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RESEARCH ARTICLE

MANAGEMENT OF CLASS II DIV 1 MALOCCLUSION WITH TWO PHASE THERAPY IN GROWING CHILD : A CASE REPORT

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Abstract

Twin block appliance is a most commonly used myofunctional appliance because of it is easy to fabricate and easy to wear by the patient. Twin block appliance in growing age brings both dental and skeletal effect and gives pleasing profile, ideal occlusion and smile. The case report presented with the treatment of a 12- year- old male with class II div 1 malocclusion. Patient was planned to treated by two phase therapy : Phase 1- Skeletal changes, Phase 2-for occlusal correction. Phase I Skeletal treatment was done using Twin Block appliance followed by a phase II Pre-adjusted Edgewise appliance therapy for finishing and detailing.

Introduction:-

The twin block appliance was developed by Clark in 1988 used to treat Class II malocclusions, and has been one of the most commonly used patient friendly appliances.[1-3]Different functional appliances are indicated in different clinical situation and their action depending on the design of the appliance and forces produced by the stretching of the muscles.[4]If the arches are not well aligned then fixed mechanotherapy is required for finishing and detailing after the use of myofunctional appliances, this is known as two phase therapy.[5,6] The following case of 12 year old male treated with first with myofunctional appliance for orthopaedic changes followed by fixed mechanotherapy for finishing and detailing.

Case:-

The 12 years old male presented with chief complaint of forward placement of his upper front teeth. Patient had convex profile, incompetent lips (Fig.1). The patient had a class II skeletal pattern (Table.1) with average Frankfort-mandibular planes angle and lower anterior faceheight. Intra-oral examination revealed that, the oralhygiene of the patient was fair and all teeth from the permanent second molarshave erupted in both the upper and lower arches. Mild crowding present in maxillary arch and moderate in mandibular arch. The incisor relationship was class II division 1; the overjet was 11 mm whereasthe overbite was increased by 9 mm. The buccal segment relationshipwas 1/2 unit class II on both sides (Fig.1). The panoramic radiograph confirmed thepresence of all permanent teeth

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including the developing upper and lower left and right third molar. Rootmorphology appeared normal and there were no obvious cariouslesions. In the cephalometric assessment (Fig.1), the ANB valueof 5suggested a class II skeletal pattern. The vertical proportionswere within normal value. The upper incisors were proclinedat $127^0$and the lower incisors were inclined by 96^0. The interincisal angle was reduced at 132^0. The lower incisorto APo and the lower lip to E line were greater than normal limits. Initially myofunctional appliance was delivered as convex profile improved with the Fraenkel manoeuvre (Fig.2a-b).

The main objectives for phase I(Functional appliance phase for orthopaedic correction) of the treatment were asfollows:

1. Reduce the overbite and overjet.
2. Achieve class I molar relationship and gainanchorage.

In phase II (Fixed appliance phase for finishing and detailing) of the treatment, the aims were:

1. Relieved upper and lower arch crowding.
2. Level and align the arches.
3. Achieve class I canine and incisor relationship.

Treatment rationale:-

In orthopaedic phase or Phase I treatment involved the use of Clark Twin Block appliance to reduce the overjet, achieve class I molar relationships and gain anchorage at the start oftreatment to simplify the fixed appliance stage (Fig. 3). The upper component of the twinblock involved an acrylic baseplate which covers the palateand occlusal surfaces of the first molars and second premolars.There was an 70^0inclined plane at the end of the mesial end of theacrylic block.A midline screw was included alongwith labial bow.The lowercomponent consisted of a lingual acrylic baseplate coveringthe edge of the lower incisors. Both blocks had Adams claspson the first molars and first premolars to provide posteriorretention. This orthopaedic phase or phase I was followed by detailing and finishing orphase II with upper and lower pre-adjusted fixedappliances (0.022" slot brackets).

Treatment progress:-

To achieve good results with functional appliance patient compliance is an essential requirement. Main aim for functional therapy is to correct skeletal base malrelationship, molar relationship and reduction of the overjet (Fig.4). Expansion screw was placed in maxillary and mandibular plate and patient was instructedto activate the midline screw twice a week and reviewedevery four weeks.In finishing and detailing phase or second phase was programmed with fixed appliance and bonding was done with 022" X 028" pre adjusted appliance. Second phase was initiated after 9 months of twin block therapy and continued for 9 months (Fig. 5). After the correction of sagittal base dysplasia, initial alignment was done with .016 NiTi wire in maxillary and mandibular arch then .017X.025 NiTi followed by .019 X.025 stainless steel wire for finishing purpose.The overall treatment time was 18months i.e. 9 months with myofunctional appliance wear,and 9 months for fixed appliance treatment.

Treatment results:-

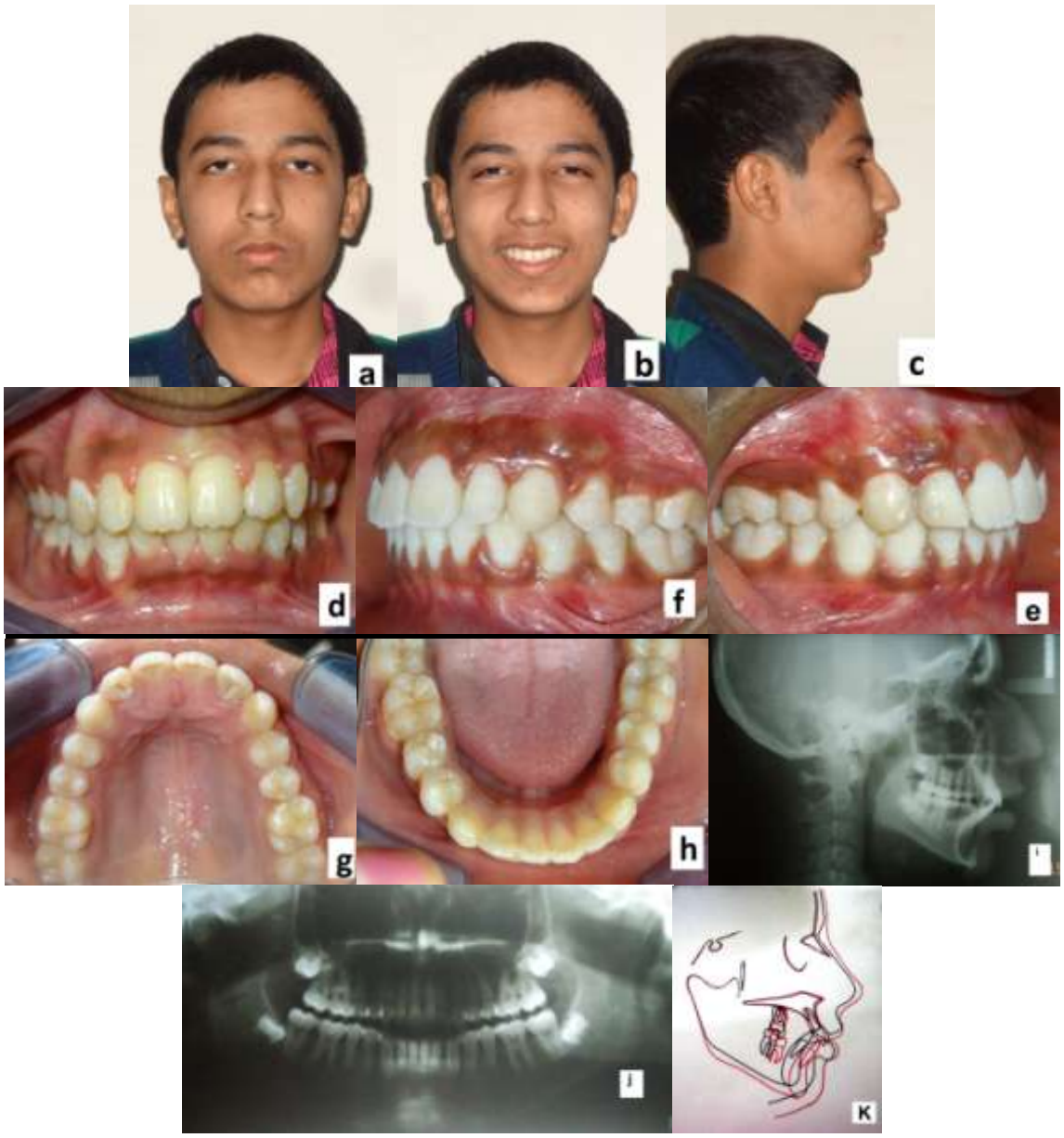
The treatment objectives were achieved. The profile of the patient has improved after the treatment (Fig. 6c). Mandibular arch crowding was corrected by proclination of the lower incisors and curve of spee by mandibular premolar eruption. The incisor, canine and molar relationships were class I at the end of treatment (Fig. 6d-h). The overbite and overjet were reduced to the average values.The growth changes are demonstrated in superimposition of the lateral cephalometric radiographs is shown in (Fig 6k).

Figures:-

Figures 3. Twin block with expansion screw in oral cavity

Figures 4. Intraoral photographs : Post-functional photographs. Note that the molar relationship was corrected to a super class I relationship on both sides.

Figures 5. Intraoral photographs. After bonding of maxillary and mandibular arch and 016 Ni Ti wire ligated in both maxillary and mandibular arch, and anterior bite plate was placed in maxillary arch



Figures 6. Post-treatment photographs (a-c). After 18 months of treatment. Patient showed competent lip, improved profile. (d-h). Intraorally Class I molar relation on both side with ideal overjet and overbite.(i-j)Lateral cephalogram and Orthopantomogram (k). Superimposition of pre-treatment and post-treatment cephalogram.

Table 1. Cephalometric Analysis

Variable	Pre-treatment	Post-treatment
Sagittal skeletal relationship		
SNA	81^0	82^0
SNB	76^0	79^0
ANB	5^0	2^0
Wit's appraisal	2mm	1mm
Dental base relationship		
Upper incisor to NA (mm/deg)	8mm and 31^0	3mm and 25^0

Lower incisor to NB (mm/deg)	5mm and 23^0	2mm and 25^0
Upper incisor to SN plane	121^0	111^0
Lower incisor to mandibular plane angle	99^0	101^0
Dental relationship		
Inter-incisal angle	124^0	137^0
Overbite	9mm	3mm
Overjet	11mm	3mm
Vertical skeletal relationship		
FMA	24^0	26^0
Upper anterior face height	56mm	60mm
Lower anterior face height	69mm	71mm
Maxillary length	99mm	101mm
Mandibular length- effective (McNamara)	107mm	113mm
Soft tissues		
Lower lip to Rickett's E plane	3mm	0mm
Nasolabial angle	105^0	112^0

Discussion:-

Twin Block is the most commonly used myofunctional appliance and it has several advantages and it is well friendly by patients[7], robust, easy to repair and it is suitable to use in the both permanent and mixed dentition. Using removable myofunctional appliance prior to fixed appliance therapy have advantage. Myofunctional appliances can lead to improvement of facial profile, changes in orofacial function through better muscle adaptation with dental and skeletal changes achieved.Ideal time for the treatment of mandibular deficiency is after onset of pubertal growth spurt.[8]

Treatment objectives were achieved largely due to the good compliance by the patient in this case, as the patient's chiefcomplaint was the increased overjet and with the use of functional appliance overjet was reduced. Patient was instructed to activate the midlinescrew only twice a week (0.25 mm of expansion per turn), this contributes to increase in arch length in both maxillary and mandibular arch and reduces crowding at the end of the functional appliance phase. Use of functional appliances is dependent upon age, compliance and clinical factors.

During treatment, the SNA value was increased by 1^0while the SNB value increased by 3^0. As a consequencethe ANB value incresed by 2^0towards class I skeletal pattern(Table.1). The upper incisor inclination reduced to 121^0 to $111^0$and the mandibular plane angle increased by 2^0. The vertical proportions increasedduring treatment. The lower lip to theE plane was reduced by 3 mm to 0. This has resulted in improvementin the patient's profile which is largely attributed tothe favourable growth and may be partly due to the functionalappliance.The superimposition of the lateral cephalometric radiographstaken during pre-treatment and post-treatment demonstratedthat the patient grew in a favourable direction towards a class I skeletal pattern (Fig. 6 K).The mandible demonstrated down and forward growth withanterior growth rotation.The upper incisors were extruded and the molars moved mesially. The lower incisors were proclinedand lower molars moved mesially.In the treated case skeletal phase and orthodontic phase combined in a single phase as the studies demonstrated that separated phases do not have any beneficial effect.[6,9,10]However, itcan be seen in this case that functional appliance can facilitatethe fixed appliance phase dramatically to achieve good result(Fig. 6 A-K).In terms of soft tissue changes, it was foundthat there is a soft tissue difference after treatment which islikely to be clinically relevant. In this particular case, the profilehad improved (Fig.6 B). The patientwas satisfied with the outcome and the appliances were removed.

Conclusion:-

Initial correction of myofunctional appliance simplifies the phase of fixedappliance by gaining anchorage and achieving class I molarrelationship In this case, the patient was treated with single phase treatment TwinBlock appliance followed by fixed appliance phase and achieved results was pleasing.

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