

The New Century for Orthodontics



Ian Walters

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Anchorage Control in the Use of the Twin Block and Other Functional Appliances

Aim of Paper -

To draw attention to important principles in anchorage control required to produce optimum skeletal correction with functional appliances in general, and the "Twin Block" appliance of Clark in particular.

Materials and Methods -

This paper is based on a thorough study of the literature, and cephalometric analysis of over 200 treated cases of skeletal Class II malocclusions using functional and fixed appliances.

Results -

The results of the study show that by proper attention to anchorage control, true skeletal correction of Class II malocclusions of juvenile, preadolescent and adolescent patients can be predictably achieved.

Discussion -

The evolution of the activator to its stripped down version of the Bionator of Balters and its improved form as the so-called American Bionator and Orthopaedic Corrector mediated a major advance in dentofacial orthopaedics. More recently the introduction of the Twin Block (Clark 1), was rapidly accepted by those clinicians who were routinely using functional appliances..

This appliance system using positive clasped retention also attracted clinicians who were interested in functional orthopaedic concepts but who lacked the confidence to use a free floating appliance such as the Bionator. This was the case with many specialist orthodontists whose formal education did not include adequate knowledge and experience of functional appliances.

However, the appliance design advocated by Clark had surprising deficiencies in anchorage control. Anchorage, as it relates to functional appliances, is poorly understood by many clinicians. For instance, to achieve maximum skeletal correction of a retrognathic or diminutive mandible, a fundamental requirement is the minimization of tooth movement while maintaining the forward mandibular position.

Figures 1, 2, 3 and 4 illustrate the pleasing facial transformation possible in a space of 9 months when true skeletal correction is achieved.

This was accomplished using Twin Block appliances with active screws to develop the arches. At the same time the guiding blocks made from a protrusive construction bite based on the cephalometric analysis, resulted in the mandible being translated from a skeletal II, dental II configuration, to a skeletal Class I, dental Class I by means of the upper and lower block locations. See Figures 5 and 6, where the malocclusion has been fully resolved through a global mandibular remodeling.

Classically the end result of optimum use of functional appliances is to have both dental arches well developed transversely and correlated with each other in good Class I dental relation on a Class I skeletal base. Ideally the interincisal angle should be in the vicinity of 125 degrees and the upper incisor to FH around 110 to 120 degrees. The final aesthetic and occlusal detailing seldom requires more than 8 to 10 months with fixed appliances.

When using the Bionator for example, the dental arches are



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Figs. 7 & 8 Twin Block appliance incorporating all required anchorage features including labial bow on upper appliance, lower incisal cap, and all lower posterior teeth incorporated into the anchor system.

developed, rounded, and correlated with a variety of active appliances such as Schwarz, Sagittal, Crozat, Jackson, Williams, Quadhelix. Only then is the Bionator introduced to translate and reposition the mandible and thereby evoke the accelerated phase of growth, transforming the skeletal Class II base to the skeletal Class I.

The less aware observer imagines initially that an orthopaedic growth modulated correction of the skeletal deficiency has been achieved. Subsequent cephalometric assessments of such cases lead to disappointment with the realization that essentially only a dental or orthodontic correction of the malocclusion has been produced. **This results in the erroneous conclusion that functional appliances produce only dentoalveolar changes, and, as further misinterpreted results are reported, the dental literature becomes seriously corrupted and misleading.**

Anchorage components of appliance systems -

In the case of the Bionator properly used, the lower incisors are prevented from proclining by engaging acrylic in all the lower posterior inter-dental embrasures and over their occlusal surfaces while easing the acrylic off the lingual surfaces of the lower incisors which are encased within an incisal cap. This is extended down the facial surface marginally beyond the height of contour line.

Thus the incisors are protected by the posterior acrylic recruiting all the buccal teeth into the anchor system while there is no contact on the lingual of the incisors and they are further prevented from proclining by the labial flange of the incisal cap.

Meanwhile, the upper labial bow recruits the upper six anterior teeth supported by the palatal cortical bone into the anchor system so that the buccal teeth do not move distally.

Now the full compliment of teeth are engaged in a powerful anchorage complex and the mandible cannot drift back by distalizing upper teeth or by significant forward movement of the lower teeth. The altered capsular matrix and the repetitive stimulation of the retrodiscal pad leads to a global remodeling and increase in size and form of the mandible, to achieve a significant and cephalometrically validated skeletal correction of the Class II mandible.

Anchorage Control With Twin Block Appliance -

When the design of the typical Twin Block appliance of Clark is analyzed, some deficiencies in anchorage are apparent and account for the predominantly dental rather than skeletal correction obtained by many clinicians with these appliances. Common deficiencies include;

1. The termination of the lower appliance at the distal of the premolars so that anchorage from molars is lost.
2. The lack of an incisal cap so that the incisors are free to tip.
3. The usual absence of the upper labial bow so that the incisors and canines as a group are not fully integrated into the anchor system.

A SPLIT BIONATOR IS THE IDEAL TWIN BLOCK APPLIANCE

The ideal Twin Block appliance should incorporate all the anchorage features available in the Bionator and is best thought of as a Bionator divided into two appliances. By incorporating retaining elements a wide range of active components can be included.

Anchorage control during treatment -

The labial bow may be removed for aesthetic reasons after the first 60 to 90 days. If the aesthetics of the case are critical then a clear thin vacuum formed retainer can be used as a base on which to fabricate the appliance. This will form a thin cap for the upper anteriors, including canines for superb anchorage. It will be completely aesthetically acceptable to the most critical patient. It, too, can be cut away once the neuro-musculature has adapted to

the new mandibular position.

It has already been mentioned that if the labial bow is absent in the first 60 to 90 days, then the muscular forces exerted distally by the advanced mandible will be transmitted through the blocks directly to the upper buccal teeth, which will distalize allowing the mandible to drift back leading to more dental compensation than skeletal correction.

Since Clark's basic appliance allows for active arch development while translation is occurring, three and four screw upper Sagittals often form the basis of the maxillary component in Division II cases requiring the advancement of the upper incisors together with transverse arch development. Any attempt to activate the Sagittal screws to advance the incisors in the early stages of treatment, (initial 60 to 90 days), will add to the distal forces on the upper buccal segments and compromise the anchorage.

For the same reason if Sagittal screws are placed to regain lost "E" space on the lower jaw, these should not be activated early since they will add to the forces tending to cause anterior alveolar drift in the premolar area and incisor proclination and may overwhelm the anchorage.

The same caution would apply if lower second molars were removed and Sagittal screws incorporated to drive the lower first molars back to regain lost arch length. (Making the dental match the skeletal).

In the author's experience slow activation of the transverse screws will not compromise anchorage if restricted to .25 mm per week.

Early proclination of the lower incisors, due to lack of posterior extension of the lower lingual flanges and lack of an incisal cap, quickly reduces the overjet into which the mandible was to have been translated and is in conflict with the treatment objectives.

There are obviously other times when the muscular forces developed through protrusion of the mandible can be allowed to generate tooth movement where such movement is a legitimate treatment goal. An obvious situation of this kind is where upper buccal teeth have drifted forward causing a loss of arch length and a dental component to the Class II malocclusion. The arch length can be regained by having no labial bow, or if present, keeping it out of contact until the correction is achieved. Similarly, if lower incisors are retroclined, the posterior anchorage can be dispensed with and acrylic left in contact with the lingual surfaces of the lower incisors until they are upright. A proper knowledge of the factors at work will allow such movement to be controlled with surprising accuracy.

Upper and lower blocks require opposing faces inclined at 70 degrees. The height or extent of engagement of the faces must be adequate to give positive control and the posterior teeth must be separated at least 5 mm in the construction bite to achieve this. Advancement of the mandible in the construction bite should not exceed 80% of the patient's capacity to protrude.

The best position for the "cut" is from the distal of the upper canine down to the distal of the lower first premolar which is clasped. In this way both the lower second premolar and the first molar can be erupted simultaneously if increased vertical dimension is a requirement. **TOOTH BLOCKS**

A number of clinicians successfully manage craniomandibular dysfunction through the use of functional appliances.

Although functional appliances cannot invoke growth in the adult mandible they are effective therapeutic tools for reducing joint dysfunction. Twin block appliances can be modified in the manner suggested to be well accepted by discerning adults to make full time wear quite practical.

Where appearance and speech are critical in importance, the incorporation of lower incisor and first premolar denture teeth to form the incisal cap and lower block, greatly enhances the aesthetic qualities of the appliances.



Figures 9, 10, 11
Twin Block construction using teeth and being used in the treatment of progressive idiopathic condylar resorption.

Upper posterior denture teeth may also be used to form the upper blocks. This innovation leads to highly aesthetic appliances which are virtually undetectable visually. Speech and masticatory function are also enhanced to a degree where the patient is not socially compromised. In fact, with the immediate improvement of profile and joint comfort the patient frequently enjoys enhanced social interaction. Patients with high verbal communication needs such as teachers and lecturers are able to function normally while wearing appliances full time. Under these circumstances therapeutic joint remodeling and rehabilitation are eminently feasible.

When adults are shown illustrations of “tooth block” appliances in action they readily accept orthopaedic treatments with a high degree of compliance with full time wear. This results in gratifying therapeutic results. These range from disc recapture progressive joint remodeling, elimination of skeletal asymmetries and remarkable facial enhancement with improved self image and life enjoyment.

To be continued next issue...



Dr. J.W. Truitt

The New Century for Orthodontics

The future of modern dentistry is unlimited for those who take the initiative and offer their patients the very best treatment procedures in orthopedics orthodontics and T.M.D. therapy. There is no longer any question as to whether the general dentist or the pediatric dentist utilizes these procedures in his or her practice. The overriding consideration is which treatment philosophy or appliance technique should one select in order to obtain the very best results for the patient and to achieve maximum productivity for the dental practice.

The classic mistake is to make the assumption that a particular treatment technique is the solution to any orthopedic, orthodontic or T.M.D. problem. The reality of the situation lies in the fact that the doctor must understand the underlying cause of the disease that is affecting the patient before a comprehensive treatment plan can be formulated.

Years of experience has taught me that if I am to be successful in treating my patients, there are three cardinal rules that I must follow and never violate. 1) Firstly and most important of all, I must understand the dental disease that is affecting my patient. This is my responsibility as a doctor, to our profession and it is my obligation to the patient!

2) Secondly, I must educate the patient and/or the parent so that they can understand the underlying cause of the disease process and therefore fully appreciate the required therapy necessary to correct their particular problem.

3) Thirdly, my treatment plan for the patient must be realistic! It should incorporate early orthopedic therapy when the child is in his/her most active growth period and is much more cooperative in wearing a removable skeletal remodeling appliance. For an adult, my treatment plan sometimes has to be modified to attain results which are a compromise compared to the ideal, and this should not be ruled out as an option.

Quite honestly, I believe our educational program through the Clinical Foundation of Orthopedics and Orthodontics will provide you, the doctor, with such skills as are necessary to correctly diagnose and treat a patient with an orthopedic, orthodontic or a T.M.D. problem. We do not base our educational program on an extraction or non-extraction technique as correct diagnosis will determine our treatment plan. We feel that we are an outstanding source of unbiased and well documented information, in the field of orthopedics, orthodontics and T.M.D. therapy. We can provide you with uncompromised support during the initial diagnosis of the patient, to the complete treatment planning and technical procedures that are required to successfully correct your patient's problems.

May I suggest that, irrespective of your current educational and experience level, that you consider taking advantage of our professional services. You will be rewarded with knowledge that you, your patients and your practice will all benefit from and continue to appreciate for many years into the future.

For further information, we invite you to call “The Clinical Foundation of Orthopedics and Orthodontics” at 1-800-843-3558.