Original Article

Dentistry

Single Arch Treatment in Class II Div 1 Malocclusion

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ABSTRACT

Objective: Orthodontic treatment can improve mastication, speech and appearance, as well as overall health, comfort, and self-esteem. However, like many other interventions, orthodontic treatment has inherent risks and complications. Best way to avoid orthodontic treatment complications is to stay away from orthodontic appliances. Thus, if correcting malocclusion is to be of benefit, the advantages it offers should outweigh any possible damage. It is also important to implement risk control procedures during and after orthodontic treatment. Patient selection always plays a vital role in minimizing risks. In this article two cases illustrate the effective treatment in class 2 div 1 malocclusion with single arch treatment. This approach may reduce risk of orthodontic treatment.

Study Design: Observational Study

Place and Duration of Study: This study was conducted at the Orthodontics Dept., Islam Dental College, Sialkot.

Materials and Methods: She 22 year old female having history of thumb sucking presented with class II incisors, canines and molars relationship on skeletal class II bases and convex profile .She also have anterior dental open bite with low vertical skeletal relationship.(pre-treatment photographs a-f). All teeth are erupted except 3rd molars at (OPG) (Pre-treatment radiographs I). Cephalometrically Skeletal class 2 with low angle and bimaxillary dental proclination (Pre-treatment radiographs j).

Conclusion: Single arch treatment can be use in selected class 2 cases, where lower arch can be accepted as such, which can give maximum wanted effects of esthetic and function with minimum treatment.

Key Words: Class 2 div I Malocclusion, Over jet, over bite.

INTRODUCTION

Class II malocclusion adult cases, where growth no longer occurs, camouflage and surgery are the only treatment options, which of these is the best approach is highly controversial.[1] The effects of surgical orthodontics versus camouflage treatment can be measured in terms of the clinical outcome produced by the treatment, i.e. the changes in dental occlusion, cephalometric measurements, and esthetic changes that occur.[2-3] When comparing the alternative treatment plans, it also is important to evaluate treatment efficiency, determined by whether and to what extent the treatment goals were met by improving dental relationships and dentofacial esthetics.[4-5]

One option of camouflage in class II div 1 is the extraction of the upper 1st maxillary premolars, correcting the canine to class I relationship with normal overjet, overbite and the molars in a class II full cusp relationship.[6]

Usually in class II cases non extraction option is upper arch distalization. But in case 2 is non-extraction treatment when spaces in upper arch for correction of class II div 1 malocclusion with anterior teeth retaction to achieve class I canine relationship with normal overjet, overbite and the molars in a class II full cusp relationship.[7,8]

Like any other branch of medicine or dentistry, orthodontic treatment is not without potential risks.[9-11] Orthodontic treatment risks are pain, decalcification and root resorbtion, alveolar bone resorption, these risks can be limited to one arch if other arch is acceptable.[12]

MATERIALS AND METHODS

She 22 year old female having history of thumb sucking presented with class II incisors, canines and molars relationship on skeletal class II bases and convex profile. She also have anterior dental open bite with low vertical skeletal relationship.(pre-treatment photographs a-f). All teeth are erupted except 3rd molars at (OPG) (Pre-treatment radiographs I). Cephalometrically Skeletal class 2 with low angle and bimaxillary dental proclination (Pre-treatment radiographs J)

Clinical Examination

Extra-Oral Features: Skeletal class 2, competent lips, Low face height

Intra-Oral Features

Soft Tissues: Mild gingival recession of lower anterior teeth. All teeth are erupted except 3rd molars

Crowding / Spacing: No arch length discrepancy in upper & lower arch

Occlusal Features

Incisor relationship: class 2

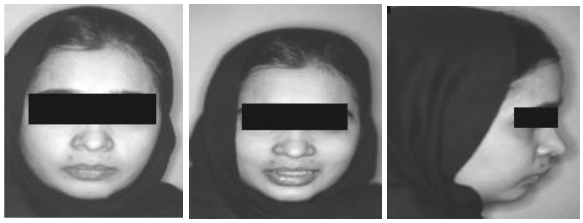
Overjet (mm): 6mm

Overbite: -2

Centrelines: upper shift to left 1mm
Left buccal segment relationship: class 2
Right buccal segment relationship: class 2

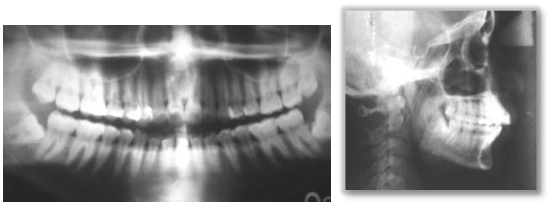
Problem List

1. Mild gingival recession lower anterior teeth.
2. History of thumb sucking
3. Convex profile
4. Skeletal class 2
5. Anterior open bite
6. Class 2 dental relationship
7. Increase overjet


A B C


D E F


G H


I J

Pre-Treatment Photographs: Extra-Oral

Treatment Objectives

1. Oral hygiene instructions.
2. To stop habit thumb sucking advice
3. To achieve good esthetic and occlusion
4. Levelling ,alignment and co-ordinate arches
5. To achieve class class 1 incisor and canines with full cusp molars.
6. Retention

Treatment Alternatives: Two treatment options; one option in this case with upper 1st premolars and lower 2nd premolars extractions to achieve class 1 molars with class 1 incisor and canine relationship.

2nd option with upper 1st premolars only extractions to achieve class 2 molars (full cusp)with class 1 incisor and canine relationship .Treatment with Upper 1st premolars extractions has been finalized due to low angle case and Lower arch accepted as such with extractions of impacted 3rd molars advised. Fixed appliance (Roth prescription) only on upper arch.

Treatment Results: An ideal display of maxillary anterior teeth with lips in repose and smiling helped to provide an aesthetically pleasing smile line. The midlines were aligned with each other and with the face. Intra-orally, a normal overjet, overbite and class 1 canines was established. A well-seated buccal occlusion with Class 2molar full cusp. Canine guidance existed in both right and left excursive movements with no balancing interferences. Centric occlusion and centric relation were coincident. Pos-treatment photographs (k-p) and Post-treatment radiographs (q,r)

Treatment progress

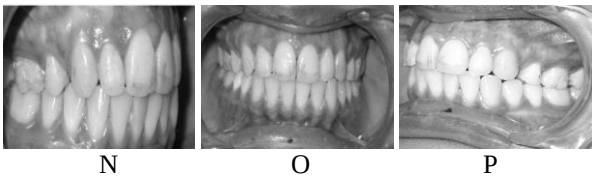
Key Stages in Treatment Progress

	Date /Time	Stage
1.	First month	Diagnosis and treatment planning Upper premolars extractions & Bonding &banding only upper arch & coaxial wire passed
2.	6months	Leveling and alignment with 0.014 SS, 0.016ss &0.018SS wires used
3.	14 months	Enemas retraction of upper anterior teeth with closing loop mechanics with0 .016X0.022 SS wire.
4.	20 months	Finishing and detailing with0.017X0.025, 0.019x0.025 wires
5.	21 months	Debonding and debanding followed by fixed bonded retainer

Post-treatment photographs –extra oral


K L M

Post-Treatment Photographs: Intra-Oral


N O P

Cephalometric analysis showed maxillary anterior teeth extrusion and retraction and mesialization of upper molar to get full cusp molars relationships.The SNA angle and SNB angle and MMA remained unchanged. The interincisal angle was increased by 16 due to retraction of upper incisors (Table 1✤). Post-treatment

panoramic radiograph showed good root paralleling. Supporting tissues appeared healthy. Table 1

Q

R

Cephalometric Assessment

Variable	Pre-treatment	Post treatment	Change
SNA	85	85	0
SNB	77	77	0
ANB	+8	+8	0
Wits appraisal	+7	+6	-1
Upper incisor to maxillary plane angle	124	108	-16
Lower incisor to mandibular plane angle	108	108	0
Interincisal angle	106	122	+16
MM angle	17	17	0
Upper anterior face height	50	52	
Face height ratio LAFH/ TAFH	55%	55%	
Lower lip to Ricketts E Plane	0	0	0

Case 2

21 year old female class II incisor relationship on class 1 skeletal bases. Right upper 1st premolar and both lower second premolars are congenitally absent. Upper incisors are proclined with spacing and retrusive profile due to prominent nose**.**(pre-treatment photographs 1-6)

OPG showing Missing teeth lower 2nd premolars and right upper 1st premolars (pre-treatment radiograph 7)

Cephalometrically ,Skeletal class 1 with ANB 3 ,normal vertical pattern ,upper incisor are proclined and retrusive profile due to prominent nose. (Pre-treatment radiograph 8)

Clinical Examination

Extra-Oral Features. Competent lips, Deep labiomental sulcus, Straight profile, Average maxillo –mandibular planes

Intra-Oral Features

Soft tissues:

No Abnormality

Oral hygiene:

Good

Erupted teeth present:

7 6 5 3 2 1	1 2 3 4 5 6 7
7 6 e 4 3 2 1	1 2 3 4 e 6 7

Unerupted teeth present

	8
8	8

General dental condition: Good quality: Caries free dentition

Missing teeth lower 2nd premolars and right upper 1st premolars

Crowding / Spacing

Spaces in upper arch

No arch length discrepancy in lower arch

Occlusal Features

Incisor relationship:	Class II
Overjet (mm):	8 mm
Overbite:	5mm
Centrelines:	On
Left buccal segment relationship:	Class II
Right buccal segment relationship:	ClassII

Problem List

1. Class II incisor relationship increased overjet ,deep bite (palatal trauma) and upper incisor proclination
2. Lower second premolars are congenitally absent.
3. Right upper Ist premolar is congenitally absent.
4. End to end molar relationship.
5. Retrusive profile due to prominent nose.

Aims and Objectives of Treatment

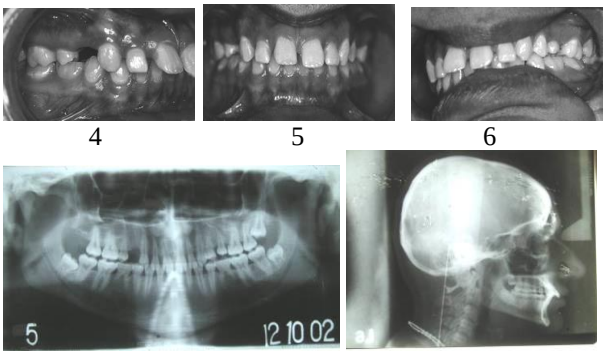
1. Levelling and alignment
2. overjet and overbite correction
3. Mesialization of upper molar
4. Replacement of upper right 1st premolar.
5. Lower arch accepted as such with primary 2nd moloars . Establish a normal class 1 incisors and canines and class 2 full cusp molars relationship with good facial harmony
6. Finishing. 7. Retention

Treatment Plan

Non extraction orthodontic Treatment plan with replacement of upper right 1st premolar, space closure by retraction and intrusion of anterior teeth and mesialization of upper molars,lower arch is accepted as such with lower 2nd deciduous molar .

Fixed appliance (Roth prescriptions) only in upper arc

1 2 3

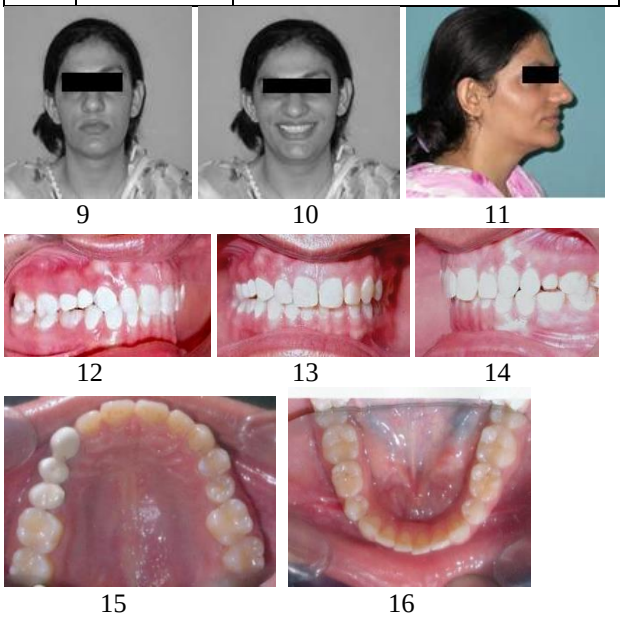


4 5 6 7 8

Figure No.12; Pre-Treatment Photographs

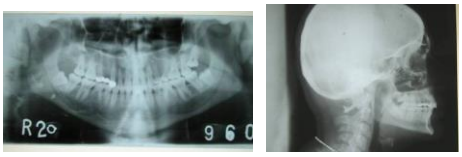
Key Stages In Treatment Progress

	Date	Stage
1.	1-6 Months	incisally placed brackets on upper incisors. Levelling and alignment with coaxial, 0.014ss, 0.016ss in upper arch.
2.	6-10 months	With0 .018ss, Canines retraction to achieve class 1 with power chain and replacement of upper right 1st premolar with three unit bridge for 3 4 5.
3.	10-20 months	0.017x0.025 Incisor retraction and intrusion with closing loop mechanics with mesialization of 1st molar
4.	20-22 months	0.019 x 0.025 rectangular steel wire use for finishing
5.	22-23 months	Debonding & debanding and placement of removable retainer with slight anterior bite plane followed by permanent fixed retainer.



9 10 11 12 13 14 15 16

Figure No. 14: Post-treatment photograghs



17 18

Figure No.15: Post-treatment radiograph

RESULTS

An ideal display of maxillary anterior teeth with lips in repose and smiling helped to provide an aesthetically pleasing smile line. The midlines were aligned with each other and with the face. Intra-orally, a normal overjet, overbite and class 1 canines was established. A well-seated buccal occlusion with Class 2 molar full cusp relationship. Canine guidance existed in both right and left excursive movements with no balancing interferences. Centric occlusion and centric relation were coincident. The patient was satisfied with the overall result. (post-treatment photographs 9-16) (post-treatment radiographs 17,18)

Variable	Pre treatment	Post treatment	Change
SNA	81	81	0
SNB	78	78	0
ANB	3	+3	0
Wits appraisal	+5	+4	-1
Upper incisor to maxillary plane angle	119	105	-14
Lower incisor to mandibular plane angle	96	96	0
Interincisal angle	118	131	13
Maxillary mandibular planes angle	22	22	0
Upper anterior face height	52	52	0
Lower anterior face height	68	70	2
Face height ratio LAFH/TAFH	56%	57 %	1%
Lower incisor to APo line	2mm	2mm	0
Lower lip to Ricketts E Plane	-5	-7	-2

Cephalometric analysis showed maxillary anterior teeth retraction. The SNA angle and SNB angle and MMA remained unchanged. The interincisal angle was reduced by 13 due to retraction of upper incisors (Table 2) Post-treatment panoramic radiograph showed good root paralleling. Supporting tissues appeared healthy.

DISCUSSION

Class 2 moderate cases in adult patient are usually treated with extraction of upper and lower premolars extraction .And non-extraction cases are treated by molar distalization or space closure if spaces in arches.[13-16]

In both cases which are treated in this article, lower arch are is inacceptable range so that treatment only in upper arch has been performed. Overall satisfactory occlusion and esthetic has been achieved. Orthodontic treatment risks are pain, decalcification , root resorbtion, alveolar bone loss , gingivitis ,gingival recession and relapse.[17] Single arch treatment reduces the risks of orthodontics, reduces the chair side time and addresses the patient chief complaint upper teeth are sticked out .[18]

Creekmore stated that optimum position of teeth in face should be determined by position of maxillary incisors rather than mandibular incisors suggested by Tweed, Ricketts and Steiner. Creekmore's dealt with his reasons for using maxillary incisors to establish his treatment goals. He stated that optimum position of teeth in face should be determined by maxillary incisors rather than mandibular incisors.[19-20]

In case 1 lower arch is accepted as such non-extraction with no treatment and in upper arch anterior teeth are retracted to achieve normal overjet, overbite and class 1 canine relationship with good esthetic after extraction of upper 1st premolars. However single arch treatment may have some problems in settling of occlusion which should be consider before treatment. But in most cases relapse occur due to lower arch change after treatment (due to change in intercanine width and lower incisor crowding).

In case 2 lower arch was well aligned, therefore no treatment given in lower arch and upper arch treatment anterior teeth are retracted to achieve normal overjet, overbite and class 1 canine relationship with good esthetic. Interdigitation can be improved at premolars area (due to presence of lower primary 2nd molars) by restorative treatment .In this case treatment also showed some relapse in the form of increased overbite which can be prevented by fixed bonded palatal retainer.

CONCLUSION

Single arch treatment can be use in selected class 2 cases, where lower arch can be accepted as such, which can give maximum wanted effects of esthetic and function with minimum treatment.

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