FUNCTIONAL TREATMENT OBJECTIVE- ROLE IN TWO PHASE TREATMENT

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ABSTRACT:

A distal occlusion exerts restraining occlusal forces on the mandibular dentition, and the maxillary dental arch is narrow from distal positioning of the lower dentition. These factors may not allow the mandible to grow to its full genetic potential. In severe class II .In the hands of an experienced clinician, full time functional appliances are most efficient in correcting severe class II malocclusion than conventional fixed appliance techniques without mandibular propulsion. This is especially true when the treatment is timed to coincide with the pubertal growth spurt. A case successfully treated with two phase treatment to meet the functional treatment objective is presented.

KEYWORDS: Functional appliance, Visual treatment objective, Two phase, Twin block

INTRODUCTION: Functional appliances have been criticized because of an unpredictable response and a lack of long term influence on the facial growth. Although it is not possible to grow beyond the individual genetic potential, environmental factors play a major role in perpetuating a severe class II malocclusion. A distal occlusion exerts restraining occlusal forces on the mandibular dentition, and the maxillary dental arch is narrow from distal positioning of the lower dentition. These factors may not allow the mandible to grow to its full genetic potential. In severe class II malocclusions the tongue is back in the throat because it is contained within a retrusive lower dental arch. This pattern has negative effects on the health and metabolism of these patients.

Expanding the maxilla and advancing the mandible unlock the malocclusion. In Functional terms, advancing the mandible advances the tongue and, as cephalometric records confirm, increase in the airway. This is fundamental physiological change with beneficial effects that can be seen clearly within 2 or 3 months of commencing treatment. In the hands of an experienced clinician, full time functional appliances are most efficient in correcting severe class II malocclusion than conventional fixed appliance techniques without mandibular propulsion. This is especially true when the treatment is timed to coincide with the pubertal growth spurt, but equally appropriate in early treatment.

DISCUSSION

Functional Treatment Objective:

The goal of functional therapy is to elicit a proprioceptive response in the muscles and ligaments, and as a secondary response, to influence the pattern of bone growth to support new functional environment for the developing dentition. The best results are obtained by combining orthodontic and orthopaedic techniques, and the future of orthodontics lies in advancing orthopaedic techniques towards a holistic approach to reduce skeletal discrepancies and restore normal function in promoting normal growth and development.[1]

Two phase orthodontic treatment is a very specialized process that encompasses jaw and facial changes, as well as tooth straightening. The major advantage of two phase treatment is to maximize the opportunity to accomplish the ideal healthy, functional, aesthetic and comfortable result that will remain stable. In some cases, interceptive treatment prevents adult tooth extractions or major jaw surgery.

Interceptive orthodontic care is one of the most rewarding treatment options that can be offered to the patients. Interceptive care is exactly that, intercepting a problem before it gets out of hand. Treatment occurs at a younger age than conventional orthodontic care and is not typically as long either.

The idea is to shift the teeth, manipulate the growth, create space for unerupted teeth, break habits and prevent trauma before it is too late. Children in the age group of 8- 11 years are best suited for this sort of treatment. They are flexible, compliant and their growth potential is still maximum.

Treatment usually lasts for14-18 months after which the child is monitored and the decision as to the need for the second phase is made. Most children will require a second, more comprehensive phase of treatment in order to create a completely stable, functional and aesthetic occlusion. The second phase usually begins once most of permanent teeth have erupted. This phase usually requires less than 18 months with braces on all the teeth. This follows with retention protocol.

The American Association of Orthodontists recommends all children be seen by an orthodontist at age 7. By age 7 the permanent teeth are starting to come in and we can tell at this point if a patient has adequate space for the remaining permanent teeth. If there is a significant problem with crowding, steps can be taken to facilitate the eruption of the permanent teeth. Also, a person's jaw relationship is pretty much established at this point or is starting to be established. This is a great opportunity to see if there is an imbalance in the jaw relationship and correct it early before it becomes a significant problem. In summary, early screening can help prevent more complicated treatment later.

Benefits of early class II treatment:

In an RCT trial preadolescent children with over jet greater than 7 mm were randomly assigned to observation only in cases treated with head gear and functional appliances compared with nontreated control group. The option of orthognathic surgery was presented more often in the cases of children who did not undergo early treatment, but surgery was accepted or was still being considered almost as frequently in the previous headgear group as in the controls, less often in the patients previously treated with functional appliances [2].

What You See Is What You Get:

Clinical diagnosis has the advantage of providing an accurate prediction of the three dimensional change in the facial contours as a result of mandibular advancement and is more important than lines and angles drawn on a cephalometric film. This does not negate or diminish the value of cephalometric analysis, but rather adds a three dimensional view to support and confirm the diagnosis (Fig 1).


A


B

Fig.1. A,B -Shows Positive visual treatment objective.

Twin block is fundamentally a pair of upper and lower plates, which has occlusal bite blocks that interlock the mandible in a forward posture and yet permit mandibular movements. It is the most widely accepted and popular removable functional appliance. Appliance designed by William Clark in 1977.According to Clark the occlusal inclined planes were the fundamental functional mechanism for the natural dentition. And the inclined planes play an important role in determining relationship of the teeth as they erupt. The aim of the inclined planes of the bite blocks in the twin block is to modify these inclined planes and cause more favourable growth pattern (Fig .2).

One major advantage of twin block is that it could be worn 24 hours, hence the masticatoryforces are transmitted via the applaince to the dentition from where they are transmitted to the bony trabacule according to Wolf's law, hence influencing the rate of growth and the supporting structure of the supprting bone.[3]

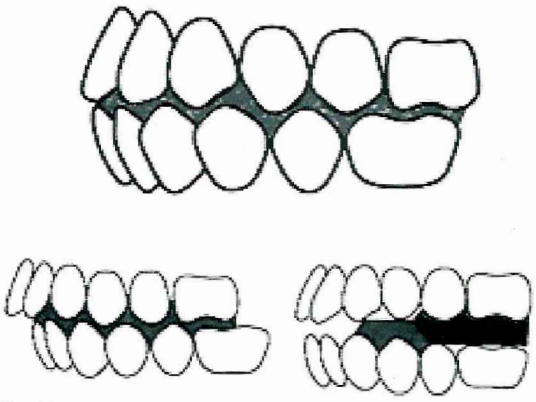
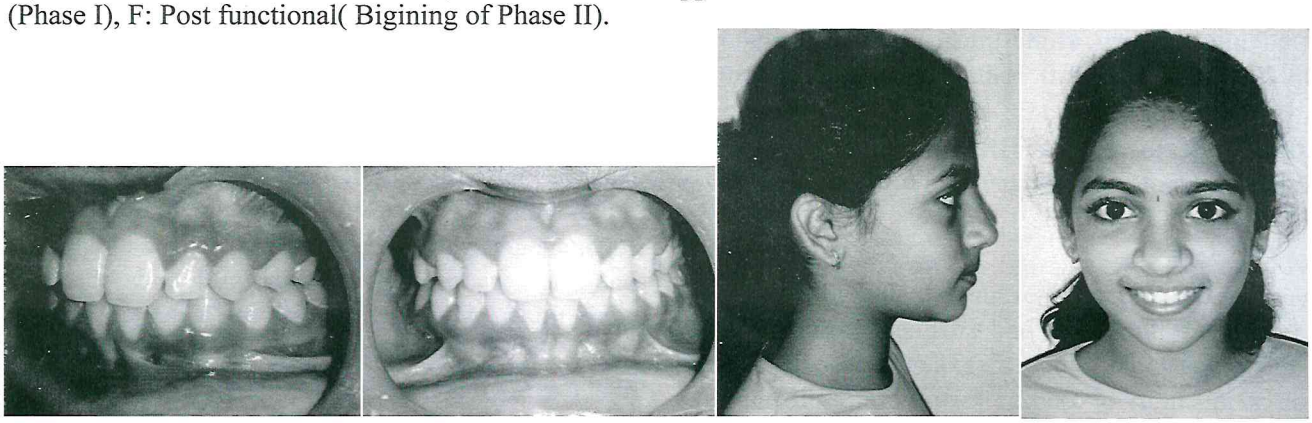


Fig.2

A 10 yrs. old female patient reported with the chief compliant of forwardly placed upper front teeth. On clinical evaluation case was diagnosed as skeletal Class II with normal maxilla and deficient mandible. As the patient showed all features favourable for functional appliance therapy most compliant appliance Twin block was given. The duration for the treatment with twin block and followed by non-extraction fixed mechanotherapy with straight wire .022 MBT mechanics was 2 years 6 months (Fig.3, 4).

Fig 3.A-C :Pre treatment extraoral, Profile, Smile and Positive visual treatment objective.

D,E : Pre treatment Intra oral Frontal, With Twin Block appliance (Phase I), F: Post functional(Bigining of Phase II).



G, H: Post Treatment intra oral, I, J: Post treatment extra oral.

Fig 4. Silhouette of progress
(Pre, Post functional, Post treatment)

Future direction of functional appliances:

Bilological research is making rapid progress in identifying the controlling factors in growth modification. The landmark article "Functional appliance therapy accelerates and enhances condylar growth" is not the optimistic evaluation of an enthusiastic clinician. Rather, it represents a revolution level to examine and define the chemical and biological factors involved in growth modification.

Replicating mesenchymal cells have been identified in the condyle and glenoid fossa during mandibular forward positioning[4,5]. Scientific study confirms importance of the genetic control factor. Patients with a high mesenchymal cell count would respond well to functional mandibular advancement, whereas a low cell count would produce a poor mandibular growth response.

In future, the mesenchymal cell count from the blood sample may define a patients potential to respond to functional mandibular advancement. Clinicians may be able to predict the individual patient's response to functional therapy with the information from a blood test or a salivary smear.

CONCLUSION:

The challenge of the functional appliance therapy is to maximize the genetic potential of the growth of the individual and guide the growing face and developing dentition towards a pattern of optimal development.

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