft tissue thickness and function. However, the exact nature of these relationships is still debatable. Literature reveals that the extraction of four premolars generally tends to flatten the profile by 2-3 mm when compared with non-extraction treatment.[2] However, many authors believe that undesirable facial aesthetics at the end of orthodontic treatment cannot be attributed to the extraction of premolars only and with proper case selection and patient management being the clinician's responsibility, undesirable end points can be avoided.[3-5] The decision of extraction versus non-extraction and its impact on facial profile has always been controversial. The major factors for determining the need for premolar extraction in orthodontic practice are arch length discrepancy, mandibular incisor protrusion, curve of spee and lip protrusion. Comparative studies on facial profile preferences and their results are essential for planning appropriate orthodontic treatment. Interest in facial aesthetics has increased with social and economic development.

[a] Corresponding author: BDS, FCPS. Assistant Professor, Department of Orthodontics, Dental Section, Islamabad Medical and Dental College, Bahria University, Islamabad, Pakistan. E-mail: khanwaheed70@gmail.com

[b] BDS, FCPS. Senior Registrar, Department of Orthodontics, Dental Section, Islamabad Medical and Dental College, Bahria University, Islamabad, Pakistan

[c] BDS, FCPS. Assistant Professor, Head Department of Periodontology, The University College of Dentistry, The University of Lahore

[d,e,f] Demonstrators: Dental Section, Islamabad Medical and Dental College, Bahria University, Islamabad, Pakistan

Accordingly the role of facial aesthetics in deciding upon dental extraction has also become important. [6-7]

With the development of modern appliances, skeletal anchorage and easier techniques for molar distalization, non-extraction therapy generally takes precedence. However, certain conditions justify the need for extractions where as others may deem otherwise.[8] Profit indicates that the decline in extraction frequencies over the years occurred due to several factors including concerns regarding facial aesthetics, stability and temporomandibular joint dysfunction as well as changes in treatment techniques.[9] Although the exact frequency of orthodontic extractions are yet unknown due to inter-operator differences,[10]almost one- third of all malocclusions are said to be severe enough to warrant need for extractions.[11]

The purpose of present study was to determine the ratio between extraction and non-extraction treatment protocols. More over whether such decisions were based on soft tissue profile or severe arch length discrepancy in border line cases. No local research on ratio of extraction versus non-extraction orthodontic treatment currently exists. This study will help clinician to better understand the effect of profile on treatment planning decision in future.

Material and Methods

One hundred and thirty five randomly selected patients reporting to Orthodontic Department and meeting the inclusion criteria were included in this study. Total sample had a mean age of 20 years with minimum reporting age of 8 years and maximum of 32 years. Radiographic records included lateral cephalogram taken in natural head position with unstrained lips and teeth in centric occlusion. Radiographs were traced on 8×10 inch standard translucent acetate paper over a standard illuminated view box with a lead pencil (2 HB). Profile was accepted as convex, concave and straight by measuring facial angle on lateral cephalogram. Facial angle is the inferior angle formed by the intersection of facial line (Nasion-Pogion) to the Frankfort Horizontal (FH) plane (Figure 1).The mean reading for this angle is 87.8˚ (±3.6˚) with a range of 82˚ to 95˚.[12]

Two groups were made on the basis of arch length discrepancy. Group one included patients with crowding greater than 6 mm and group two considered the border line cases with crowding less than 6 mm. Arch length discrepancy was determined by measuring arch length from mesiobuccal cusp of first permanent molar to that of the contra lateral side. Mesio-distal widths of each tooth mesial to the first permanent molars were added up to calculate the space required. The difference between the two gave arch length discrepancy. Profile was divided into three groups on basis of facial angle.

1. Convex profile: Facial angle less than 87.8˚ ± 3.6˚
2. Straight profile: Facial angle 87.8˚ ± 3.6˚
3. Concave profile: Facial angle more than 87.8˚±3.6˚

Patients with any systemic diseases, history of previous orthodontic treatment and teeth extracted due to trauma or pathology were excluded from the study. Data was analyzed on Statistical Package for Social Sciences (SPSS 10). Descriptive statistics were used. Frequencies and percentages were calculated for extraction, non-extraction, age, skeletal pattern and profile.

Results

Out of the total sample, 74 were females and 61 were males (Table I). Patients in study groups had mean age of 20 years with minimum reporting age of 8 years and maximum age of 32 years (Table II). 55.6% of the sample belonged to skeletal class I group, 34% to the skeletal class II and 9.6% to skeletal class III (Table III). 57% patients had convex profile, 41.5% had straight profile and 1.5% had concave profiles (Table IV). Out of 135 patients, 41.5% were planned with extraction

protocol and 58.5% non-extraction treatment protocol (Table V). Out of 41.5% extraction cases, 67% cases had crowding less than 6 mm while 32.1% had more than 6 mm (Table VI).

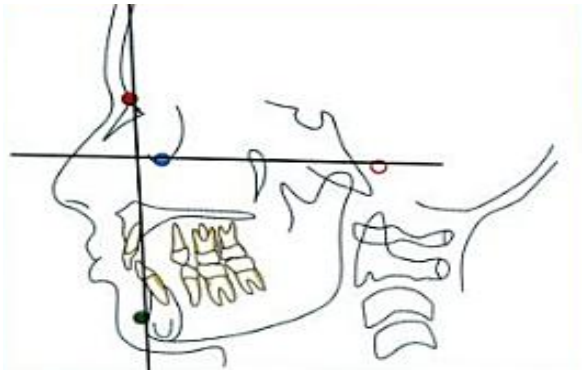

Figure 1. Angle of convexity

Table I. Sex distribution

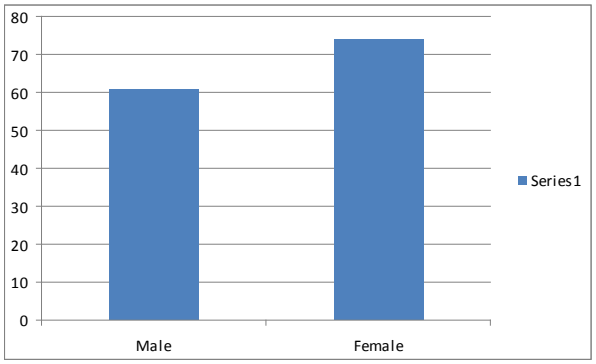

Table II. Age distribution

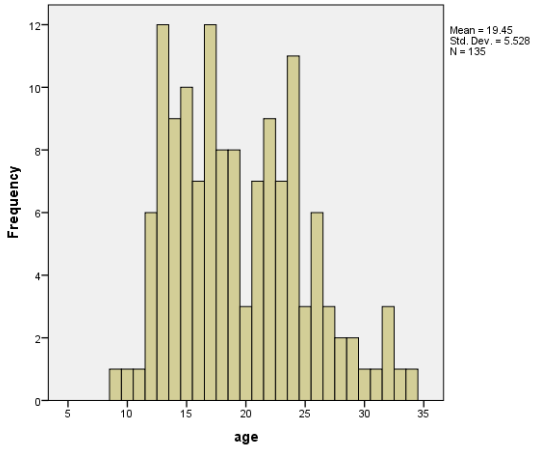

Table III. Distribution of skeletal pattern

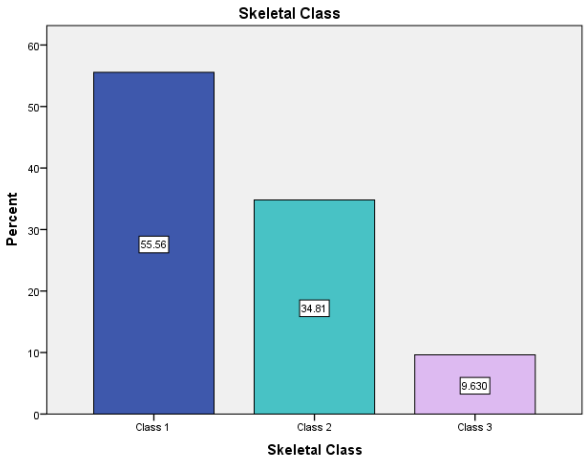

Table IV. Profile distribution

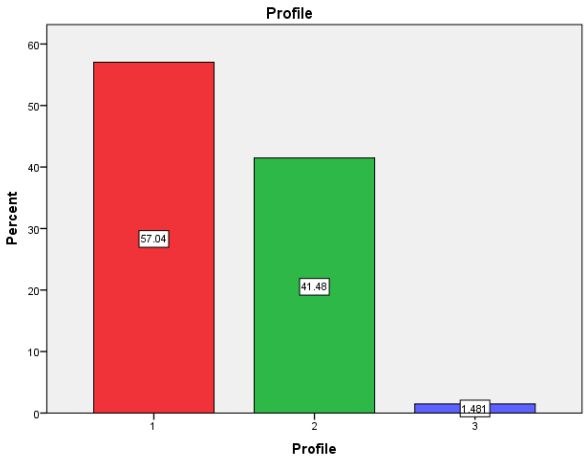

Table V. Extraction versus non-extraction distribution

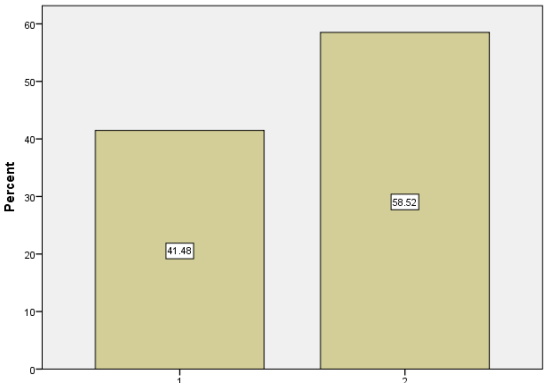

Table VI. Degree of crowding in extraction cases

	Frequency	Percent
< 6mm Crowding	38	67.9
> 6mm Crowding	18	32.1

Discussion

Attaining harmony and balance among the various facial features by predicting the individual response to treatment is part of an orthodontist's responsibility and professional acumen. Evaluation of patient's facial profile gives valuable information for planning extraction versus non-extraction orthodontic treatment therapy and this forms the essence of the soft tissue paradigm. According to our results, the frequency of extraction was 41.5% and this is in accordance with the finding of Peck and Peck's 42%.[13] However, this result differs from the frequency reported by Profit[9] in which frequency of extraction was 30% in 1953, peaking at 76% in 1968 and declined again to 28% in 1993. The slight increase in frequency in our study when compared to the ratio found by Profit in 1993 may be due to the difference in selection criteria as they included only first premolar extraction while this study included all kinds of extractions e.g. incisors, first or second premolars and molars. Another reason for a higher frequency was inclusion of all the three skeletal classes, i.e. skeletal class I, II and III cases where as in their study only class II camouflage cases were included in the sample. Thirdly, a higher frequency of extraction may be due to diverse ethnic population in Bhara Kahu region.

According to this study non-extraction (58.5%) takes precedence over extraction (41.5%).This supports the study[9] that shows a general trend of increase in non-extraction (70%) orthodontic therapy after 1993. This change might be due to a changing aesthetic guideline in facial aesthetics with fuller lips and broader smile being easily considered to be managed with a non extraction treatment methodology.

This study has aimed to investigate the effects of facial profile on extraction versus non-extraction treatment decision which will help orthodontic practitioners to identify current trends in treatment planning and its basis. This study has limitation of a small size sample and needs to be carried out in multiple centers with a much larger sample.

Conclusions

The decision of extractions as a treatment protocol depended at a higher rate on soft tissue profile rather than arch length discrepancy. Profile of the patients according to soft tissue paradigm plays an important part in orthodontic treatment planning and should therefore not be neglected while making treatment decisions. Prediction of soft tissue response to orthodontic tooth movement is complex and will require further studies. The significant changes occurring with orthodontic treatment verify the fact that such relationships in fact do exist. Profile based treatment planning leads to better treatment results.

References

1. Naini FB, Moss JP. Three-dimensional assessment of the relative contribution of genetics and environment to various facial parameters with twin method. Am J Orthod Dentofacial Orthop 2004; 126:655-65.
2. Luppanapornlarp S, Johnston LE. The effects of premolar extraction: a long-term comparison of outcomes in 'clear-cut' extraction and non-extraction Class II patients. Angle Orthod 1993; 63:257-72.
3. Ismail SF, Moss JP. The three-dimensional effects of orthodontic treatment on the facial tissues: a preliminary study. Br Dent J 2002; 192:104-8.
4. Bishara SE, Cummins DM, Zaher AR. Treatment and post-treatment changes in patients with Class II Division 1 malocclusion after extraction and non-extraction treatment. Am J Orthod Dentofacial Orthop 1997; 111:18-27.
5. Wholley CJ, Woods MG. The effects of commonly prescribed premolar extraction sequences on the

curvature of the upper and lower lips. Angle Orthod 2003; 73:386-95.
6. Bowman SJ. More than lip service: facial esthetics in orthodontics. J Am Dent Assoc 1999; 130:1173-81.
7. Peck S, Peck L. Selected aspects of the art and science of facial esthetics. Sem in Orthod. 1995; 1:105-26.
8. Khan M and Fida M. Soft tissue response in extraction versus non-extraction orthodontic treatment. J Col Phy and Sur Pak. 2010; Vol. 20: 454-9.
9. Profit WR. Forty-year review of extraction frequencies at a University orthodontic clinic. Angle Orthod. 1994; 64:407-14.
10. Ribarevski R, Vig P, Vig KD, Weyant R, O'Brien K. Consistency of orthodontic extraction decisions. Eur J Orthod. 1996; 18:77-80.
11. Proffit WR, Fields HW, Sarver DM. Orthodontic treatment planning: Limitations, Controversies and special problems. In: Proffit WR, Fields HW, Sarver DM (edi). Contemporary orthodontics. 4th ed. St Louis: Mosby 2007:268-331.
12. Singh G. Cephalometric Landmarks and analysis. Singh G. In: Text book of Orthodontics. 2nd edi. Jaypee Brothers Med Pub.2007:94-123
13. Peck S and Peck H. Frequency of tooth extraction in orthodontic treatment. Am J Orthod. 1979; 95:462-6.