

Decision in Class II Subdivision Malocclusions Treatment: Three Case Reports with Contrasting Strategies

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J Contemp Orthod 2020;4(4): 6-10.

Received on: 25-11-2020

Accepted on: 15-12-2020

Source of Support: Nil

Conflict of Interest: None

ABSTRACT

Abstract: Class II Subdivision refers to the asymmetric molar relationship that can be commonly accounted to dental and occasionally to the skeletal disharmony. Furthermore, the discrepancy may be present in the maxilla or the mandible. To put it differently Class II subdivision is a heterogeneous group of malocclusions and cannot be considered as a discrete entity to be treated with predefined specific strategies.

Treatment goals encompass the usual cook-book approach and entail the orthodontists to think-before-act strategy considering all the parameters that may be affected favorably or deleteriously while executing a specific plan. Treatment options may vary from non-extraction to four premolar extractions depending upon the site and severity of the malocclusion.

Another consideration would be the indispensable side-effects of the biomechanics involved that may be symmetric or asymmetric, again depending upon the needs of the patient. These not only require thorough diagnosis but also clarity in the treatment goals.

This piece of literature would briefly outline the important considerations while treating Class II Subdivision cases with the help of examples of three patients bearing different etiologies treated with contrasting strategies.

Keywords: Class-II Subdiv malocclusion, Midface deficiency, Decompensation, Overjet, Crossbite

INTRODUCTION

Class II Subdivision may be defined as the one with Class II molar relationship only on one side of the dentition. Class II Subdivision malocclusions have characteristics of both Class I and Class II. Class II Subdivisions feature distal molar occlusion on one side and Class I molar occlusion on the contra-lateral side. The disagreement in molar relationships between each side results in asymmetric occlusal relationship and midlines. For clarity, the term subdivision refers to the Class II side.

Class II subdivisions are estimated to account for upto 50% of all Class II malocclusions and are among the most common dental asymmetries in the orthodontic population.¹ Class II Subdivision malocclusions can involve skeletal asymmetries, dentoalveolar asymmetries, functional shift due to occlusal interferences or temporomandibular joint disorders (disk displacement & pathology).

Janson et al,² evaluated three types of Class II Subdivision malocclusion and defined Type 1 as the one with coinciding

maxillary dental midline with the facial midline and deviation of the mandibular midline toward the Class II side. It is created by the distal positioning of the mandibular first molar on the class II side. Frequency of occurrence is 61.36%. Type 2 characterizes deviated maxillary dental midline away from the Class II side and coincident mandibular midline with the facial midline. It is created by mesial positioning of maxillary molar on class II side. Frequency of occurrence is 20%. Combination type involves deviation of the maxillary and mandibular dental midlines from the facial midline in opposite directions with the frequency of occurrence of about 20%.²

Factors like early loss of a primary second molar on one side with unilateral loss of leeway space, premature exfoliation of primary canines, ankylosed primary molars, ectopic eruption of maxillary first molars, congenitally missing teeth, supernumerary teeth, caries with loss of interproximal tooth structure, tooth size discrepancy, excess spacing, asymmetric crowding are important in aetiology of subdivision malocclusions.

The source of the subdivision must be determined to know if the

asymmetry is skeletal, dental, or possibly a combination of both; maxillary arch, mandibular arch or both. If it is dental related, then orthodontics alone should suffice. Even after correct diagnosis, treatment can be difficult because it often involves asymmetric extractions and asymmetric mechanics. It is imperative to ascertain whether a dental midline deviation is due to buccal segment asymmetry or whether it is primarily due to uneven crowding in the arches.³

It is now imperative to state that subdivision involves a wide array of malocclusion that may involve a simple unilateral buccal segment asymmetry, dental in origin to a more severe complete arch skewing that may be skeletal in origin. Thus, the spectrum of subdivision would involve an incessant combination of vast aetiological aspects that may individually or in combination with other contributing factors complicate the diagnosis and treatment strategies applicable in each patient. The asymmetries of skeletal origin may be more critical and might demand an extensive surgical intervention. Nevertheless, the non-surgical approaches require a thorough understanding of these malocclusions in order to reach to an appropriate diagnosis that would lead to the most pertinent and validate treatment decisions.

One of the simplest, yet robust in majority of cases is the description of subdivision malocclusion by Jansonet al², that grossly divides the same into three subtypes, as described earlier. It is quite essential to review these before detailing the diagnosis, treatment planning and outcome of the cases representing the each prototype.

CLASS II SUBDIVISION TYPE 1 CASES

If the profile of patient dictates for extractions, they can be either symmetric (4 premolar extraction) or differential (asymmetric-3 premolar extraction). Pleasing profile on the other hand contra-indicates extractions. Non extraction treatment plan includes Class II elastics, diagonal elastics, asymmetric elastics (Class II on malocclusion side and Class III on normal side) or spring corrector.

The three bicuspid extraction method shows slightly better treatment success rate in correcting the midline deviation and a tendency for better correction of antero-posterior discrepancy of posterior segments, compared with four premolar extraction plan.⁴

DEFERRED EXTRACTION OPTION

In many Class II subdivision cases, it is worthwhile to delay the extraction of a mandibular premolar in the affected quadrant (Class II side) until a good canine interlocking (Class I) relationship is obtained. This delay will concurrently correct compensatory mesiodistal inclination of anterior teeth as well as midlines. The inherent mechanical limitations of

current appliances in correcting the molar relationship can be offset to a great extent by altering the timing of extraction.^{3,5}

CLASS II SUBDIVISION TYPE 2 CASES

Class II subdivision Type 2 cases can be treated either with single premolar extraction plan on Class II side or non-extraction plan by distalization of the molar on the Class II side. Extraction plan will correct maxillary midline deviation, the Class II molar can remain in Class II while the canines and contra-lateral molar will finish in a Class I relationship. Distalization will correct midline deviation as well as molar relation.

CLASS II SUBDIVISION COMBINATION TYPE CASES

As the name suggests, it is the combination of above two and may require a more planned approach when treating such subjects. The treatment plan would vary with the etiology and severity of discrepancy.

In view of specificity in the application of the abovementioned guidelines it is imperative to reinforce the understanding of the readers with appropriate examples. Three Class II subdivision patients treated in a dental centre in Pune (Maharashtra) India will be discussed to give clarity to the subject. Table-1 compares the pre-treatment and post-treatment cephalometric values of the three cases.

CASE-1: CLASS II SUBDIVISION RIGHT TYPE 1 CASE

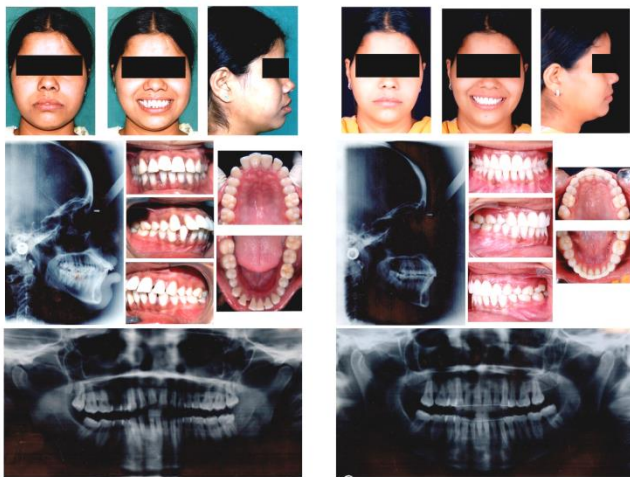
Treatment by: Asymmetric 3 premolar Extractions

A 20 years old post pubertal female with Class I jaw bases and average growth pattern reported to the orthodontic opd with prominent features of convex profile, incompetent lips, acute nasolabial angle, grossly symmetrical face, compromised periodontal health and increased incisor show. Her upper dental midline was coincident with the facial midline and lower dental midline was deviated towards right side by 2mm.

Clinical examination ascertained that the malocclusion was dental in origin as indicated by the absence of gross asymmetry in the extra-oral facial photographs (Fig.1). Furthermore, there was tipping of the lower incisors on the right side that could be clearly appreciated on the orthopantomogram of the patient (Fig.1). It was now clear that there was no underlying skeletal asymmetry which was also reinforced by the history of premature exfoliation of deciduous molar due to caries on lower left side resulting in the presence of asymmetric lower molar positions with mandibular left molar occupying more mesial position in the arch as seen in the intra-oral mandibular occlusal photograph leading to Class I molar relationship on the left side and Class II molar relationship on the right side and subsequent lower dental midline shift towards right side.

Treatment strategy included periodontal maintenance, correction of exhibited malocclusion using comprehensive fixed orthodontic mechanotherapy with PEA (M.B.T. prescription 0.022-inch slot) with extraction treatment approach with asymmetric extractions (14,24,34). Upper extraction spaces were utilized to correct inclinations of upper anterior teeth. It was decided to extract lower left first premolar to correct deviated midline to allow tooth movement to that side and to correct dental inclinations. The purpose of asymmetric extraction was to obtain Class I canine relationship on both sides, Class I molar relationship on left side and Class II molar relationship on right side with ideal overjet and overbite.

TREATMENT PROGRESS AND RESULTS



CASE-1: PRE TREATMENT RECORDS

POST TREATMENT RECORDS

An active treatment period of 19 months was utilized to relieve the malocclusion that involved sliding mechanics for initial canine retraction followed by enmasse incisor retraction in the upper arch by the use of bilateral Class I force. In the lower arch, unilateral Class I force was used on the left side to sequentially retract canine followed by complete space consolidation on the same side. The asymmetric mechanics were supplemented with Class II elastic force to reinforce the upper anchorage while maintaining the molar relationships on the respective sides.

Post treatment features included improved soft tissue facial esthetics, improved lip competency, dental midlines coincident with the facial midline, improved nasolabial angle and improved periodontal health of lower anteriors.

CASE 2: CLASS II SUBDIVISION LEFT TYPE 2 CASE

Treatment: Non Extraction by Molar Distalization on the Left Side.

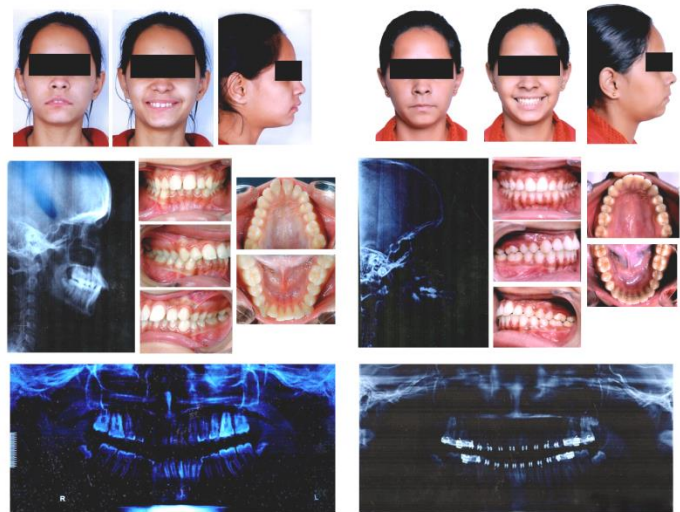
A 13 years old circum-pubertal female with Class I jaw bases and horizontal growth pattern reported to the orthodontic opd

with prominent features of convex profile, incompetent lips, acute nasolabial angle, grossly symmetrical face, increased incisor show, deviated upper midline to the right side by 3mm and lip sucking habit.

Clinical examination could ascertain that the malocclusion was not purely dental in origin despite the absence of gross asymmetry in the extra-oral facial photographs. There was bodily shift of upper incisors towards the right side that could be clearly appreciated on the orthopantomogram of the patient (Fig.2) indicating skeletal origin due to skewing of arches and/or basal bone. There was also the presence of asymmetric upper molar positions with maxillary left molar occupying more mesial position in the arch as seen in the intra-oral maxillary occlusal photograph (Fig.2) with no history of caries or premature exfoliation of deciduous teeth.

Treatment strategy included correction of exhibited malocclusion using comprehensive fixed orthodontic mechanotherapy with PEA (M.B.T. prescription 0.022-inch slot) with non-extraction treatment approach with correction of Class II molar relationship on left side by unilateral distalization using Jones Jig, interception of lip sucking habit and increasing the arch perimeter in the lower dental arch for correction of crowding by using lip bumper.

TREATMENT PROGRESS AND RESULTS



CASE-2: PRE TREATMENT RECORDS

POST TREATMENT RECORDS

An active treatment period of 14 months was utilized to relieve the malocclusion that involved unilateral distalization using Jones Jig that was completed in 4.5 months followed by correction of upper dental midline and inclination of upper incisors by sliding mechanics with the use of unilateral Class I force on the left side. Habit interception using lip bumper was discontinued after 8 months. The asymmetric mechanics were supplemented with asymmetric Class II elastic force to reinforce the upper anchorage while maintaining the molar relationships on the respective sides.

Post treatment features included improved lip competency, upper midline coincident with the facial midline, lower lip trap resolved and nasolabial angle improved.

mechanotherapy with PEA (M.B.T. prescription 0.022-inch slot) with extraction treatment approach with symmetric extractions (14,24,34,44). Upper extraction spaces were utilized to correct

TABLE-1

Variable	CASE 1 (Type 1)		CASE 2 (Type 2)		CASE 3 (Combination Type)	
	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
SNA	86°	87°	78°	78°	79°	80°
SNB	82°	82°	74°	74°	76°	77°
ANB	4°	5°	4°	4°	3°	3°
U1-NA	43°/13mm	14°/3mm	40°/12mm	20°/5mm	26°/7mm	21°/3mm
U1-SN	128°	82°	117°	100°	95°	91°
U1-PP	136°	101.5°	131°	114°	119°	111°
LI-NB	40°/12mm	35°/7mm	17°/4mm	36°/8mm	28°/6mm	23°/4mm
IMPA	99°	94°	89°	98°	95°	91°
Interincisal Angle	94°	127°	119°	125°	122°	131°
FMA	26°	28°	24°	26°	25°	25°
SN-GoGn	34°	35°	30°	33°	30°	30°
Overjet	7mm	2mm	11mm	2mm	6mm	2mm
Nasolabial Angle	90°	101°	80°	103°	99°	106°

CASE 3: CLASS II SUBDIVISION LEFT COMBINATION TYPE

Treatment by: Symmetric 4 Premolar Extractions

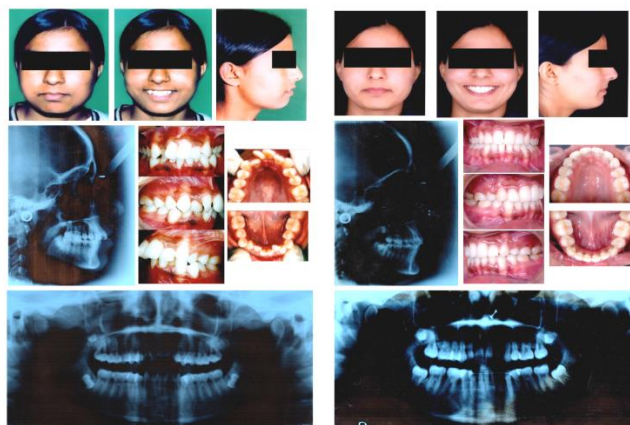
A 16 years old post-pubertal female patient with Class I jaw bases and average growth pattern reported to the orthodontic opd with prominent features of convex profile, incompetent lips, acute nasolabial angle, grossly asymmetrical face showing deviation towards right, upper dental midline deviated towards right by 4mm and lower towards left by 3mm with respect to facial midline.

Clinical examination could ascertain that the malocclusion was not purely dental and/or skeletal in origin despite the presence of gross asymmetry in the extra-oral facial photographs. There was bodily shift of upper incisors towards the right side that could be clearly appreciated on the orthopantomogram of the patient (Fig.3). There was also the presence of asymmetric upper and lower molar positions with both upper and lower left molars occupying more mesial position in the arch along with asymmetric anterior crowding as seen in the intra-oral maxillary occlusal photograph (Fig.3).

Treatment strategy included correction of exhibited malocclusion using comprehensive fixed orthodontic

crowding, midline and inclinations of upper anterior teeth. It was decided to extract lower first premolars to correct deviated midline and to correct dental inclinations. The purpose of symmetric extraction was to obtain Class I canines and molar relationship on both sides with ideal overjet and overbite.

TREATMENT PROGRESS AND RESULTS



CASE-3: PRE TREATMENT RECORDS

POST TREATMENT RECORDS

An active treatment period of 22 months was utilized to relieve the malocclusion that involved sliding mechanics for the correction of anterior crowding initially, followed by en masse anterior retraction in both upper and lower arches by the use of bilateral Class I force. The asymmetric mechanics were chosen for this particular case to titrate space closure with critical anchorage in

the upper arch by the use of nance palatal button and by the consolidation of the buccal segment in the lower right quadrant, and intermediate anchorage in the lower left quadrant supplemented with asymmetric Class II elastic force only on the left side to allow for the slippage of molar and obtain bilateral Class I molar relationship with ideal overjet and overbite.

Post treatment features included improved lip competency, well aligned arches and acceptable nasolabial angle.

DISCUSSION

Class II subdivision is a heterogeneous group of malocclusions and cannot be considered as a discrete entity to be treated with predefined specific strategies. The discrepancy may be present in the maxilla, mandible or in both the arches.

Alaviet al⁶ and Rose et al⁷ observed that Class II subdivisions result mainly from asymmetry of the mandibular first molars, by distal positioning of the mandibular molars on the Class II side. Jansonet al² concluded that asymmetric antero-posterior relationships in Class II Subdivision malocclusion were mainly dentoalveolar. Class II Subdivision malocclusion does not present skeletal asymmetries in relation to normal occlusion. Azevado et al¹ concluded that subdivision was primarily dentoalveolar with minimum skeletal involvement. According to Sanders et al⁸, the components contributing to an asymmetric antero-posterior relationship in a Class II Subdivision malocclusion are multifactorial. According to them, the etiology of Class II Subdivision malocclusion is primarily due to an asymmetric mandible that is shorter and positioned posteriorly on the Class II side. Also mesial positioning of the maxillary first molar on the Class II side without skeletal asymmetry was the second contributing factor and distal positioning of the mandibular first molar on the Class II side was the third contributing factor.

Most of the orthodontic treatment strategies were originally grounded on the imperialistic approach of the ones who developed them. Yet the better understanding of the various clinical situations have provoked the new era of Evidence-based orthodontics. This not only marks the clarity in the vision of the orthodontists in terms of diagnosis but also the definitive protocols in varying spectrum of malocclusions.

Class II subdivision has always been a source of dilemma due to heterogeneity of the subgroups that it covers and only the clear understanding of each subtype would lead to the successful treatment. Various types as instituted by Jansonet al² have described with their treatment options to provide a more practical approach to deal with these efficiently.

CONCLUSION

Patients with Class II Subdivision malocclusions although seen commonly, have long been a treatment challenge for clinicians. Treating asymmetric malocclusions is inherently more difficult than treating symmetric malocclusions, as symmetry in one or both arches needs to be re-established, usually with asymmetric extractions, mechanics, or surgery. For example, Class II subdivisions that are due to maxillary dental asymmetries might be addressed with asymmetric extractions. Similarly, Class II subdivisions due to mandibular skeletal asymmetry might be ideally corrected with asymmetric mandibular advancements. Whatsoever may be the etiology, treatment goals encompass the usual cook-book approach and entail the orthodontists to think-before-act strategy considering all the parameters that may be affected favorably or deleteriously while executing a specific plan. It is indubitable to conclude from the aforementioned cases that if the underlying etiology has been correctly identified and appropriate diagnosis is made, ideal results can be achieved with minimal side effects keeping reasonable objectives in mind by employing predictable mechanics.

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