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Aesthetic rehabilitation of a patient with severe crowding by orthodontic and prosthodontic intervention" –A case report on multidisciplinary dentistry

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Abstract

This case report is of a 25 year old male patient who presented with irregularly placed and severely crowded teeth in both maxillary and mandibular arch with coincident dental midlines but a non-consonant smile arc. This case was corrected non surgically merely by employing simple mechanics with the help of Fixed Orthodontic Mechanotherapy without extraction of premolars by expansion and proximal stripping of teeth. The case ended in a Class I Molar and canine relationship bilaterally. The case report emphasizes on the non-extraction protocol despite various problems the patient presented with such as severe crowding, peg shaped laterals and an unaesthetic smile. Following fixed orthodontic treatment, marked improvement in patient's smile was achieved and there was a remarkable increase in the patient's confidence and quality of life the profile changes and treatment results were demonstrated with proper case selection and good patient cooperation with fixed appliance therapy. At the end of the treatment, composite build up restorations of the peg shaped lateral incisors was done. The patient was extremely satisfied with the results at the end of treatment.

Keywords: proximal stripping, class iii malocclusion, peg shaped lateral incisors, occlusal rehabilitation, non-consonant smile arc, orthodontic treatment, severe crowding, buccally placed canines, palatally placed lateral incisors, fixed orthodontic mechanotherapy, composite build up, multi-disciplinary dentistry

Introduction

Facial Esthetics has been in increasing demand in today's century**.** Nowadays, patients with the slightest misalignment of teeth demand Orthodontic treatment to get it corrected and improve their smile and facial profile. Fixed Appliance treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth [1]. The number of adults seeking orthodontic treatment has increased significantly [1, 19, 26]. In Today's times, Fixed Appliance treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth. Class III malocclusion is the 3rd most prevalent after Class I and Class II malocclusion [2-3, 14-15]. Over the last few decades, there has been an increase in the awareness about orthodontic treatment which has led to more and more adults demanding high quality treatment in the shortest possible time with increased efficiency and reduced costs [4, 16-18]. There are many ways to treat Class III malocclusions, according to the characteristics associated with the problem, such as anteroposterior discrepancy, age, and patient compliance.[5-6, 20]The indications for extractions in orthodontic practice have historically been controversial [7-9, 21]. On the other hand, correction of Class III malocclusions in growing patients, with subsequent dental camouflage to mask the skeletal discrepancy, can involve either retraction by non-extraction means simply by utilizing the available spaces or by extractions of premolars [10-11]. Lack of crowding or cephalometric discrepancy in the mandibular arch is an indication of 2 premolar extraction [12- 13, 22-25]. Fortunately, in some instances satisfactory results with an exceptional degree of correction can be achieved without extraction of permanent premolars. This case presents the correction of a Bimaxillary dentoalveolar protrusion with a Class III malocclusion in an adult male patient having severe crowding by non-extraction of premolars, simply by executing the procedure of arch expansion and proximal stripping. The Non-extraction protocol shown in this case is indicative of how an unesthetic non consonant smile can be converted into a more aesthetic

and pleasing one by routine fixed Orthodontic treatment without the need for extracting premolars.

Case Report

Extra-oral examination

A 25 year old adult male patient presented with the chief complaint of irregularly placed upper and lower front teeth with excessive show of front teeth. On Extraoral examination, the patient had an orthognathic facial profile, grossly symmetrical face on both sides with competent lips, shallow mentolabial sulcus, increased lip strain, procumbent upper and lower lips, increased labial fullness and an acute Nasolabial Angle, a Leptoprosopic facial form, Dolicocephalic head form, average width of nose and mouth, increased buccal corridor space and a non- consonant flat smile arc. The patient had no relevant prenatal, natal, postnatal history, history of habits or a family history. On Smiling, there was excessive show of maxillary and mandibular anterior teeth and presence of severely crowded anterior dentition and an unaesthetic appearence and smile. The patient was very dissatisfied with his smile.

Pre-Treatment Extra Oral Photographs

Fig 1

Intra-oral examination

Intraoral examination on frontal view shows presence of an average overjet and overbite with crossbite present bilaterally in the lateral incisor and canine region. On lateral view the patient shows the presence of Class I incisor relationship, a Class III Canine relationship bilaterally and a Class III molar relationship bilaterally. Occlusal view showed presence of crowding in the maxillary and mandibular anterior region, amalgam restorations on the occlusal and buccal surfaces of mandibular molars. The patient wanted to get the amalgam restorations removed and replace it with composite restorations for the purpose of aesthetics. The upper and lower arch showed the presence of a “U” shaped arch form.

Pre treatment intra oral photographs

Fig 2

Pre treatment cephalometric readings

Table 1

Parameters	Pre-treatment
SNA	82°
SNB	83°
ANB	-1°
Wits	-1mm
Max. Length	74mm
Man. Length	99mm
IMPA	96°
Nasolabial Angle	94°
U1 to NA degrees	24°
U1 to NA mm	1mm
L1 to NB degrees	23°
L1 to NB mm	1mm
U1/L1 angle	129°
FMA	25°
Y Axis	65°

Diagnosis

This 25 year old male patient was diagnosed with a Class III malocclusion on a Class III skeletal base with an average maxilla and a prognathic mandible and an average growth pattern, normal overjet and overbite, Severe maxillary and mandibular anterior crowding, crosssbite in the lateral incisor canine region, competent lips, procumbent upper and lower lips a reduced nasolabial angle, increased buccal corridor space and a non- consonant flat smile arc.

List of problems

1. Severe maxillary and mandibular anterior crowding
2. Prognathic mandible
3. Class III malocclusion
4. Crossbite in lateral incisor -canine region
5. Increased buccal corridor space
6. Decreased nasolabial angle

Treatment Objectives

1. To correct maxillary and mandibular anterior crowding
2. To correct mandibular prognathism
3. To correct crossbite in lateral incisor-canine region
4. To correct the increased buccal corridor space
5. To achieve a Class I Incisor, Canine and molar relationship
6. To achieve a pleasing smile and a pleasing profile

Treatment Plan

- Fixed appliance therapy with MBT 0.022 inch bracket slot
- Initial leveling and alignment with 0.012", 0.014", 0.016", 0.018", 0.020" Niti archwires following sequence A of MBT
- Arch expansion in maxillary and mandibular arch with heavy 0.019" x 0.025" rectangular stainless steel expanded archwires
- Proximal stripping in upper and lower anterior region
- Final finishing and detailing with 0.014" round stainless steel wires
- Composite build-up restorations with the peg shaped maxillary lateral incisors
- Retention by means of Hawleys's retainers along with lingual bonded retainers in the upper and lower arch.

Treatment Progress

Complete bonding & banding in both maxillary and mandibular arch done, using MBT-0.022X0.028"slot. Initially a 0.012" NiTi wire was used which was followed by 0.014, 0.016", 0.018", 0.020" Niti archwires following sequence A of MBT. After 6 months of alignment and leveling NiTi round wires were discontinued. Use of 0.019" x 0.025" rectangular NiTi followed by 0.019" x 0.025" rectangular stainless steel wires was done followed by which the rectangular stainless steel wires were expanded manually both in upper and lower arch and replaced in the bracket slot for the purpose of arch expansion and broadening of both the dental arches. Hence the space required was gained by this method and the residual space was obtained by proximal stripping in the upper and lower anterior region. Class III Elastics were given to correct the molar and canine relationship bilaterally. Crossbite in the lateral incisor- canine region was corrected by using cross elastics bilaterally. Bite Turbos were given on mandibular 1st molars bilaterally for opening of bite until the crossbite was corrected. Finally light settling elastics were given with rectangular steel wires in lower arch and 0.012" light NiTi wire in upper arch for settling, finishing, detailing and proper intercuspation. Class I incisor, canine and moar relationship was achieved and an ideal occlusion was obtained at the end of the fixed apppliance therapy. The smile of the patient improved significantly from being non consonant and flat to more consonant and pleasing.

Post treatment cephalometric readings

Table 2

Parameters	Post-treatment
SNA	82°
SNB	82°
ANB	0°
WITS	0mm
Max. Length	76mm
Man. Length	97mm
IMPA	98°
Nasolabial Angle	96°
U1 TO NA degrees	26°
U1 TO NA mm	2mm
L1 TO NB degrees	25°
L1 TO NB mm	2mm
U1/L1 angle	125°
FMA	25°
Y axis	66°

Fig 3

Post treatment extra oral photographs

Fig 4

Discussion

Treatment of a Class III malocclusion with crowding is challenging. A well-chosen individualized treatment plan, undertaken with sound biomechanical principles and appropriate control of orthodontic mechanics to execute the plan is the surest way to achieve predictable results with minimal side effects. Class III malocclusion might have any number of a combination of the skeletal and dental components. Hence, identifying and understanding the etiology and expression of Class III malocclusion and identifying differential diagnosis is helpful for its correction. The patient's chief complaint was irregularly placed upper and lower front teeth with excessive show of front teeth. The selection of orthodontic fixed appliances is dependent upon several factors which can be categorized into patient factors, such as age and compliance, and clinical factors, such as preference/familiarity and laboratory facilities. The execution of only fixed appliance therapy appropriately resulted in an improvement in the patient's profile in this case. The most important point to be highlighted here is the use of Class III Elastics. Class III Elastics played a very piviotal role in this case for drastically bringing improvement not only in the correction of the canine and molar relationships, but also very efficiently improving the patients profile changing it to more orthognathic at the end of the treatment. There was improvement in occlusion, smile arc, profile, lower incisor inclination and position of chin. Successful results were obtained after the fixed MBT appliance therapy within a stipulated period of time. The overall treatment time was 19 months. After this active treatment phase, the profile of this 25 year old male patient improved significantly as seen in the post treatment Extra oral photographs. Minor spaces weren't closed at the end of the treatment for the purpose of composite build-up restorations of the peg shaped lateral incisors. The patient also wanted to get the amalgam restorations removed and replace it with composite restorations for the purpose of aesthetics, which was done at the end of the orthodontic treatment as seen in the post treatment intra oral photographs. The patient was extremely satisfied with the results at the end of treatment. Removable Hawley's retainers were then delivered to the patient along with fixed lingual bonded retainers in upper and lower arch.

Comparison of pre and post treatment cephalometric readings

Table 3

Parameters	Pre- treatment	Post-treatment
SNA	82°	82°
SNB	83°	82°
ANB	-1°	0°
WITS	-1mm	0mm
Max. length	74mm	76mm
Man. length	99mm	97mm
IMPA	96°	98°
Nasolabial angle	94°	96°
U1 TO NA degrees	24°	26°
U1 TO NA mm	1mm	2mm
L1 TO NB degrees	23°	25°
L1 TO NB mm	1mm	2mm
U1/L1 angle	129°	125°
FMA	25°	25°
Y axis	65°	66°

Retention with hawley's retainer

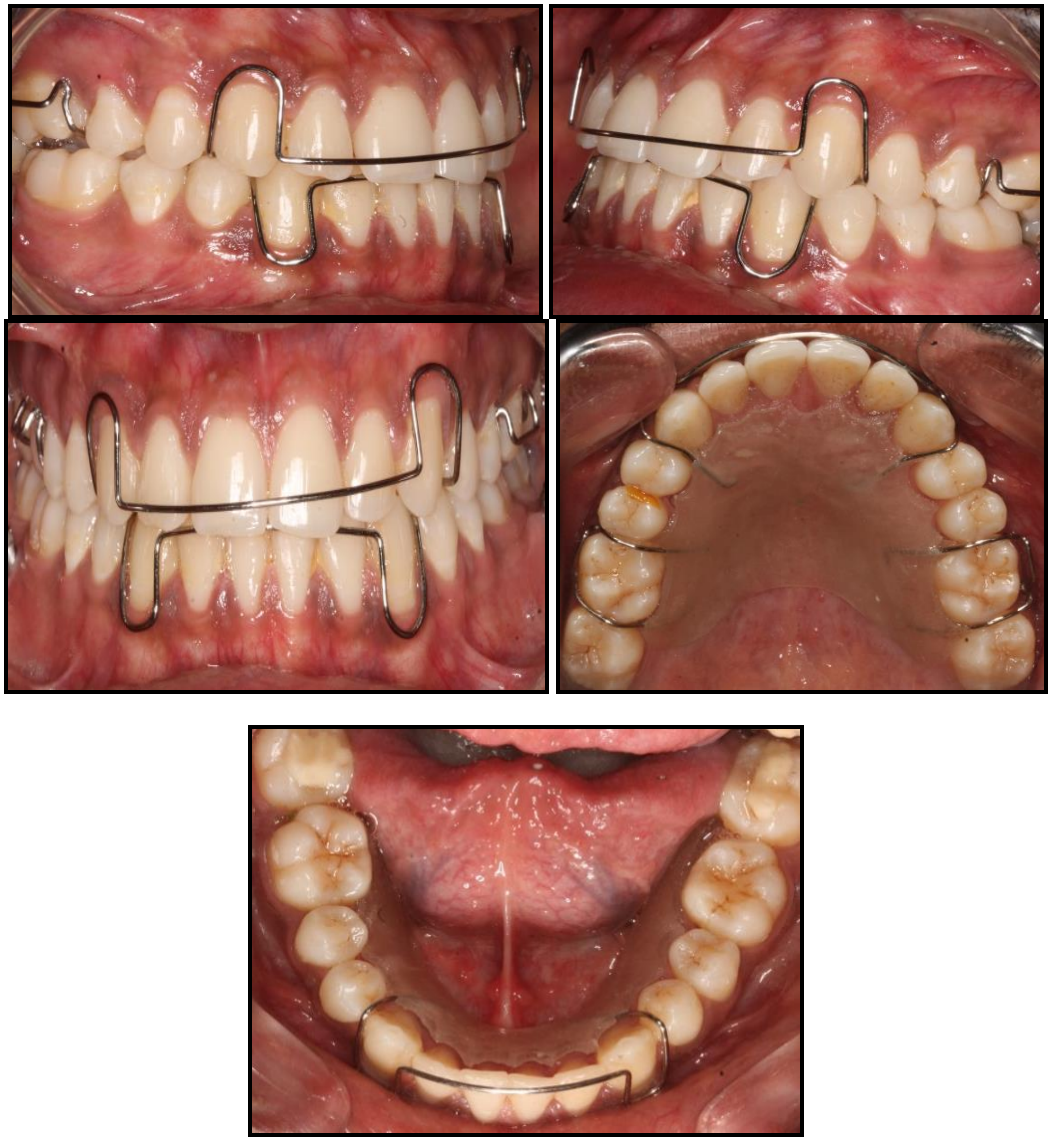

Fig 5

Conclusion

This case report shows how Class III case can be managed without Extraction Protocol by means of appropriate use of simplified fixed orthodontic treatment and efficient use of

Class III Elastics. The planned goals set in the pretreatment plan were successfully attained. Good intercuspation of the teeth was achieved with a class I Incisor, Canine and Molar relationship bilaterally. Treatment of the Prognathic appearing lower jaw included the retraction and retroclination of mandibular incisors with a resultant decrease in soft tissue procumbency and facial concavity. The overjet become near ideal and normal overbite was achieved. The maxillary and mandibular teeth were found to be esthetically satisfactory in the line of occlusion. Patient had improved smile and Profile and correction of the malocclusion was achieved, with a significant improvement in the patient aesthetics and self-esteem. The patient was very satisfied with the result of the treatment.

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