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Lower Anterior Facial Height Changes in Class 2 Division 1 Malocclusion Cases Treated with Premolar Extractions.

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ABSTRACT

The aim of this study is done to find the lower anterior facial height changes in class 2 division 1 malocclusion cases treated with premolar extractions. Extraction of premolars for orthodontic therapy is routinely advocated in many class 2 division 1 cases. Vertical facial changes following premolar extractions in class 2 division 1 cases have been studied extensively still remain a controversy. Facial height changes will determine the facial esthetic of the individual.

Keywords: Lower anterior facial height (LAFH), class 2 division 1, 1st premolars, cephalometric study

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INTRODUCTION

Lower facial height change following premolar extractions is a debatable topic in orthodontics. Most orthodontists agree that lower facial height can be influenced following 1st premolar extraction, while others report mild to insignificant changes. The extraction of premolars as a practical form of orthodontic therapy has been accepted for many years, but there remains a controversy regarding the effect of premolar extraction on the facial vertical dimension. Chua et al found that premolar extraction was not associated with any significant change of the lower anterior facial height (LAFH), whereas nonextraction treatment was associated with a significant increase in LAFH [1]. In the same year, another study showed no significant difference in facial vertical changes between extraction and non-extraction groups although it found a general increase in vertical dimensions of both groups [2]. The vertical changes that occur after extraction of the premolars were not significantly different from non-extraction treatment. It had been reported that the extraction treatment of Class II malocclusion does not cause a diminution of the LAFH, whereas nonextraction method tends to increase the LAFH. The protrusion of the mandibular molars is expected to be greater in cases treated with second premolar extraction than those treated with first premolar extraction. If mesial movement of mandibular molars is associated with mandibular overclosure and decreases in the vertical facial dimension, subjects treated with second premolar extraction should have more reduction in the vertical dimension than those treated with first premolar extraction.

METHODOLOGY

In this study, 12 patients (6 males and 6 females) with class 2 skeletal division 1 malocclusion were selected and treated with fixed orthodontic appliances. All the patients were between 13-20 yrs at the beginning of treatment. All patients were treated with MBT 022 prescription straight wire fixed appliances.

Inclusion Criteria

- Patients with class 2 division 1 malocclusion
- Upper 4 lower 5 premolar extraction cases
- Age range 13 to 20 yrs
- Good periodontal health
- No systemic diseases.

Exclusion Criteria

- Malocclusions other than class 2 div 1
- Non extraction cases other than upper 4 lower 5 premolar extraction.
- Periodontally compromised
- No functional appliance or orthognathic surgical procedure
- No congenitally missing teeth.

The dental, skeletal and soft tissue measurements were investigated using pre and post treatment lateral cephalometric tracings exposed at the beginning and end of the treatment. All radiographs were taken in standing position with the horizontal plane parallel to the floor, the dentition in centric occlusion and the lips relaxed. Standardized cephalometric radiographs measuring 8" 10" were taken using sirona cephalostat with settings of 14mA and 77 Kvp and exposure time was 4.7 seconds.

Parameters Measured

The skeletal angular parameters measured with pre and post treatment lateral cephalogram tracings were done to verify the skeletal contribution to the bi maxillary protrusion cases. The parameters used in this study were SNA Angle, SNB Angle, ANB Angle, GoGn to SN, UI to NA angle, UI to NA linear, UI to SN angle, LI to NB angle, LI to NB linear, LI to man plane, Interincisal angle and LAFH.

Statistical Method

Mean and standard deviation was calculated, Paired sample T test was used to compare the pre and post treatment values.

RESULTS

The skeletal cephalometric parameter for the maxilla (SNA) after treatment had reduced by 1 degree but there was no significant change in SNB angle. Post treatment dental cephalometric parameter of ANB Angle showed no significant changes, GoGn to SN have reduced by 1 degree. Post treatment dental cephalometric parameter of UI to NA angle have increased by 12 degree, UI to NA linear have increased by 4 mm and UI to SN angle have 10 degree. Post treatment dental cephalometric parameter of LI to NB angle have increased by 2 degree, LI to NB linear have increased by 1.5mm and LI to man plane have increased by 3 mm. Post treatment dental cephalometric parameter of Interincisal angle have reduced by 7 degree and LAFH have significantly reduced by 3.5 mm.

DISCUSSION

The aim of this study was to find the lower anterior facial height changes in class 2 division 1 malocclusion cases treated with premolar extractions. Functional appliances and cervical headgear were considered to have an extrusive effect on the posterior teeth that could mask any possible vertical dimension loss resulted from premolar extraction. Therefore, cases with functional appliance or headgear were excluded. The reason for not including a non extraction group in this study was that non extraction treatment of class 2 division 1 malocclusion invariably involves headgear or functional appliance (or both) [3]. In our study, all patients selected had class 2 division 1 malocclusion and reduced lower anterior facial height. Facial attractiveness is due to individual perception [4] the patients in our study had reported for esthetic reasons. The investigations in our study mostly depended on pre- and post treatment hard tissue and soft tissue lateral cephalometric analysis.

In our study, selected skeletal parameters used were SNA Angle, SNB Angle, ANB Angle, GoGn to SN, UI to NA angle, UI to NA linear, UI to SN angle, LI to NB angle, LI to NB linear, LI to man plane, Interincisal angle and LAFH. Mean and standard deviation was calculated, Paired sample T test was used to compare the pre and post treatment values. As investigated by Looi LK and Mills JRE [5], hard tissue skeletal values show little change with tooth movement. Young T & Smith R [6] also concluded that 1st premolar extractions caused insignificant to no skeletal changes with orthodontic treatment.

Our study showed that the skeletal cephalometric parameter for the maxilla (SNA) after treatment had reduced by 1 degree but there was no significant change in SNB angle. Most authors quote the wedging-hypothesis [7] to justify the decrease in lower anterior facial height following treatment with 1st premolar extractions. Orce-Romero et al [8] also states that premolar extractions causes forward movement of the upper and lower buccal segments leading to decrease in anterior vertical dimensions. Furthermore, Bills DA & Handelman [9] has stated that premolar extractions leads to better anterior-posterior and vertical facial esthetics in bi-maxillary protrusion patients post-treatment. In our study, lower anterior facial height had significantly reduced by 3.5 mm. However, other measurements such Jarabak analysis and Frankfort to mandibular plane (FMA) angle can be used in the future to study lower facial height changes following 1st premolar extraction.

CONCLUSION

On the basis of the results, Lower facial height can be altered following 1st premolar extractions (upper 4 lower 5) in class 2 division 1 cases. It appears that all of the orthodontic patients had some dental extrusion after the extraction of four first premolars during fixed orthodontic treatment.

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