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REVIEW ARTICLE

Timing of Orthodontic Treatment

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ABSTRACT

In providing orthodontic care for paediatric patients, clinicians often questions whether to begin treatment early-during the primary or early-transitional dentition-or wait until all or most of the permanent teeth are present. A comprehensive knowledge is necessary for planning the implementation of preventive therapy or the choice for interception is left. Early orthodontic treatment is effective and desirable in specific situations. The early treatment eliminates noxious habits, re-orientates dental-maxillary development and compensates for the structural discrepancy between teeth and bone. This leads to a timely correction of defects, which could have a negative aesthetic impact, therefore, contributing effectively to a better harmonization of the child with the human environment where he lives, and improving his feelings of acceptance within it. However, the evidence is equally compelling that such an approach is not indicated in many cases for which later, single-phase treatment is more effective. Therefore, clinicians must decide, on a case-by-case basis, when to provide orthodontic treatment.

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INTRODUCTION

The goal of orthodontic treatment is to achieve "the achievable normal occlusion which is esthetically pleasing and functionally stable". Factors which influence orthodontic goal are not only the type of malocclusion, mechano-therapy or the type and duration of retention but equally important is the timing of treatment.

Many of the times the orthodontist tells his new patient "if only I had seen you earlier we could have prevented your problem". As guardian of occlusion, the general duty dental surgeon who is answerable to the queries of anxious parents finds himself at a loss as the problem of timing of orthodontic treatment is not very clear to him.

Whether it is a Class II or Class III type of malocclusion proper treatment timing based on knowledge of growth and development of craniofacial complex is an essential prerequisite for successful orthodontic therapy. There is a lot more in diagnosis than asking the patient to close his teeth together to check the molar relationship.

We all know "there is no place for never or always in biology" it is impossible to make a rule. No formula can develop to indicate precisely when an appliance should be placed. It is the duty of every dentist.

To understand the growth and development of dento-facial complex and have a clear concept as regards to timing of orthodontic intervention, there are four tissue systems involved in cases of mal-occlusion namely the bone system, muscle system and tooth system. Almost two-third of the cases who seek orthodontic treatment has dysplasia of bone system along with tooth system. Timely intervention can prevent and intercept these skeleto-dental dysplasias. Final result would be much more stable if only dental dysplasias can be managed.

Growth is an increase in size and development is a progress towards maturity. Although growth is an orderly process there are times when spurts' do occur. It is certainly *time* and *sex* linked.

The greatest increments occur during the following periods (1):

	Girls	**Boys**
First peak	3 yrs	3yrs
Second peak	6-7 yrs	7-9 yrs
Third peak	1-12 yrs	14-15 yrs

To bring about maximum changes in skeletal system cases must be treated during these peak periods. The crucial point is that girls mature earlier than boys.

CLINICAL APPLICATION OF KNOWLEDGE OF GROWTH

Deciduous dentition

- **Mild deep bite:** deep bite during deciduous dentition is due to upright incisors, inter-incisor angle is very obtuse / increased. This corrects by itself in permanent dentition due to reduced inter incisor angle and vertical alveolar growth (2).
- **Spacing in deciduous dentition:** The so called primate spaces are normal and are good sign for a developing occlusion in permanent dentition to become normal.
- **Retruded mandible and flush terminal plane** (end-on molar relationship): This also gets corrected by itself, in two ways.
  - We all know lee-way space, the difference in mesio-distal width C D and E and 3 4 5 which is 1.7mm on each side in mandible and only 1mm in maxilla (3). After eruption of premolar mandibular teeth settle down to normal molar relationship by gaining 0.7mm on each side more than maxillary.
  - Mandible grows much more downwards and forward then maxilla dose at the third peak of growth (the pre-pubertal growth spurt) and hence corrects the retruded mandible. Face become longer and convexity of face looks such less in longer face.

    In a six year old child when the first permanent molar erupts, it continues to have Class II molar relationship for want of leeway space, permanent lower incisor struggle to erupt into the arch and space is almost always at premium.

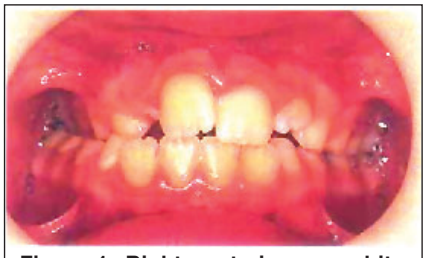

Figure 1: Right posterior cross bite with associated displacement

Most of the time this crowding in lower anterior region is also self correcting at this age mesio-distal width of incisor is final but inter canine width is still to increase.

- Mandibular inter-canine width settles down by nine years in girls and ten years in boys and maxillary inter canine width in girls by twelve years and eighteen years in boys (4, 5). Any attempt to expand the arches significantly after this age will be futile, no stable expansion in inter-canine width can be achieved after the age mentioned.

During mixed dentition period

Diastema in upper central incisor and flared lateral incisors are also transitory and it is called 'ugly duckling' stage. Obviously no orthodontic intervention is required science the eruptive thrust of the canine corrects this.

To keep the total treatment time as short as possible and to prevent skeletal dysplasia, timing of treatment will be decided by growth magnitude and direction in individual cases. We may not be able to reduce or increase the amount of growth but can certainly alter the direction to our benefit.

With this limited but significant knowledge on growth the following guidelines as regards to orthodontic therapy timing, keeping in view the benefits to patient in terms of cost, convenience and result are as follows :-

Cross Bites

Anterior and posterior cross bite should be corrected the moment they develop.

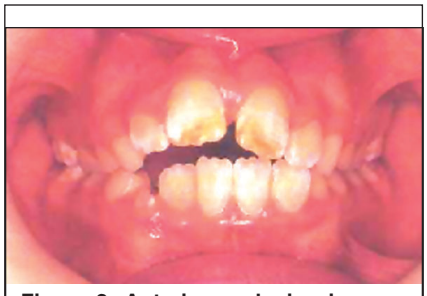

Figure 2: Anterior occlusion in a thumb-sucker

Cross bites in deciduous dentition (Figure 1), if not corrected the entire maxillary arch may be restrained in growth and mandible over developed which might lead to Class III malocclusion.

Pernicious oral habits

Such as finger, thumb or lip sucking (Figure 2**),** tongue thrusting and mouth breathing must be intercepted after 4 years of age otherwise they can cause bizarre malocclusions (5).

Problems of space maintenance

Premature loss of deciduous teeth leads to drifting of the permanent teeth and abnormal tongue habits. (Figure 3a and 3b) Therefore, space maintainers/ regainers should be placed, particularly in the lower arch (6).

Crowded deciduous dentetion

Although very unusual, but when present, arches should be expanded before 6 years of age as studies have shown that crowded deciduous dentition will have crowded permanent dentition and expansion of deciduous arches have a direct effect on permanent dentition which follows.

Figure 3a: Mandibular arch with anterior crowding

Figure 3b: Same mandibular arch after natural transition of posterior dentition

Crowded mixed dentition

- In patients with severe crowding, having pleasing profiles and class I molar relationship, serial extraction may be attempted with a word of caution "Correct diagnosis of paramount importance in successful execution of this procedure (7). Miscalculation can lead to deterioration of existing malocclusion."

Collapsed maxillary arches

- Since rapid palatal expansion requires adjustments in other craniofacial sutures it should be done during mixed dentition. (Figure 4a and 4b) Execution of mid-palate split during active growth period can hardly be over emphasized (8, 9).

Maxillary prognathism

- **Patient having procumbent maxillary incisors with spaces**
  It is advisable to gather in the incisors as they are very susceptible to fracture and lip trapping accentuates the protrusion. Word of caution is "ugly duckling stage"
- **Cases where maxilla is overgrown in relation to mandible**
  Orthopedic force of 450gms - 600gms each side may be applied to the maxilla to restrict its growth n allow the mandible to grow freely and catch up with maxilla.

Mandibular retrusion

- Sometimes convexity of face exists not because of maxillary protrusion but due to mandibular retrusion. Myofunctional appliances such as activator, bionator etc are very effective to correct mandibular retrusion if used during prepubertal growth spurts (10). Even Frankel has advised appliances to be placed as early as 8yrs of age as he believed in functional matrix theory of growth.

Mandibular prognathism

If mandibular prognathism is evident during deciduous dentition it is advisable to apply extra oral orthopedic force as early as 3yrs of life (11). Otherwise, to prevent class III relationship from developing, advantage of residual growth during mixed dentition period must be taken. Orthopedic force of 900 – 1350 gm each side through chin cap is very effective in redirection of mandibular growth. Correction of class III is very difficult in the permanent dentition where growth has tapered. Surgery has often to be restored in such cases.

Psychological aspects

In today's face conscious society the psychological implication of malocclusion can be enormous. A child is like a fragile flower starts getting esthetic awareness fairly early in life. We should remember that smaller the period of deformity the less would be the psychological implications (12).

A properly motivated child can be highly cooperative but in case of uncooperative child treatment is best deferred for a few months, even years.

CONCLUSION

In conclusion it can be said, treatment in mixed dentition opens the door for an orthodontist to apply his judgment and experience. Proper diagnosis and treatment planning can produce the most gratifying results during mixed dentition stage. It is here we have growth to assist us, the hard tissue are highly responsive to forces applied and soft tissue show higher degree of adaptability, thereby enhancing the stability of results. On the other hand lack of careful planning can lead to disastrous results. It should be remembered that there is generally greater danger in: "Too much too soon, rather than in too little too late".

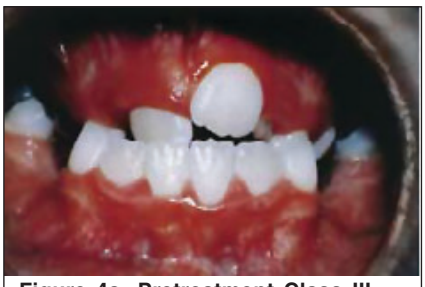

Figure 4a: Pretreatment Class III malocclusion (transitional dentition)

Figure 4b: Post-treatment Class III occlusion (permanent dentition)

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