Correction of Class II Subdivision Malocclusion in An Adult Patient By Asymmetric Extraction Treatment

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Abstract

Correcting Class II malocclusions characterized by dentoalveolar asymmetry has long been a challenge for clinicians. It is necessary to determine the source of asymmetry in Class II subdivision malocclusions before deciding a treatment plan as compromised treatment plans can lead to additional complications like tipping of the occlusal plane, dental instability, or temporomandibular disharmonies. The asymmetric extraction protocols for Class II subdivision malocclusions are often successful because they maintain existing molar relationships, resulting in reduced treatment time and greater ease of midline correction. As a result of asymmetric extractions, the correction of maxillary and mandibular dental midline deviations might be possible without canting of the occlusal plane. The purpose of this article is to report a Class II division 1 subdivision malocclusion (right side) treated with asymmetric extractions.

Keywords : Class II malocclusion, Dentoalveolar asymmetry, Asymmetric extraction.

INTRODUCTION

Patients with Class II subdivision malocclusions have Class I characteristics on one side and Class II characteristics on the other, primarily because of the distal positioning of the mandibular first molar in relation to the maxillary first molar on the Class II side.[1-3] Less frequently, this malocclusion can also be produced by the more mesial position of the maxillary first molar in relation to the mandibular first molar[3] on the Class II side. Consequently, in many Class II subdivision patients, the maxillary dental midline will be coincidental or show minimal deviation relative to the clinical facial midline. However, the mandibular dental midline will be displaced toward the Class II side in such patients.[1-3] The resulting asymmetric occlusal relationship complicates orthodontic treatment.

The purpose of this article is to report a Class II division 1 subdivision malocclusion (right side) treated with asymmetric extractions.

The patient presented as a 21 year old female patient who stated her chief concern as, “I feel my upper front teeth are forwardly placed”. Patient had undergone periodontal treatment (scaling, root planning and curettage) 3 months before the start of treatment and had gingival recession present in relation to lower right mandibular central and lateral incisors.

DIAGNOSIS AND ETIOLOGY

The pretreatment analysis showed convex profile with protrusive upper and lower lips. Nasolabial angle was acute with deep mentolabial sulcus.

The pretreatment intraoral photographs (Fig 1)

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demonstrate Class II dental occlusion on the right and Class I dental occlusion on the left side, increased overjet and overbite, spacing present in both upper and lower anterior teeth and lower dental midline shifted to right by 2mm. A dental asymmetry was present in the mandibular arch with left mandibular first molar ahead.

Figure 1: Pre-Treatment Intraoral View

Lateral cephalometric evaluation (Fig 2) suggested Angle Class II division 1 subdivision malocclusion with skeletal Class I jaw bases (ANB angle = 4º) and average growth pattern (FMA = 24º). Patient had proclined and forwardly placed upper and lower anteriors (U1 to NA = 14mm at 42º, L1 to NB = 9mm at 34º).

Figure 2: Pre-Treatment Lateral Cephalogram

Panoramic radiograph showed normal morphology of condyle and mandible. All permanent teeth were present except mandibular right third molar. Generalized alveolar bone loss was seen in both upper and lower arches.

There was no hereditary basis of malocclusion. No habits were reported that might have contributed to the malocclusion. A contributing factor might have been the early loss of deciduous teeth in the mandibular arch, leading to mandibular dental midline deviation.

TREATMENT OBJECTIVES

Treatment objectives included correction of proclined upper and lower anteriors, correction of increased overjet and increased overbite, closure of spaces in upper and lower arches, correction of canine relationship on right side and reducing lip protrusion to improve the profile.

TREATMENT ALTERNATIVES

A non-surgical approach with two alternatives was presented to the patient:

1. Extract four first premolars to achieve bilateral Class I molar and canine relationship with an ideal overbite, overjet and a lower midline correction, or
2. Extract three first premolars (maxillary right and left and mandibular left) to achieve bilateral Class I canine relationship, Class I molar relationship on the left, Class II molar relationship on the right.

The second treatment plan was selected because extracting the mandibular left first premolar provided space to resolve the lower arch midline discrepancy and incisor proclination.

In all treatment plan alternatives, surgical extraction of the maxillary third molars and extraction of mandibular left third molar was indicated.

TREATMENT PROGRESS

The maxillary right and left and the mandibular left first premolars and the maxillary third molars were extracted. The treatment was done using fixed preadjusted edgewise appliance (Roth prescription .022 slot) placed in both maxillary and mandibular arches simultaneously.

Anchorage reinforcement was done by banding both molars in upper and lower arches and placing Nance palatal button in upper arch.

Initial leveling and alignment was done on round and rectangular nickel-titanium arch wires. Spacing present in both upper and lower arches were consolidated distal to the lateral incisors.

Upper canines were retracted on .018 special plus AJW wire with the molar stops placed. After completion of canine retraction in upper arch, Nance palatal arch was removed and three piece intrusion and retraction arch was used for intrusion and retraction of upper incisors.

In the mandibular arch, lower anteriors were retracted enmasse on rectangular stainless steel wire (.019”×.025”) using sliding mechanics.

Finally the case was settled in Class I molars on left side, Class II molars on right side and Class I incisor and canine relationship.

Bands were removed after 34 months of active treatment. The day the appliances were removed, maxillary and mandibular bonded lingual retainers were placed. Begg's wraparound retainer was given for the upper arch, with instructions to wear them 24 hours per day for the first 6 months, then at night only, decreasing to every other night, and finally to 1 or 2 nights per week after the second year.[4]

TREATMENT RESULTS

The original treatment objectives were achieved. Facial harmony and lip support were improved, and the depth of the mentolabial fold was reduced. Incisor show and interlabial gap were decreased and smile esthetics were enhanced.

The study casts show bilateral Class I canine, Class II right molar, and Class I left molar relationships. Dental midlines were aligned with the facial midline, and ideal overbite and overjet were achieved (Figs 3). The final radiographs (Figs 4) confirm proper space closure and acceptable root parallelism. Some minor blunting of the roots of the maxillary incisors is observed.

Figure 3: Post-Treatment Intraoral View

Figure 4: Post-Treatment Lateral Cepahlogram

The cephalometric analysis and superimposition show no skeletal changes in the maxilla or the mandible, as expected in this nongrowing patient.

The lower anterior facial height, the Frankfort mandibular plane angle, and the basal plane angle increased slightly, reflecting a downward rotation of the mandible. Anteroposterior, vertical, and transverse positions of the maxilla and mandible were unchanged, with the exception of a slight downward rotation reflected by an increase of the mandibular plane angle.

The maxillary dentition was aligned and leveled, and a more ideal incisor angulation was established. Along with retraction, some intrusion of upper incisors was also achieved. The mandibular dentition was aligned and leveled and the midline corrected, along with some intrusion of lower anteriors. According to superimposition, the lower anteriors were more bodily retracted. More ideal overbite and overjet relationships were established. Posterior occlusal relationships were improved to achieve Class I canine occlusion bilaterally with canine guidance and Class II molar relationship on the right and Class I on the left. Finally, facial esthetics were improved, with better upper and lower lip support and relationship, reduced depth of the mentolabial fold, and improved smile esthetics.

DISCUSSION

The patient had Angle Class II division 1 subdivision (right) malocclusion with increased overjet, increased overbite and mandibular midline deviated towards the Class II side. The case was treated with asymmetric extraction of 3 premolars (2 maxillary premolars and 1 mandibular premolar on the Class I side) to produce Class I canine and molar relationships on the Class I side and Class II molar and Class I canine relationships on the Class II side, along with coincidence of the maxillary and mandibular dental midlines to each other and in relation to the midsagittal plane.

This case could also be treated with the alternative approach of symmetric extraction of 4 premolars. This treatment plan would have produced a final occlusion with bilateral Class I molar and canine relationships. However, attaining a Class I molar relationship on the original Class II side and a consequent coincidence of the maxillary and mandibular dental midlines with this treatment approach is more time consuming and difficult as it depends largely on patient compliance in the use of Class II and anterior diagonal intermaxillary elastics.[3,5-9]

Whereas correcting the interdental midline deviation with 3 premolar extraction approach is easier, because it is achieved simultaneously with closing the extraction space in the mandibular arch. There is also minimal need for Class II and anterior diagonal intermaxillary elastics, because the molars on the Class II side will remain in their initial positions and the correction of the interdental midline deviation will be consequent to closing the mandibular extraction space.[3,9]

The literature demonstrates that the main factor contributing to the asymmetric anteroposterior relationship in Class II subdivision malocclusions is the dentoalveolar component.[1-3] This dentoalveolar asymmetry is primarily related to the distal positioning of the mandibular first molar on the Class II side or, less frequently, to the more mesial positioning of the maxillary molar on the Class II side.[3] This leads to a coincidence or a minimum deviation of the

maxillary dental midline to the midsagittal plane, as well as a mandibular dental midline deviation to the Class II side in relation to the midsagittal plane in most Class II subdivision malocclusion patients.[3] Thus, authors such as Cheney,[10,12] Lewis,[9] Alavi et al,[1] and Janson et al[3,12] suggest extracting 2 maxillary premolars and 1 mandibular premolar in the Class I side as a good treatment option, when the patient's profile allows for retracting the maxillary and mandibular incisors. In this case, space generated was needed for the correction of excess overjet and overbite. Correcting the midline deviation with this treatment plan was easier, because it was achieved simultaneously with closing the extraction space in the mandibular arch, with little or no need for intermaxillary elastics for midline correction[9] and patient compliance.

Treatment time of these extraction protocols should also be considered. The number of extracted premolars has a direct relationship to treatment time, according to Fink and Smith.[13] Treatment time is increased by 0.9 months for each extracted premolar. Thus, patients treated with 3 premolar asymmetric extractions can be treated faster than those having 4 premolar extractions, not only because of the easier orthodontic mechanics, but also because of fewer extracted teeth. This might apply even more to adult treatment because, as Alexander et al[14] stated, extracting 4 premolars in an adult increases treatment time and the amount of retraction of the anterior teeth, increasing patient discomfort and the probability for root resorption and periodontal problems. In adult patients with Class II subdivision malocclusion, asymmetric extractions would also help to decrease these unfavorable consequences.

A proper diagnosis, logical extraction and excellent cooperation are crucial for treatment success. The treatment results were excellent, with all objectives met and the patient's chief concern satisfied. Good bite opening was established, and facial and smiling esthetics were enhanced. A bilateral canine Class I relationship and guidance were attained. The asymmetric extraction of the mandibular left premolar allowed for a Class I molar relationship on the left and a Class II molar relationship on the right with good interdigitation. The prognosis for stability is good, and dental corrections should be maintained by proper retainer wear.

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