

ANALYSIS OF CLINICAL EFFICACY OF INTERCEPTIVE TREATMENT OF CLASS II DIVISION 2 MALOCCLUSION IN A PAIR OF TWINS THROUGH THE USE OF TWO MODIFIED REMOVABLE APPLIANCES

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SUMMARY

Analysis of clinical efficacy of interceptive treatment of Class II division 2 malocclusion in a pair of twins through the use of two modified removable appliances.

The interceptive therapeutic approach of a functional type is indicated for the treatment of Class II Division 2 mandibular retrusion with deep bite, where improvement is required not only in occlusal relationships but also in skeletal and aesthetic parameters.

Purpose. The aim of this study is to assess, in two identical twins suffering from the same malocclusion, the effectiveness and clinical stability of functional interceptive Class II division 2 treatment during puberty by mandibular retro-positioning associated with deep bite, and to compare skeletal changes and dental and dental-alveolar changes induced by the application of two different modified removable appliances: Clark's Twin block and Bergersen's Occlus-o-guide®.

Results. The results show that both devices allowed for circumvention of the pre-functional therapy phase aimed at correcting the upper labial segment, and for the conversion of the Class II division 1 incisor relationship, they were able to promote significant and obvious clinical effects.

Conclusions. The study shows that Class II Division 2 functional type interceptive treatment of mandibular retrusion with deep bite conducted in the puberal phase through clinical use of modified Bergersen's Occlus-o-guide® allowed for simultaneous resolution of the skeletal, dental-alveolar and dental problems in one step, while that using modified Clark's Twin-block still requires a second phase of treatment necessary to resolve the alignment, levelling, inter-cuspidation of the arches, optimization of the dental overjet and overbite parameters and to the stabilization of the basal Class I.

Key words: occlus-o guide®, Twin Block, Class II division 2, paediatric patient.

RIASSUNTO

Analisi dell'efficacia clinica del trattamento intercettivo della malocclusione di Classe II divisione 2 in una coppia di gemelli omozigoti attraverso l'utilizzo di due dispositivi rimovibili modificati.

L'approccio terapeutico intercettivo di tipo funzionale trova indicazione nel trattamento della Classe II divisione 2 da retrusione mandibolare con morso profondo in cui è richiesto il miglioramento non solo dei rapporti occlusali ma anche dei parametri scheletrici ed estetici.

Scopo. Scopo del presente studio è quello di valutare, in due gemelli omozigoti affetti dal medesimo quadro malocclusivo, l'efficacia e la stabilità clinica del trattamento intercettivo funzionale della II Classe divisione 2 da retro-posizionamento mandibolare associata a morso profondo in età puberale e comparare i cambiamenti scheletrici e le modificazioni dentali e dento-alveolari indotte dall'applicazione di due differenti dispositivi rimovibili modificati: il Twin block di Clark e l'Occlus-o-guide® di Bergesen.

Risultati. I risultati ottenuti dimostrano che entrambi i dispositivi hanno consentito di eludere la fase pre-funzionale di terapia volta alla correzione del segmento labiale superiore e alla conversione del rapporto incisale in Classe II divisione 1 e sono stati in grado di promuovere rilevanti ed evidenti effetti clinici.

Conclusioni. Lo studio dimostra che il trattamento intercettivo di tipo funzionale della Classe II divisione 2 da retrusione mandibolare con morso profondo condotto in fase puberale attraverso l'utilizzo clinico dell'Occlus-o-guide® di Bergesen modificato, consente di risolvere simultaneamente le problematiche scheletriche, dentali e dentoalveolari in un'unica fase di terapia, mentre quello eseguito tramite l'utilizzo del Twin-block di Clark modificato richiede comunque una seconda fase di trattamento necessaria alla risoluzione dell'allineamento, livellamento, intercuspidazione delle arcate, ottimizzazione dei parametri dentali di overjet e overbite e alla stabilizzazione della I Classe basale.

Parole chiave: occlus-o guide®, Twin Block, Classe II divisione 2, paziente pediatrico.

Introduction

Functional ortho-paedodontic therapy has long been an important part of treatment methods used in the resolution of dental-facial malocclusions in growth subjects (1).

In the paedodontic patient this type of therapy is intended to act on abnormal behaviour of the musculature, resolving issues related to the presence of non-physiological functional spaces through the use of removable appliances; the ultimate goal is indeed to restore proper development of the oral-facial complex through functional rehabilitation (2). Many Authors are in agreement that this treatment should be initiated in a specific age group between 11 and 13 years, or puberty, in order to maximize individual growth (3,4,5). The optimal period of therapy should in fact coincide with the period of maximum height growth rate (6,7). Woodside D.G. has shown that the growth rate of facial bones, particularly the jaw, is similar to height growth, and Baume R.M., Buschang P.H. and Weinstein S. argue that the vertical changes to the face occur at rates that reflect the height growth (8,9,10). In this regard, the Authors argue that the Class II division 2 malocclusion from retro-mandibular positioning with deep bite, consisting of a disharmony between the sagittal and vertical relationships between upper and lower arches, and between the upper maxilla and mandible, is one of the most commonly encountered skeletal alterations in paedodontic patients in the puberty phase with the prevalence estimated between 52% and 56% (9).

The purpose of this study was to evaluate, in two identical twins suffering from the same malocclusion, the clinical effectiveness and stability of the functional Class II division 2 interceptive treatment by mandibular back-positioning associated with deep bite at puberty, and to compare skeletal and dental and dento-alveolar changes induced by the application of two different removable appliances: the Clark's Twin block and Bergersen's Occlus-o-guide®.

Clark's Twin Block

According to functionalist theory proposed by

Clark W.J. and Singh G.D., occlusal strength induced by the masticatory function and transmitted to the teeth is able to provide a continuous stimulus to bone remodelling, affecting the speed of growth (11,12). To this aim, is designed the Twin Block (1982), a removable appliance in resin consisting of two plates each provided with opposing lateral planes, inclined at 70° to the occlusal plane, which come into contact in the distal region of lower second premolars, resulting in a protruded position of the jaw and allowing the correct mandibular rotation (11). To date, few studies have been published on the effects induced by the Twin Block interceptive treatment of Class II malocclusion (13,14). In studies carried out among control groups and patients treated with this appliance it was demonstrated that it is capable of promoting a significant increase in the length of the mandibular body, even if the large part of the overjet correction was verified by the induction of a dentoalveolar controlled movement (15,16,17,18). The comparative studies conducted with other types of functional appliances such as Bass, Bionator and Frankel, showed that the Twin Block functional appliance appears to be the most effective in simultaneously producing both the changes to the sagittal and those related to the vertical plane (19,20,21). In fact, the optimal cephalometric timing for such treatment turns out to coincide with the corresponding period, or shortly thereafter, of the start of the peak pubertal growth, the last stage of mixed dentition (22). This in fact produces numerous beneficial effects, including: greater skeletal contribution to the correction of molar ratio, significant increase in the mandibular length and branch height and increase in condylar growth in posterior direction (23). Consequently, we are simultaneously watching a significant mandibular extension and an anterior repositioning of the condyle (22). The stability of the treatment is guaranteed by the angle of the inter-incisor reduction to a value of 125° (16,24). Moreover, in the literature, the small reports on the use of the Twin Block interceptive treatment of Class II division 2 malocclusion show that this appliance is able to promote growth and the front repositioning of the jaw, with a negligible effect on the branch height and maxillary growth (25,26).

Bergersen's Occlus-o-guide®

According to the *theory of guided occlusion* by Bergersen E.O., it is possible to achieve simultaneously the ideal occlusion by supporting, intercepting and guiding the innumerable variables of the times and methods of each element of tooth eruption, thereby exploiting the natural forces of growth to obtain harmonic occlusion in a balanced craniofacial context (27). To this aim have been designed The eruption guide appliances EGA (Eruption Guide Appliance), including the Occlus-o-guides® (28). These devices have the basic characteristic of guiding the teeth, initially during the emergence stage and subsequently in the more complex eruption stage, to the correct spatial position within the occlusal plane (29). The objective is therefore to prevent or eventually correct any development of more or less complex malocclusion before the dental exchange is fully completed, gradually guiding the permanent teeth towards a stable relationship in the Class I normal conformant arches with ideal parameters of overjet and overbite so as to be as close as possible to the physiology of occlusal development (30). The Occlus-o-guide® in particular is a preformed monoblock appliance, indicated for patients aged between 6 and 12 (30). It is made of soft elastomeric silicone, odourless and tasteless, according to a head to head incisor bite that, if on the one hand it has the ability to promote myoskeletal jaw growth or progress to achieve the basic Class I (true characteristic of a functional appliance), on the other hand it is able to guide the eruption of each permanent individual element in its proper place, or niche, ensuring intercuspitation and achieving and maintaining each tooth in the correct position until the end of the dental exchange, (proper capability of a positioner) (32). This appliance furthermore subjects the front teeth to intrusive, depressive forces and is also capable of promoting the eruption of the posterior sector to the optimal vertical position to allow stabilization of the overbite into ideal minimal values, before the periodontal ligament fibres condition their orthogonal settlement (31).

Studies to evaluate the clinical efficacy of EGA show that in on the skeletal level, condylar growth is enhanced, resulting in a significant increase both in

length and in the degree of mandibular advancement (33). We also note a significant increase in total anterior facial height, which in the sagittal maxillo-mandibular and molar relationship, with a significant decrease in the values of overjet and overbite, while not detecting appreciable changes in maxillary growth (33,34,35). The occlusal correction is achieved mainly through changes incurred in the alveolar region of the mandible, while no effect is observed in the maxilla in terms of position, size, angle and protrusion of the incisors (36,37). In particular, the Occlus-o-guide® is also able to inhibit the vertical skeletal growth while simultaneously ensuring a good control of the overjet and overbite dental parameters (38). In the Literature there has been no precise report on the Occlus-o-guide® in the treatment of Class II, Division 2 malocclusion.

Materials and methods

In the department of Paediatric Dentistry of Azienda Ospedaliera Policlinico Tor Vergata of Rome, during the first paedodontic visit, a pair of homozygous twins was selected, P.F. and P.R., 11 years and 4 months of age, in mixed dentition, with the same malocclusion: Class II division 2 caused by mandibular retro-positioning associated with deep bite. The selection criteria was based on radiographic verification of the existence of further potential craniofacial growth, and on the presence of Class II division 2 dental relationship on a Class II skeletal basis with an ANB including between the 4° and 6° and mandibular retro positioning (SNB <78°). The cephalometric analysis confirmed that during the treatment, the lower incisors may be proclined while the axial inclination of upper incisors may be initially adjusted by a labial movement of tipping and subsequently maintained so during the skeletal correction of malocclusion.

The first phase of testing was conducted by recording clinical parameters. For each of the two patients the radiographic documentation complete with orthopantomography of the dental arches (Figs. 1A, 2A), and telerradiography of the skull in the latero-lateral projection (Figs. 1B, 2B) was in fact collected, followed by registration of the plaster study mo-



Figure 1A
P.R.: Orthopantography of the dental arches at the beginning of treatment.



Figure 2A
P.F.: Orthopantography of the dental arches at the beginning of treatment.



Figure 1B
P.R.: Teleradiography of the skull in latero-lateral projection at the beginning of treatment.



Figure 2B
P.F.: Teleradiography of the skull in latero-lateral projection at the beginning of treatment.

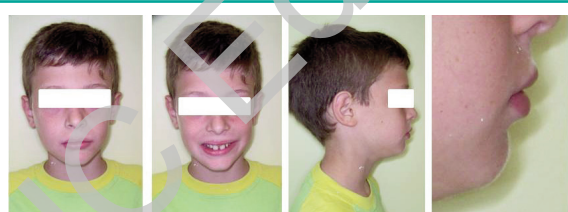


Figure 1C
P.R.: Image of the face in frontal view, frontal with smile, lateral and nasolabial profile at the beginning of treatment.

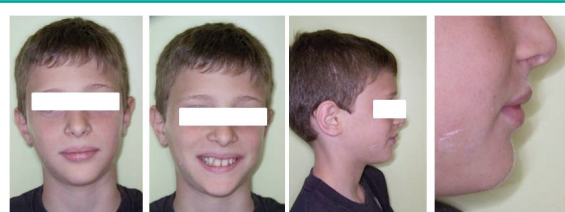


Figure 2C
P.F.: Image of the face in frontal view, frontal with smile, lateral and nasolabial profile at the beginning of treatment.

dels, and the following photographic documentation was made:

- extra-oral, with photos of the face in frontal view, frontal with smile, side and naso-labial-chin profile (Figs. 1C, 2C);

- intra-oral with photos of frontal view, right side, left side, upper occlusal and lower occlusal (Figs. 1D, 2D).
- In accordance with Standard cephalometric analysis (39), parameters were recorded for skele-



Table 1 - P.F.: Cephalometric analysis at the beginning of treatment.

SAGITTAL ANALYSIS							
OF BASIC		N.V.		SUPPLEMENTARY		N.V.	
SNA		82° +/- 2°	79°	AO-BO	0 +/- 2 mm	5 mm	
SNB		80° +/- 2°	73,5°	NPg ^ PF	87° +/- 3°	94°	
ANB		2° +/- 2°	5,5°	SN - GoMe	11 y. Equiv.	7,2 mm - 7,4 mm	
N perp. point A		b. 0 mm	7 mm				
		a. 1 mm					
N perp. pointPg		b. - 8 / -6 mm	-7 mm				
		a. - 2 + 4 mm					
VERTICAL ANALYSIS							
OF BASIC		N.V.		SUPPLEMENTARY		N.V.	
FMA		25° +/- 3°	15°	SN ^ P.occl.	14° +/- 3°	15°	
SN ^ GoGn		32° +/- 5°	34°	SN ^ ANS-PNS	10° +/- 3°	8°	
P.occl. ^ PF		9° +/- 3°	6°				
DENTAL ANALYSIS							
OF BASIC		N.V.		SUPPLEMENTARY		N.V.	
IMPA		90° +/- 5°	81°	UPP. INC. - NA	4 mm	4 mm	
FMIA		65° +/- 5°	78°	LOW. INC. - NB	4 mm	4 mm	
UPP. INC. ^ PF		105° - 110°	101°	OVERJET	2,5 +/- 2,5 mm	6 mm	
INTERINC. ANGLE		130° +/- 5°	155°	OVERBITE	2,5 +/- 2,5 mm	7 mm	
AESTHETIC ANALYSIS							
OF BASIC		N.V.		SUPPLEMENTARY		N.V.	
Z ANGLE		78°	79°	NPgc ^ PF	90° +/- 3°	91°	
E LINE	UL	-4 +/- 2 mm	1 mm				
	LL	-3 +/- 2 mm	-4 mm				
ANL ANGLE		90° - 110°	115°				
GROWTH PREVISION							
JARABAK		N.V.		N.V.		N.V.	
NS ^ SAr		122° +/- 5°	127°	NGo ^ GoMe	70° - 75°	72°	
SAr ^ ArGo		144° +/- 6°	140°	TOTAL SUM	396° +/- 6°	395°	
ArGo ^ GoMe		130°	128°	Y AXIS	59° +/- 4°	50°	
ArGo ^ GoN		48° - 52°	57°				

tal and dental growth analyses forecast for both patients (Tables 1, 2).

In the second phase of testing we proceeded to the design of two appliances. In the realization of the modified Twin-block by the addition of two distal snare springs to the upper lateral incisors and two zeta springs behind the upper central incisors, the bite registration was carried out in a position of overcorrection, with incisal relationship in a head to head ra-

tio (overjet zero or slightly inverted). However, ensuring that the two arches are kept together, separated by a space of 7-8 mm, this does not cause any interference when the upper central incisors are labially proclined. The height of the blocks ensures that the patient can assume a protruding and more comfortable jaw position, at the same time enabling him to properly close in a centric relationship. This device was assigned to the patient P.R., of whom a daily colla-

Table 2 - P.R.: Cephalometric analysis at the beginning of treatment.

SAGITTAL ANALYSIS					
OF BASIC	N.V.		SUPPLEMENTARY	N.V.	
SNA	82° +/- 2°	78°	AO-BO	0 +/- 2 mm	1 mm
SNB	80° +/- 2°	74°	NPg ^ PF	87° +/- 3°	85°
ANB	2° +/- 2°	5°	SN - GoMe	11 y. Equiv.	7,6 mm - 7,2 mm
N perp. point A	b. 0 mm	-2 mm			
N perp. pointPg	a. 1 mm b. - 8 / -6 mm a. - 2 + 4 mm	-1 mm			
VERTICAL ANALYSIS					
OF BASIC	N.V.		SUPPLEMENTARY	N.V.	
FMA	25° +/- 3°	17°	SN ^ P.occl.	14° +/- 3°	20°
SN ^ GoGn	32° +/- 5°	34°	SN ^ ANS-PNS	10° +/- 3°	17°
P.occl. ^ PF	9° +/- 3°	11°			
DENTAL ANALYSIS					
OF BASIC	N.V.		SUPPLEMENTARY	N.V.	
IMPA	90° +/- 5°	75°	UPP. INC. - NA	4 mm	0 mm
FMIA	65° +/- 5°	83°	LOW. INC. - NB	4 mm	2 mm
UPP. INC. ^ PF	105° - 110°	104°	OVERJET	2,5+/-2,5 mm	6 mm
INTERINC. ANGLE	130° +/- 5°	153°	OVERBITE	2,5+/-2,5 mm	6 mm
AESTHETIC ANALYSIS					
OF BASIC	N.V.		SUPPLEMENTARY	N.V.	
Z ANGLE	78°	69°	NPgc ^ PF	90° +/- 3°	88°
E LINE UL	-4 +/- 2 mm	0 mm			
LL	-3 +/- 2 mm	-3 mm			
ANL ANGLE	90° - 110°	108°			
GROWTH PREVISION					
JARABAK	N.V.			N.V.	
NS ^ SAr	122° +/- 5°	127°	NGo ^ GoMe	70° - 75°	71°
SAr ^ ArGo	144° +/- 6°	141°	TOTAL SUM	396° +/- 6°	396°
ArGo ^ GoMe	130°	128°	Y AXYS	59° +/- 4°	57°
ArGo ^ GoN	48° - 52°	60°			

boration equivalent to 14 hours was requested (Fig. 1E). In designing the Occlus-o-guide®, based on the exchange phase, the G series was chosen and by measuring was found to be the most suitable; first, on the plaster model, two Australian 0.14 wire springs were modelled, which were then placed in niches inside the appliance, corresponding to the palatal surface of upper central incisors. This appliance was assigned to the patient P.F., of whom it was requested

that he wear the device passively for 12 hours during the night, and for 2 hours during the day, do chewing exercises (Fig. 2E).

Under the treatment protocol, monthly clinical, six months photographic and annual radiographic (including Orthopantomography of dental arches and telerradiography of the skull in latero-lateral projection) controls were carried out. Both patients were monitored for a total period of 18 months.



Figure 1E
P.R.: Modified Twin block of Clark.



Figure 2E
P.F.: Modified Occlus-o-guide® of Bergersen.

Results

Skeletal, dental and Standard (34) cephalometric analysis growth forecast parameters were taken into account the before (Tables 1, 2) and after (Tables 3, 4) treatment. The results show that both appliances were able to promote significant and obvious clinical effects.

Discussion

The Class II division 2 malocclusion is a clinical entity that presents considerable difficulties in predicting an outcome that is very stable over time (24). Traditionally, treatment of Class II Division 2, associated with a moderate to severe skeletal discrepancy of the jaw, provides a pre-functional therapy aimed only at correcting the upper labial segment for proclination of the central maxillary incisors and the Class II division 1 incisor conversion ratio (25). The success of this therapy is, therefore, in the simultaneous correction of the transverse, sagittal and vertical discrepancies (25).

The purpose of this study was to evaluate, in two Homozigous twins with the same malocclusion, the clinical effectiveness and stability of the interceptive functional treatment of Class II division 2 caused by the mandibular retro-positioning associated with deep

bite at puberty, and to compare the skeletal, dental and dento-alveolar changes induced by the application of two different modified removable appliances: the Clark's Twin block and Bergersen's Occlus-o-guide®. The results show that both devices were able to promote significant and obvious clinical effects.

In the first phase of therapy, the activation of retro-incisor zeta springs added on both appliances allowed the dental-alveolar correction of the *Upper incisor angle* ^{PH} for the vestibular version of the maxillary central incisors and the conversion of the incisor relationship from Class II division 2 incisor into Class II division 1.

In the second phase of therapy, the most significant effects were those related to the anterior repositioning of the main mandibular points with respect to the vertical reference line that indicates clear forward movement and increase in length of the mandibular body. The overjet correction occurred mainly as a result of mandibular growth and minimally because of the induction dento-alveolar type of a controlled movement. The slight proclination of the lower incisors obtained at the end of treatment contributed to both the decrease of the inter-incisor angle, as a guarantee of stability of the treatment, and the advancement of the lower lip required for the correction of the profile. No significant effect is observed in the upper maxilla in terms of position, size, angle and protrusion of the incisors.

Although interceptive treatment performed by the cli-

Table 3 - P.F.: Cephalometric analysis at the end of treatment.

SAGITTAL ANALYSIS					
OF BASE	N.V.		SUPPLEMENTARY	N.V.	
SNA	82° +/- 2°	80°	AO-BO	0 +/- 2 mm	4 mm
SNB	80° +/- 2°	78°	NPg ^ PF	87° +/- 3°	90°
ANB	2° +/- 2°	2°	SN - GoMe	11 y. Equiv.	8 mm - 8 mm
N perp. point A	b. 0 mm	4 mm			
N perp. point Pg	a. 1 mm b. - 8 / -6 mm a. - 2 + 4 mm	-3 mm			
VERTICAL ANALYSIS					
OF BASE	N.V.		SUPPLEMENTARY	N.V.	
FMA	25° +/- 3°	20°	SN ^ P.occl.	14° +/- 3°	14°
SN ^ GoGn	32° +/- 5°	34°	SN ^ ANS-PNS	10° +/- 3°	8°
P.occl. ^ PF	9° +/- 3°	8°			
DENTAL ANALYSIS					
OF BASE	N.V.		SUPPLEMENTARY	N.V.	
IMPA	90° +/- 5°	93°	UPP. INC. - NA	4 mm	3 mm
FMIA	65° +/- 5°	67°	LOW. INC. - NB	4 mm	5 mm
UPP. INC. ^ PF	105° - 110°	108°	OVERJET	2,5+/-2,5 mm	4 mm
INTERINC. ANGLE	130° +/- 5°	125°	OVERBITE	2,5+/-2,5 mm	4 mm
AESTHETIC ANALYSIS					
OF BASE	N.V.		SUPPLEMENTARY	N.V.	
Z ANGLE	78°	75°	NPgc ^ PF	90° +/- 3°	90°
E LINE UL	-4 +/- 2 mm	3 mm			
LL	-3 +/- 2 mm	1 mm			
ANL ANGLE	90° - 110°	112°			
GROWTH PREVISION					
JARABAK	N.V.			N.V.	
NS ^ SAr	122° +/- 5°	125°	NGo ^ GoMe	70° - 75°	70°
SAr ^ ArGo	144° +/- 6°	144°	TOTAL SUM	396° +/- 6°	395°
ArGo ^ GoMe	130°	126°	Y AXIS	59° +/- 4°	54°
ArGo ^ GoN	48° - 52°	57°			

anical use of the modified Twin block obtained: a good correction of the molar ratio, a significant increase in mandibular length and branch height, a significant increase in posterior direction condylar growth with an anterior repositioning of the condyle and improvement in the overjet and overbite, it still required a further stage of finishing time aimed at alignment resolution, levelling, intercuspitation of dental arches, optimization of the dental parameters of

overbite and overjet and the stabilization of basal Class I (Figs. 1F, 1G, 1H, 1I).

Interceptive treatment performed by using the modified clinical Occlus-o-guide® permits instead:

- the strengthening of condylar growth in both length and degree of mandibular myo-skeletal progress as well as the establishment of basal and dental Class I;
- the achievement of optimal intercuspitation for

Table 4 - P.R.: Cephalometric analysis at the end of treatment.

SAGITTAL ANALISYS					
OF BASE	N.V.		SUPPLEMENTARY	N.V.	
SNA	82° +/- 2°	82°	AO-BO	0 +/- 2 mm	5 mm
SNB	80° +/- 2°	79°	NPg ^ PF	87° +/- 3°	88°
ANB	2° +/- 2°	3°	SN - GoMe	11 y. Equiv.	7,9 mm - 7,7 mm
N perp. point A	b. 0 mm	3 mm			
	a. 1 mm				
N perp. point Pg	b. - 8 / -6 mm	-5 mm			
	a. - 2 + 4 mm				
VERTICAL ANALISYS					
OF BASE	N.V.		SUPPLEMENTARY	N.V.	
FMA	25° +/- 3°	21°	SN ^ P.occl.	14° +/- 3°	20°
SN ^ GoGn	32° +/- 5°	33°	SN ^ ANS-PNS	10° +/- 3°	7°
P.occl. ^ PF	9° +/- 3°	9°			
DENTAL ANALISYS					
OF BASE	N.V.		SUPPLEMENTARY	N.V.	
IMPA	90° +/- 5°	94°	UPP. INC. - NA	4 mm	3 mm
FMIA	65° +/- 5°	62°	LOW. INC. - NB	4 mm	4 mm
UPP. INC. ^ PF	105° - 110°	107°	OVERJET	2,5 +/- 2,5 mm	4 mm
INTERINC.ANGLE	130° +/- 5°	128°	OVERBITE	2,5 +/- 2,5 mm	5 mm
AESTHETIC ANALISYS					
OF BASE	N.V.		SUPPLEMENTARY	N.V.	
Z ANGLE	78°	74°	NPgc ^ PF	90° +/- 3°	90°
E LINE UL	-4 +/- 2 mm	3 mm			
LL	-3 +/- 2 mm	1 mm			
ANL ANGLE	90° - 110°	115°			
GROWTH PREVISION					
JARABAK	N.V.			N.V.	
NS ^ SAr	122° +/- 5°	123°	NGo ^ GoMe	70° - 75°	73°
SAr ^ ArGo	144° +/- 6°	143°	TOTAL SUM	396° +/- 6°	396°
ArGo ^ GoMe	130°	130°	Y AXYS	59° +/- 4°	56°
ArGo ^ GoN	48° - 52°	54°			

guiding the eruption and maintenance of each individual permanent element in the correct position until the end of the dental exchange;

- the decrease in the overjet and the stabilization of the overbite within the ideal minimum;
- the alignment and levelling of the dental arches;
- progressive improvement of gingival recession present in correspondence to the vestibular surfaces of both central mandibular incisors (Figs.

2F, 2G, 2H, 2I, 2L).

This gingival recession recognized a multifactorial etiology: the low level of oral hygiene and improper brushing techniques carried out favoured the accumulation of bacterial plaque in an area where the anatomy of both the gum and the alveolar bone appears to be too thin, and that the insertion of the labial frenulum is quite close to the gumline. Moreover, the presence of severe deep bite and palate-ver-

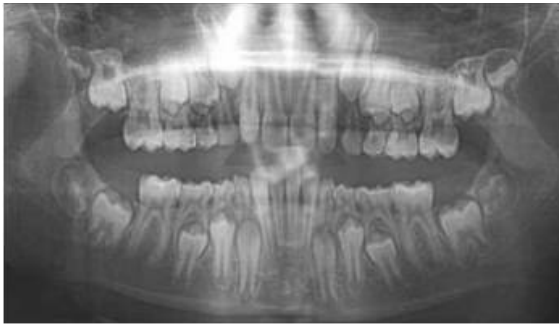


Figure 1F
P.R.: Orthopantography of the dental arches at the end of treatment.

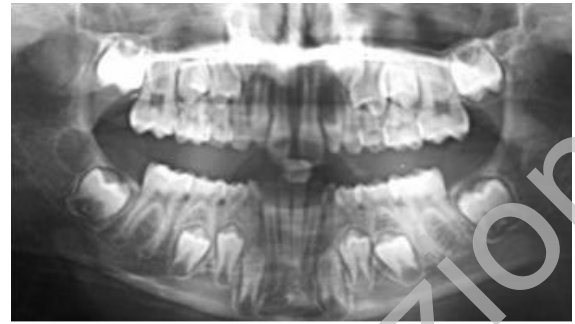


Figure 2F
P.F.: Orthopantography of the dental arches at the end of treatment.



Figure 1G
P.R.: Teleradiography of the skull in latero-lateral projection at the end of treatment.



Figure 2G
P.F.: Teleradiography of the skull in latero-lateral projection at the end of treatment.

sion of the upper central incisors led to a constant trauma caused by contact between the upper incisors and the vestibular gingival margin of the lower incisors. Numerous studies reveal that in mixed dentition, gingival recession present on the vestibular surface of mandibular incisors shows a tendency to diminish with the passage of time and to improve with increasing chronological age (40,41). This improvement seems to be correlated on the one hand to physiological gain in the loss of the attachment, and on the other to dealing with the root causes and/or favouring the recession (42). In particular, Nanda R.S., studying the changes that occur during the longitudinal growth of soft tissues, found that changes involving the development of these tissues are able to make positive modifications after clinical use of

Class II functional appliances (43,44,45). Therefore, the use of a removable, elastodontic, Class II functional appliance, with no hard surfaces, able to support and guide the eruption of teeth into ideal occlusion with moderate and constant strength, gradually allowed correction and stabilization of the overbite and the overjet within minimum ideal values that improve and resolve gingival recession.

Conclusions

The therapeutic approach of interceptive functional type is indicated for the treatment of Class II Division 2 deep bite with mandibular retrusion, in which improvement is required not only for occlu-



Figure 1H

P.R.: Intraoral image in frontal view, right lateral, left lateral, superior occlusal and inferior occlusal at the end of treatment.



Figure 2H

P.F.: Intraoral image in frontal view, right lateral, left lateral, superior occlusal and inferior occlusal at the end of treatment.



Figure 11

P.R.: Image of the face in frontal view, lateral and $\frac{3}{4}$ with smile at the end of treatment.



Figure 21

P.F.: Image of the face in frontal view, lateral and $\frac{3}{4}$ with smile at the end of treatment.

sal relationships but also of the skeletal and aesthetic parameters.

The treatment performed by using the modified Clark's Twin-block has brought about many important clinical effects, both skeletal and dental. This appliance, if on the one hand allowed to circumvent the pre-functional therapy aimed only at correction of the upper labial segment and to the conversion of incisal relationship in Class II Division 1, it however needs a second treatment phase for resolving the alignment, levelling, intercuspitation of the arches, optimization of the dental overbite and overjet parameters and stabilization of the basal Class I.



Figure 2L

P.F.: Improvement of gingival recession.

Therefore, this study demonstrates that interceptive functional treatment of Class II division 2 caused by mandibular retrusion with deep bite conducted in puberal phase with clinical use of modified Bergen's Occluso-guide[®], allows for simultaneously solving the skeletal, dentoalveolar and dental problems in one single therapy phase.

The long-term efficacy of this treatment modality, as well as the possible absence or presence of a percentage, even a minimal *recidiva* can be assessed only after the appropriate period of stabilization and post-stabilization.

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