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RESEARCH ARTICLE

MANAGEMENT OF A BORDERLINE EXTRACTION CASE OF A FEMALE PATIENT HAVING A MID FACE DEFICIENCY BY NON EXTRACTION PROTOCOL WITH PROXIMAL STRIPPING FOR PROFILE IMPROVEMENT AND SMILE ARC CORRECTION- A CASE REPORT

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Midface Deficiency, Borderline Extraction Case, Non Extraction Protocol, Proximal Stripping, Fixed Appliance Therapy, Profile Improvement, Smile Arc Correction

Abstract

Class I malocclusion is one of the most common problems around the globe affecting around one-third of the patients who come for orthodontic treatment .This case report evaluates the management of Class I malocclusion with crowded dentition in a female patient have a retrognathic and deficient maxilla,with the help of proximal stripping of upper and lower anterior region followed by retraction and closure of spaces. This modality of treatment helped in camouflaging the prognathic looking dentition due to the underlying midface deficiency mwith the help of Proximal stripping stripping, thus eliminating the need for extractions to mask the defect . Clinical and cephalometric evaluation revealed skeletal Class I malocclusion with severe maxillary incisor proclination, concave to orthognathic facial profile, decreased mandibular plane angle, competent lips, increased overjet and overbite.Following fixed orthodontic treatment ,marked improvement in patient's smile and facial profile were 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.

Introduction:-

Fixed Appliance treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth. Class I malocclusion is moreprevalent than any type of malocclusion after Class II malocclusion.[1-2]Over the last few decades, there are increased number of adults who have become aware of orthodontic treatment and are demanding high quality treatment, in the shortest possible time with increased efficiency and reduced costs[3]. Class I malocclusions can be treated by several means, according to the characteristics associated with the problem, such as anteroposterior discrepancy, age, and patient compliance.[4- 5]The indications for extractions in orthodontic practice have historically been controversial.[6-8]. On the other hand, correction of Class II div.1 malocclusions in nongrowing patients, with subsequent dental camouflage to mask the skeletal discrepancy, can

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involve either retraction by non extraction means simply by utilizing the availabe spaces or by extractions of premolars.[9-10]The extraction of 4 premolars is generally indicated when there is crowding or cephalometric discrepancy in the maxillary and mandibular arch.[11- 12]But fortunately some time with suitable mechanotherapy, satisfactory results with an amazing degree of correction can be achieved without extraction of permanent premolars. This is when, Proximal Stripping comes into play frequently. This case presents the correction of a Class I Crowded malocclusion in an adult female patient have a midface deficiency, with increased overjet, overbite and a bimaxillary protrusion merely simply by executing a non extraction protocol by proximal stripping of upper and lower anterior dentition followed by retraction and closure of spaces. The Non Extraction protocol shown in this case is indicative of how a borderline extraction case can be converted into a non extraction case by routine Fixed Orthodontic treatment, just by employing minimal proximal stripping to mask the discrepancy.

Case Report:

Extra-Oral Examination

A 18 year old female patient presented with the chief complaint of forwardly placed upper front teeth and malaligned upper front teeth. On Extraoral examination, the patient had a merely concave to Orthognathicfacialprofile,grossly symmetrical face on both sides, competent lips ,moderately deep mentolabial sulcus and a slightly decreased Nasolabial Angle , a Leptoprosopic facial form, Dolicocephalic head form, Average width of nose and mouth, minimal buccal corridor space, an unaesthetic, nonconsonant, flat smile arc and slightly anterior divergence of face . The patient had no relevant prenatal, natal, postnatal history, history of habits or a family history.However the patient presented with malar deficiency and increased visibility of sclera, thus indicative of maxillary deficiency. On Smiling, there was complete show of maxillary anterior teeth . However, mandibular teeth were not visible on smile.

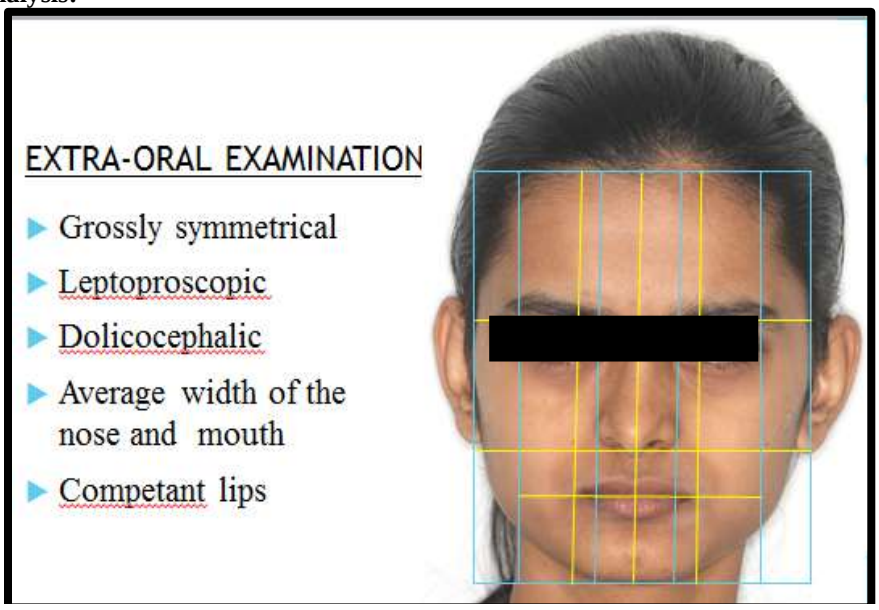
Pre Treatment Extraoral Photographs

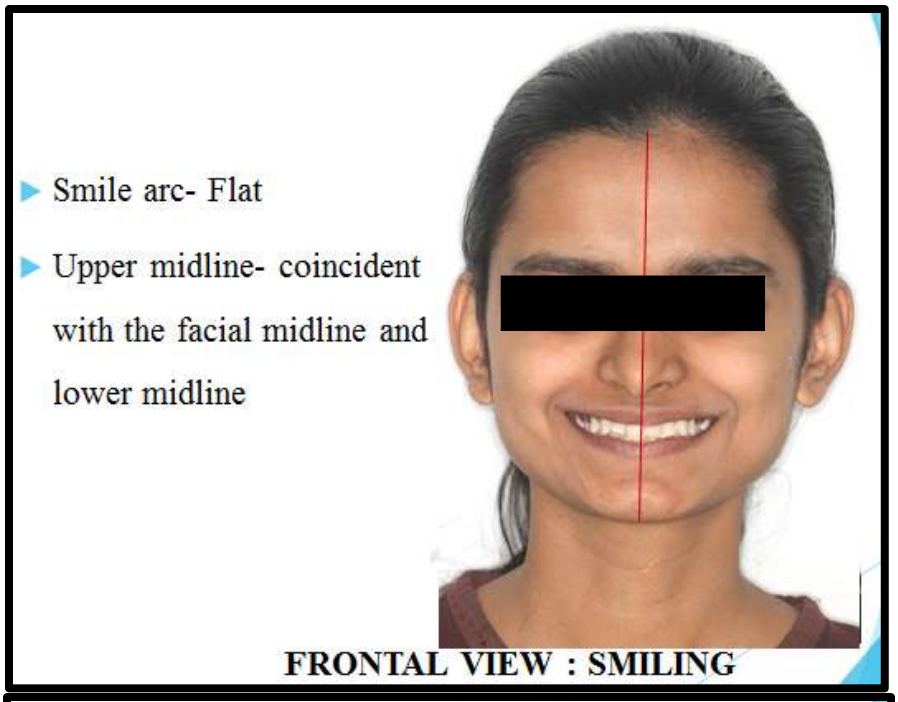
Intra-Oral Examination

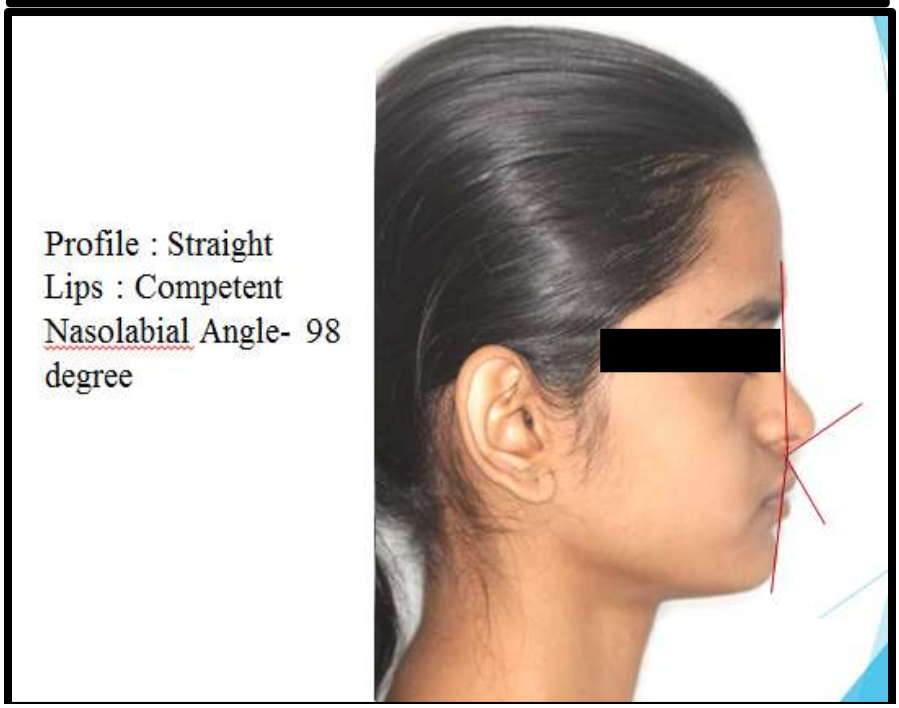
Intraoral examination on frontal view shows presence of overlapping incisors, crowded anterior dentition, a deep overbite with almost coinciding upper and lower dental midlines. On lateral view the patient shows the presence of Class II div 1 incisor relationship, a Class I Canine relationship on both sides and a Class I molar relationship Bilaterally. Patient showed presence of a proclined left central incisor and retroclined right central incisor. Patient has an overjet of 4 mm and an overbite of 3 mm.The upper and lower arch shows the presence of a V shaped arch form and both upper and lower anterior region show flared out anterior teeth indicative of a bimaillarydentoalveolar protrusion. OPG of the patient shows presence of all four 3rd molars in a developing stage. Lateral cephalogram is clearly indicative of proclined upper and lower anterior dentition again indicative of a Bimaxillary protrusion

Pre Treatment Intraoral Photographs

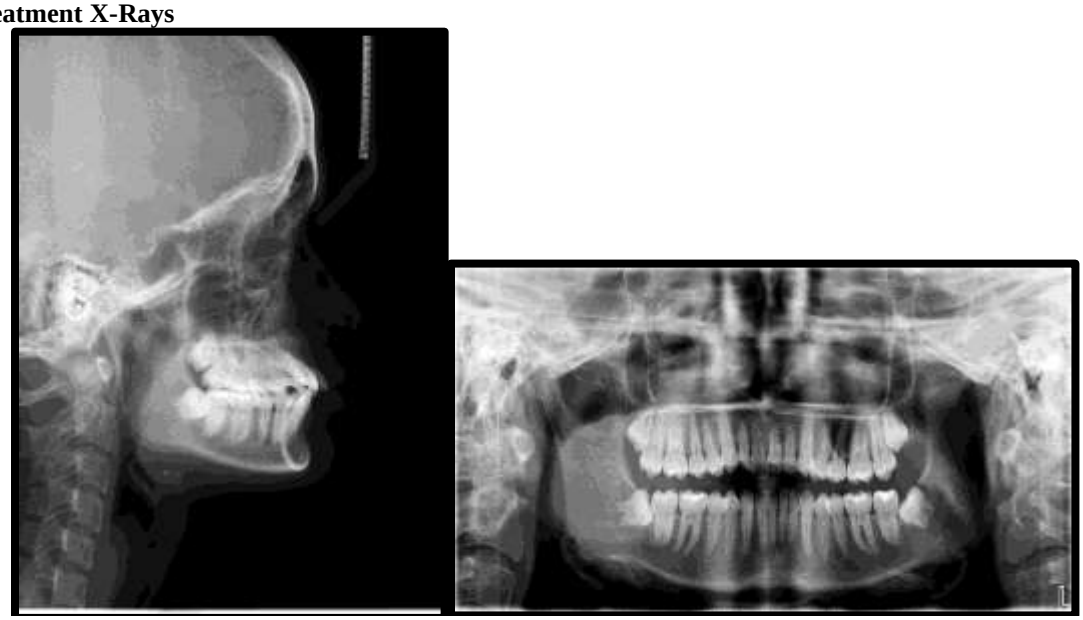
Photographic Analysis:




Smile arc- Flat
Upper midline- coincident with the facial midline and lower midline
FRONTAL VIEW : SMILING


Profile : Straight
Lips : Competent
Nasolabial Angle- 98 degree

Pre Treatment X-Rays



STEINER'S ANALYSIS

Measurement	Mean	Pre Rx	Inference
SNA	82^0	80^0	Average
SNB	80^0	81^0	Average
ANB	2^0	-1^0	Average
Go-Gn to Sn	32^0	19^0	Horizontal growth pattern
U1 to NA angle	22^0	43^0	Proclined max incisors
U1 to NA mm	4mm	7mm	Forwardly placed max incisors
L1 to NB angle	25^0	25^0	Average
L1 to NB mm	4mm	4mm	Average
Interincisal angle	130^0	114^0	Proclined upper and lower anteriors
Occlusal plane – SN	14^0	11^0	Horizontal growth pattern
'S' Line U Lip L Lip	 0mm 0mm	 1mm 0mm	Average

TWEEDS ANALYSIS

Measurement	Mean	Pre Rx	Inference
FMA	25^0	18^0	Horizontal growth pattern
FMIA	65^0	65^0	
IMPA	90^0	95^0	Proclined lower incisors

Wits appraisal:-
BO ahead of AO by 1 mm indicating mild anteroposterior skeletal discrepancy

RICKETTS ANALYSIS

Measurement	Mean (for 9 yrs)	Pre Rx	Inference
Facial axis(Ba-Na to Pt-Gn)	90 ± 3.5^0	87^0	Average
Facial angle(N-pg to FH)	87 ± 3^0	87^0	Average
Mandibular plane angle	26 ± 4.5^0	16^0	Horizontal growth pattern
Convexity at Pt.A	2± 2mm	3 mm	Average maxilla
L1 to A - Pg	1± 2 mm	2 mm	Average
U6 to Ptv	Age + 3 yrs	20 mm	
L1 inclination(1 to A-Pog)	22 ± 4^0	26^0	Average
Lower lip to E plane(Pog-Pn)	-2 ±2 mm	1 mm	Average

MC NAMARA ANALYSIS

Measurement	Mean	Pre Rx	Inference
N perp - A	0 -1mm	1 mm	Average
N perp to Pog	0-4 mm	4mm	Average
Facial axis angle(Ptm-Gn)-(Ba-Na)	0± 3.5^0	3^0	Average
Mand. Plane angle(FH-GoMe)	22 ± 4^0	17^0	Horizontal growth pattern
Eff. Maxillary Length(Co- A)		75 mm	Reduced
Eff. Mandibular Length(Co-Gn)		99mm	Reduced
Maxillomandibular differential		24mm	Reduced
Lower ant. Facial ht(ANS-Me)		50mm	Reduced
U1 to Pt. A	4-6 mm	5 mm	Average
L1 to A-Pog	1-3mm	2mm	Average
Nasolabial angle	102 ± 8^0	98^0	Average
Pharyngeal analysis U L	15-20 11-14	20 mm 11 mm	Adequate upper and lower airway passage

RAKOSI JARABAK ANALYSIS

Measurement	Mean	Pre Rx	Inference
Saddle angle	123± 5^0	127^0	Average
Articular angle	143± 6^0	137^0	Average
Gonial angle	128± 7^0	121^0	Average
Upper gonial angle	52-55^0	55^0	Average
Lower gonial angle	70-75^0	63^0	Horizontal growth pattern
Sum of posterior angles	396± 6^0	385^0	
Mandibular plane angle	32^0	17^0	Horizontal growth pattern
Angle of inclination	85^0	85^0	Average
Basal plane angle	25^0	14^0	Horizontal growth pattern
Palatal plane to occlusal plane	11^0	6^0	Horizontal growth pattern
Occlusal plane to MP	14^0	8^0	Horizontal growth pattern
Post to Ant. Face ht. ratio	62-65%	74.46 %	Horizontal growth pattern
Y - axis(FH-SeGn)	66^0	57^0	Horizontal growth pattern
U1 - SN	102± 2^0	122^0	Increased
U1-Palatal plane	70±5	50^0	Proclined max incisors
L1 - MP	90± 3^0	95^0	Average

HOLDAWAYS SOFT TISSUE ANALYSIS

Measurement	Mean	Pre Rx	Inference
Facial angle	90± 3^0	87^0	Average
Upper lip curvature	2-5 mm	3mm	Average
Skeletal convexity at Pt. A	2 ± 2 mm	3 mm	Average
H line angle	7 - 15^0	13^0	Average
Nose tip to H line	12 mm	4 mm	Average
Upper sulcus depth	5 mm	5 mm	Average
Upper lip thickness	15 mm	13 mm	Average
Upper lip strain	2 mm	2mm	Average
Lower lip to H line	-1 to +2mm	1 mm	Average
Lower sulcus depth	5 mm	5 mm	Average
Soft tissue chin thickness	10-12 mm	10mm	Average

DOWNS ANALYSIS

Measurement	Mean	Pre Rx	Inference
Facial angle	87.8^0 (82^0-95^0)	87^0	Average
Angle of convexity	0^0 (-8.5^0-10^0)	-10^0	Average maxilla
Mandibular plane angle	21.9^0 (17^0-28^0)	17^0	Horizontal growth pattern
Y-axis	59^0 (53^0-66^0)	57^0	Average
A-B plane angle	-4.6^0 (-9^0-0^0)	-5^0	Average
Cant of occlusal plane	9.3^0 (1.5^0-14^0)	8^0	Average
Interincisal angle	135.4 +/- 5.8	114^0	Proclined upper and lower anteriors
Incisor mandibular plane angle	1.4^0 (-8.2^0-7^0)	-15^0	Proclined lower anteriors
Incisor occlusal plane angle	14.5^0 (3.5^0-20^0)	24^0	Proclined upper anteriors
U1- A-Pog	2.7mm(-1-5mm)	6 mm	Proclined upper anteriors

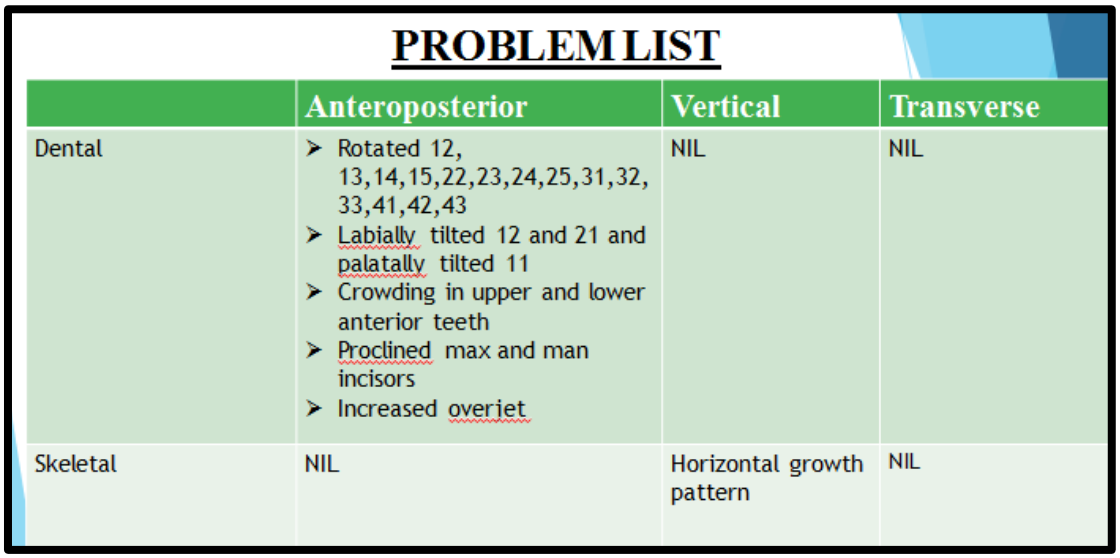
Pre Treatment Cephalometric Summary

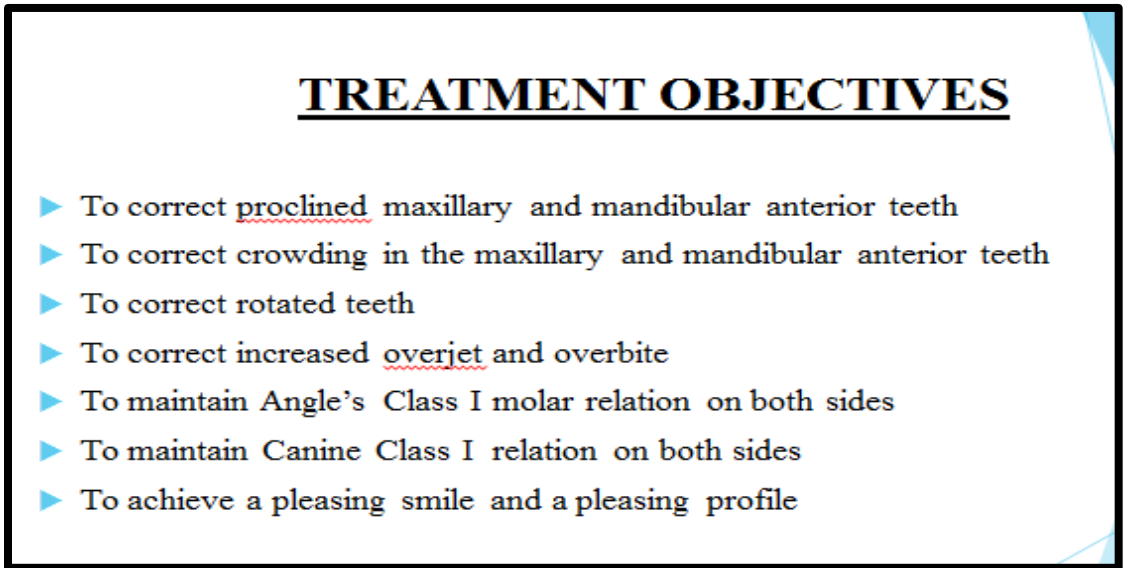
PARAMETERS	PRE- TREATMENT
SNA	80°
SNB	81°
ANB	-1°
WITS	1mm(BO ahead of AO)
MAX. LENGTH	75mm
MAN. LENGTH	99mm
IMPA	95°

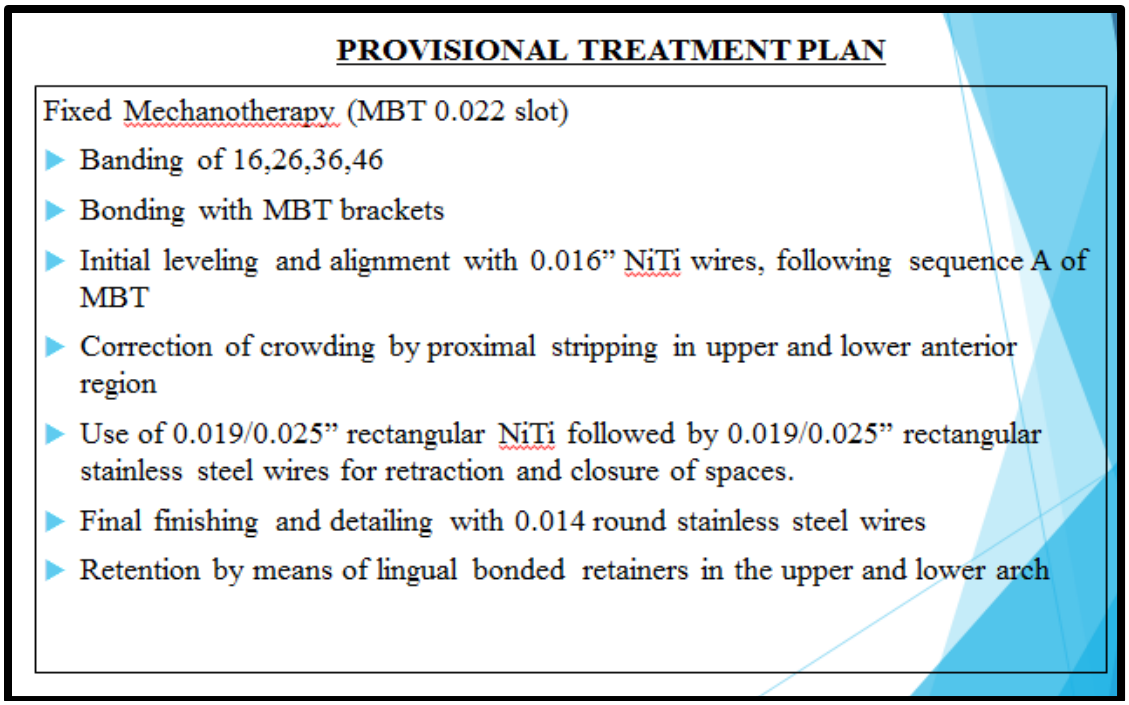
NASOLABIAL ANGLE	**98°**
U1 TO NA DEGREES	**43°**
U1 TO NA mm	**7mm**
L1 TO NB DEGREES	**25°**
L1 TO NB mm	**4mm**
U1/L1 ANGLE	**114°**
SADDLE ANGLE	**127°**
ARTICULAR ANGLE	**137°**
GONIAL ANGLE	**131°**
FMA	**18°**
Y AXIS	**57°**

Diagnosis

This 18 years old female patient is diagnosed with a Retrognathic maxilla, a Class I skeletal pattern, Angle's Class I malocclusion with a horizontal growth pattern, proclined upper and lower incisors and crowding in upper and lower anterior region with protruded upper and lower lips.







MODEL ANALYSIS

Bolton ratio:-

Mandibular anterior excess:- 2.48 mm

Mandibular overall excess:- 0.35 mm

Ashley Howe's index:-

Borderline case

Pont's Index :

Expansion not needed

Arch Perimeter Analysis :
Need for proximal stripping

Careys Analysis :
Need for proximal stripping

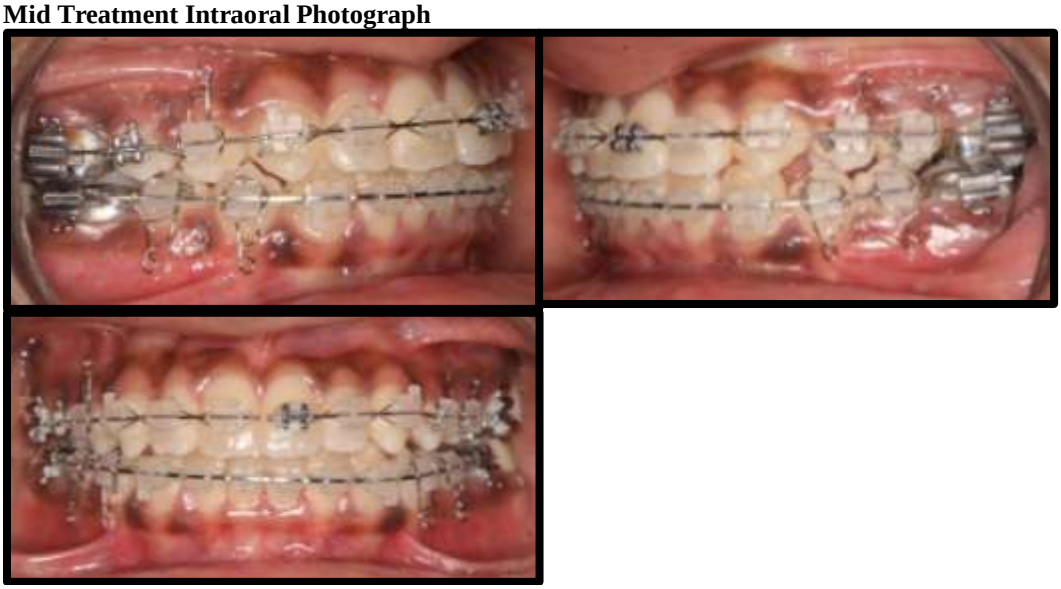
Chadda's Index :
Expansion not needed

Treatment Progress

Complete bonding & banding in both maxillary and mandibular arch done, using MBT-0.022X0.028"slot. Ceramic brackets were used for the purpose of esthetics. Initially a 0.012" NiTi wire was used which was followed by 0.014 , 0.016", 0.018", 0.020" Nitiarchwires following sequence A of MBT. After 6 months of alignment and leveling NiTi round wires were discontinued. Proximal stripping of lower and upper anterior dentition was done. This provided space for retraction of the proclined maxillary and mandibular anterior dentition. Retraction and closure of spaces was then started by use of 0.019" x 0.025" rectangular NiTi with accentuated Anchor sweeps in the upper and lower stiff archwires for opening of bite to correct the increased overbite followed by 0.019" x 0.025" rectangular stainless steel wires. Anchorage was conserved by light retraction forces constantly monitoring the already well settled molar relation. This is the most important step in a borderline extraction case wherein anchorage conservation is of utmost importance. Finally light settling triangular 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. The smile arc was consonant at the end of the treatment and the patient was very happy with her smile.

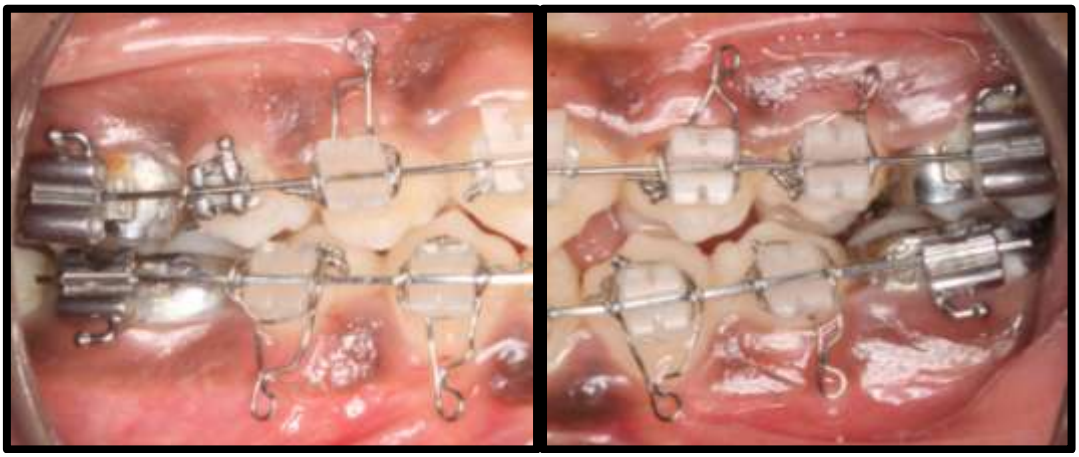
Mid Treatment Extraoral Photographs

Mid Treatment Intraoral Photograph

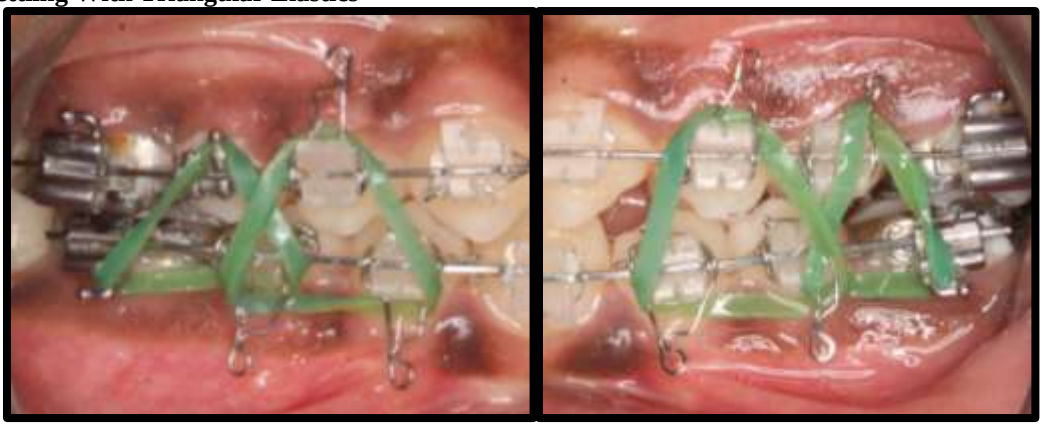


Kobayashi Ties To Aid Engagement Of Elastics

Since the ceramic brackets did not have hooks for engagement of settling elastics, Kobayashi ties were tied around the buccal segment brackets bilaterally to aid in the engagement of triangular settling elastics. The patient routinely used the settling elastics for 2 weeks until there was good intercuspation of the buccal segment. Good alignment of teeth was seen in the upper and lower arch at the end of the treatment.



Buccal Settling With Triangular Elastics

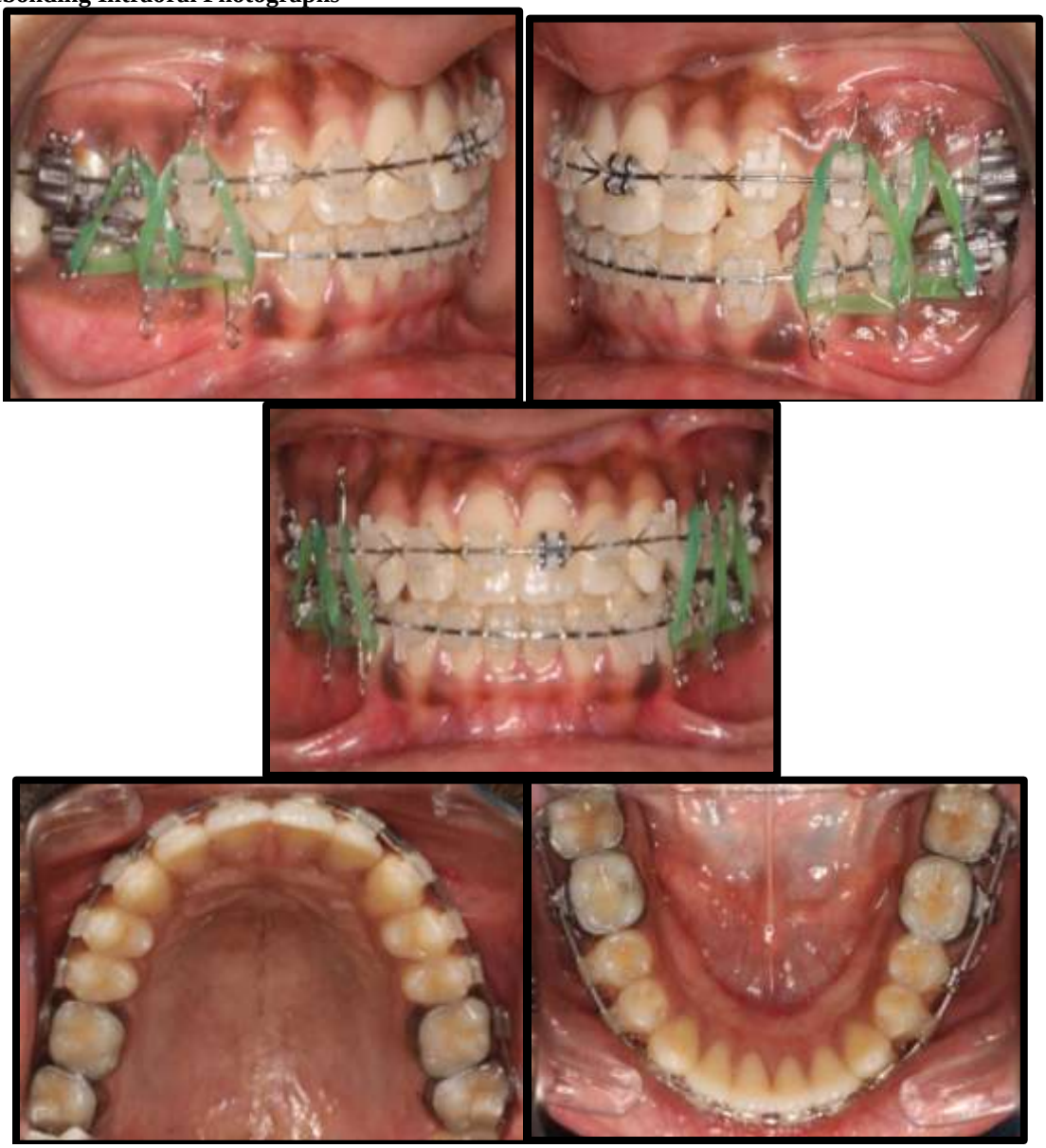


Pre DebondingCephalometric Summary

PARAMETERS	POST-TREATMENT
SNA	81°
SNB	80°
ANB	1°
WITS	1mm

MAX. LENGTH	**74mm**
MAN. LENGTH	**97mm**
IMPA	**92°**
NASOLABIAL ANGLE	**103°**
U1 TO NA DEGREES	**31°**
U1 TO NA mm	**2mm**
L1 TO NB DEGREES	**23°**
L1 TO NB mm	**2mm**
U1/L1 ANGLE	**131°**
SADDLE ANGLE	**128°**
ARTICULAR ANGLE	**136°**
GONIAL ANGLE	**132°**
FMA	**20°**
Y AXIS	**62°**

Pre Debonding Intraoral Photographs



Discussion:-

Treatment of Class I malocclusion with crowding in adults without extractions of premolars 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.ClassI malocclusion might have any number of a combination of the skeletal and dental component. Hence, identifying and understanding the etiology and expression of Class I malocclusion and identifying differential diagnosis is helpful for its correction. The patient's chief complaint was forwardly placed and malaligned upper 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 proximal stripping along with Fixed appliance therapy appropriately resulted in an improvement in the patient's profile in this case. The SNAvalue showed an increase from 80 to 81 degrees, the SNB value changed from 81 to 80 degrees. The mandibular incisor proclination reduced from 95 to 92 degrees, the nasolabial angle changed from 98 degrees to 102degrees thus improving the patients profile drastically and the Frankfurts mandibular plane angle changed from 18 to 20 degrees due to the counter clockwise rotation of the mandibular plane. The smile arch of the patient significantly improved from being flat and non consonant to more pleasing and consonant. The upper and lower incisor proclination values, both angular and linear measurements improved significantly. Successful results were obtained after the fixed MBT appliance therapy within a stipulated period of time.The overall treatment time was 13 months. After this active treatment phase, the profile of this 18 year old female patient improved . Removable hawleys retainers followed by Fixed lingual bonded retainers were then delivered to the patient.

Comparison Of Pre Treatment And Pre DebondingCephalometric Readings

PARAMETERS	PRE- TREATMENT	POST-TREATMENT
SNA	80°	81°
SNB	81°	80°
ANB	-1°	1°
WITS	1mm(BO ahead of AO)	1mm
MAX. LENGTH	75mm	74mm
MAN. LENGTH	99mm	97mm
IMPA	95°	92°
NASOLABIAL ANGLE	98°	103°
U1 TO NA DEGREES	43°	31°
U1 TO NA mm	7mm	2mm
L1 TO NB DEGREES	25°	23°
L1 TO NB mm	4mm	2mm
U1/L1 ANGLE	114°	131°
SADDLE ANGLE	127°	128°
ARTICULAR ANGLE	137°	136°
GONIAL ANGLE	131°	132°
FMA	18°	20°
Y AXIS	57°	62°

Conclusion:-

This case report shows how a borderline extraction case can be managed with a Non Extraction Protocol by means of proximal stripping and properly conserving Anchorage.The planned goals set in the pretreatment plan were successfully attained. Good intercuspation of the teeth was maintained with class I molar relationship. Treatment of bimaxillary protrusion and localized spacing included the retraction and retroclination of maxillary and mandibular incisors with a resultant decrease in soft tissue procumbency and convexity. The maxillary and mandibular teeth were found to be esthetically satisfactory in the line of occlusion. The overjet become near ideal and normal overbite was found. Patient had improved smile and Profile without the need for extractions The 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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