

Early treatment for the Class II pediatric dental patient

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The pediatric dentist is in a unique position to positively influence the development of the face of a child. Clinically, the child's face and related skeletal structures can be altered while growth is taking place, and the overall health and appearance of the child can be improved. The changes can be incredible, giving the pediatric dentist, the parents, and the patient a marvelous sense of accomplishment and satisfaction.

The pediatric dentist should be aware of aspects of these changes which are possible, regardless if he chooses to actually treat the patient, or decides to refer the child to an orthodontist.

Historical Perspective

Before considering diagnosis and treatment, the pediatric dentist should have some historical perspective of orthodontic treatment.

Prior to Angle, crowded dentitions generally were treated with extractions. Usually, the permanent canines erupted buccally (as the cortical plate of bone is thinner on the facial) and these teeth were then most likely to be extracted. With subsequent lack of canine support, aging of the face was not esthetic as the profile tended to become more concave.

Angle and his students, Broadbent, Brodie, Hellman, Oppenheimer, and Ketchum, were all strong advocates of nonextraction orthodontic treatment. Only Case dissented, feeling that extractions were warranted in about 15% of his patients.

In the 1930s, Brodie, using Broadbent's cephalostat, introduced information that the mandibular plane and the nasal floor seemed to descend with growth in a fairly predictable and parallel manner. This disagreed with Angle who had felt that structures were essentially mobile and that bone would change to the dental position following tooth movement.

Thus began a controversy between those who felt that bony structures were moldable and changeable and those who felt that they were predictable and unchange-

able. This debate was overshadowed when Tweed, concerned with relapse of crowding in his cases, re-treated with extractions approximately 25 cases (at no cost and during the Depression years). The orthodontic community then gave credence to the extraction philosophy. The possibilities of bony changes to circumvent extractions became a closed issue in the United States.

Flattening of the face and very straight profiles generally continued until the early 1970s. In 1985 Behrents demonstrated how the face changes with aging. With a group of 133 patients of the original Bolton sample (who had never received orthodontic treatment), he showed precisely what happens in the aging face and how faces become more recessive with time.

Today, extractions remain common as some practitioners continue to treat most types of patients in the same way, waiting for permanent teeth to erupt, then extracting and placing the appliances. Of course, extractions are necessary in selected cases, but certainly the prevalence of extractions has decreased, and will likely continue to do so as clinicians gain a better understanding of growth and development of the dentofacial structures and their relationship to the temporomandibular complex.

Socio-Psychological Implications

Facial esthetics play a very critical part in an individual's self perception and perception by others. The pediatric dentist must be aware of the implications of attractiveness to the individual.

Bersheid (1980) has shown a noticeable difference in reaction among children to unattractive faces. In later studies she showed that children ages 7-8 years had the same perception and reaction to unattractive faces as adults who were 25 years of age.

In other studies, Cross and Cross noted that individuals with well balanced faces attained better jobs,

more promotions, and were consistently perceived to be happier by their peers.

In 1975 Lucker demonstrated that unattractive children had an altered self-perception of their ability to solve problems, regardless of whether they could actually solve the problems. And Bersheid indicated that various studies have indicated that teachers tend to give more response and attention to children with more attractive faces. This subject is further elucidated in the literature review of the second workshop, *Supervision of Class II discrepancies*.

From all of this information, it becomes evident that the psychological aspects of facial esthetics should be taken into serious consideration by clinicians, and that children should be evaluated for treatment at a young age in order to attain the best possible facial balance.

Prevalence of Class II Malocclusions

Ricketts (1957) has stated that a Class II malocclusion is capable of becoming 25% more severe each year. Although this is his opinion, it certainly is apparent that very few Class II malocclusions improve with time. In addition, Angle (1907) referred to the "progressive deformity" of the Class II, division 1 discrepancy. White and Proffit (1985) report that in the 1960s, Kelly (1977) and various co-authors working for the United States Public Health Service completed 2 large-scale studies of malocclusions. It was concluded that about 15% of American youths (about 30 million) had Class II malocclusions; it was further noted that these Class II malocclusions were amenable to orthodontic treatment, and that the vast majority of them could have their condition corrected very satisfactorily with orthodontic treatment alone. The estimate was that 95% of Class IIs could be treated orthodontically, while the remaining 5% were considered candidates for surgery. Half of the surgery candidates (about 750,000 patients) would benefit from a combination of orthodontics and surgery to correct the malocclusion. White and Proffit (1985) have stated that beyond the 750,000 patients now in need of Class II surgery, there are an additional 27,500 new cases per year.

The next consideration is specific identification of the discrepancy — whether dental, skeletal, or both. In 1981, McNamara found mandibular retrusion in greater than 60% of Class II malocclusions. He concluded that mandibular retrusion, along with maxillary dental protrusion and excess vertical development (dolichofacial), are among the most common findings in Class II patients. He agreed with many earlier researchers (Wylie, Drelich, Craig, Blair, Sassouni, Nanda, and Moyers) that the Class II was not a single entity, but resulted from numerous combinations of components.

This further agrees with Ricketts' studies of the combined nature in Class II malocclusions. Ricketts had demonstrated in 1960, with a sample of 300 Class II patients, that the majority of these patients revealed combined skeletal and dental discrepancies.

Orthodontic Treatment Versus Orthognathic Surgery

In 1953, Bjork noted that research to date presented little evidence that growth could be influenced by treatment. Guided by Ricketts, the initial work of Klein (1957) revealed that it was possible to alter the sagittal position of the maxilla. This was further proven by Armstrong in 1971.

Ketterhagen showed in an unpublished report that permanent canines and premolars were affected positively by early treatment. Ricketts has also shown treatment in the primary dentition which has positively affected the permanent dentition.

Bell and Proffit (1980) report that early treatment is effective. They note that in most instances, extra oral force to the maxilla can control excessive maxillary growth. They further state that functional appliances may correct mandibular deficiency. In addition, they report that functional appliances may be quite successful in "guiding" skeletal growth, although it is not clear that they actually "stimulate" mandibular growth.

White (1985) reported that surgical intervention in the period of primary dentition should be reserved for patients with "congenital defects only."

White and Proffit (1985) reported that in the mixed dentition, it is not acceptable to proceed with surgical maxillary or mandibular advancements at ages 7-10. They reason that 5-10% will improve spontaneously with age, and that patients respond well to growth modification techniques (except in the most severe cases). Furthermore, Epker and O'Ryan (1962) suggested that growth after surgery may continue to express itself, and can lead to relapse and the need for further surgery.

White and Proffit (1985) conclude that surgical intervention should not be performed until after pubertal growth is complete, except in very unusual cases such as mandibular ankylosis secondary to trauma or infection, severe injury to joint, etc.

Surgery for the treatment of malocclusion is not without its complications. Hardy and Piecuch (1985) found 56% total relapse occurring in surgical cases during the period of intermaxillary fixation, with 44% relapse in the long-term follow-up period. The degree of advancement and relapse was similar to a study reported by Lake et al. (1981). Horizontal relapse after surgery, in the same direction as its presurgical position, was also demonstrated by Behrman (1972), Guernsey

(1974), Kohn (1978), and Schendel and Epker (1980) in other studies. Hardy and Piecuch (1985) also noted that while there was skeletal relapse, the dental position unexplainably held in anterior overjet cases. They concluded that while there was significant relapse of skeletal components following surgery of Class II cases, there was improvement due to the unexplained stability of the teeth, and that correction of the Class II malocclusion was essentially achieved and maintained.

The surgical literature supports that it is well worth the effort to attempt correction in a nonsurgical manner, regardless of the difficulty of prognosis. Early growth modification can avoid or at least minimize orthognathic surgery later. The clinician has everything to gain, and nothing to lose by trying. If however, there is no attempt at growth modification, it is far more likely that the patient will eventually require surgical treatment.

Consideration of Facial Forming Treatment

Traditionally, patients in orthodontic therapy have received similar treatment during similar time frames. This has been the case regardless of facial type. It is questionable that all patients have needed the "same treatment" at the "same time", need the "same arch size", and have the "same treatment objective." This has been the situation for those who routinely wait for complete dental development, and then extract teeth in the vast majority of cases.

There is an obvious variability of facial form among humans. This variability should affect treatment methods, responses, and objectives. Sassouni (1964), Ricketts (1975), Enlow (1977), and Moyers (1980) emphasize the variability in craniofacial form. When reading the literature, one rarely is made aware of the ramifications of facial types. Instead, variables between faces are "averaged." When treating a vertical growing (dolichofacial) or horizontal growing (brachialfacial) patient, the patient is not average, and the literature findings may not be accurate for clinical application.

The clinician must recognize that there is a range of "response to treatment." This range may be due in large part to the variability in "facial types." Therefore, the clinician should be aware of different treatment prognoses, objectives, procedures, and potential for relapse due to facial type, and the various environmental factors in the etiology of the patient's malocclusion.

In 1983, Trouten et al. addressed the matter of skeletal patterns underlying deep bite and open bite cases. They noted various part-counterpart relationships, or compensations, and identified combinations accounting for composite, multifactorial morphological relationships underlying malocclusions. They reported that there are compensatory adjustments of skeletal and

dental components during growth, which allow one to have a more "normal" face and function. However, this adjustment process can fall short, with inadequate compensation, and result in more substantial malocclusion.

The authors discussed that in individuals with normal occlusions there are some skeletal imbalances which exist due to various anatomical relationships (facial types). These structural imbalances have generally been "compensated" by other anatomical relationships, so that overall severe dysplasias are not expressed. They continue that there are multiple combinations of relationships which lead to the normality or abnormality, and that deep bites and open bites are essentially opposite anatomic entities. They are, in fact, very different skeletal facial forms.

Of course, the next consideration is determination of the "facial type" of the patient. Due to the variations of soft tissue form, the facial type should not be evaluated simply by looking at the patient. A method must be chosen that includes an appropriate cephalometric analysis. The cephalometric analysis selected should also be age and race related, and have a statistical sample (at least 30 cases). For the clinician interested in facial appearance, an assessment of growth direction and amount is also essential.

The data base for cephalometric analysis must be known, and include the variables of race, age, and facial type. Applying adult norms to children is not appropriate, nor is applying Caucasian norms to non-Caucasian patients.

Treatment of Class II Malocclusions

In 1984 Gianelly compared Class II treatment with light-wire, edgewise, and Frankel appliances. He found no statistically significant differences in treatment outcome when the techniques were compared. None gave a unique response. Extraoral traction did not result in maxillary retraction alone, and Frankel therapy did not result in mandibular growth alone. Essentially, similar results were found with both methods of treatment, and both showed larger mandibular growth increments than untreated control patients. Treatment results were useful for the average patient; however, these results might not apply to severe facial forms. Gianelly (1984) continued that the orthopedic contribution to mandibular growth by the Frankel appliance was difficult to evaluate, yet the use of headgear producing only maxillary changes was just as difficult to ascertain. He concluded that most treatment modalities probably influence the average growing face in a similar manner.

Owen (1986) evaluated Class II, Division 1 cases using Frankel and edgewise appliances on 2 groups of

50 patients. He found the edgewise appliance more effective in maxillary retraction and incisor torque control. The functional regulator (FR) produced less undesirable lip retraction. He noted that in those cases where the upper lip esthetics were already acceptable, the functional regulator might be the treatment method of choice. In those patients with an acute nasolabial angle (protrusive lip), it would be beneficial to use maxillary orthopedic retraction to produce best lip appearance. He concurred with Lo and Hunter (1982) who reported upper lip change proportional to upper incisor change.

None of these authors addressed treatment response variations, and they noted the need to change from one appliance method to another when there was a lack of treatment response.

Ricketts (1975) and Shulhof and Bagha (1975) demonstrated as much mandibular development with extraoral headgear as with a Frankel or activator appliance. It was inferred that the malocclusion was "unlocked," allowing more optimal growth to occur. Again, a combined correction was observed.

In a personal communication, Ricketts also noted the resting state of the musculature in malocclusions, and the likelihood that the mandible becomes opportunistic when the malocclusion is unlocked. However, he continued, the mandible could not exceed its genetic potential for growth. The concept of treating the resting musculature is confirmed by Frankel (1981), who has indicated that the functional regulator works while the muscles are at rest. Proffit (1986) has further led credence to this theory, noting it is the resting, or tonic, musculature that will have major influence on eventual skeletal form. Furthermore, Subtelny and Subtelny (1973) reported a small sample in which the resting musculature adapted to the malocclusion.

It may then be concluded that changes in skeletal and dental structures must be accompanied by a change in the intraoral environment. This allows for the combined correction and compensations reported in the literature.

Discussion

More research in the realm of early treatment is needed. However, the discussions presented reveal the importance of this concept. Regardless of the pediatric dentist's intentions to actually treat the young patient or to refer that patient, parents and colleagues often have questions pertaining to early treatment. Information must be available for adequate responses to the inquiries.

In order to provide accurate information, it is necessary for pediatric dentists and orthodontists to be aware and critical of the possibilities and practicalities of early treatment. Working together and drawing upon each

other's areas of expertise can only result in more superb care for children.

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