Terapija malokluzije II klase 1. odelenja pomoću herbst aparata

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Treatement of 2nd class division 1 malocclusion by using herbs applience

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CASE REPORT

KRATAK SADRŽAJ

U ovom radu je prikazana terapija sprovedena kod pacijenta ženskog pola, uzrasta 14.5 godina, sa malokluzijom II klase 1. odelenja. Na osnovu kliničkog nalaza, morfološke analize sprovedene na studijskim modelima, analize ortopantomografskog i profilnog kefalometrijskog snimka, utvrđeno je da se radi o malokluziji II klase 1. odelenja , sa dubokim preklopom, protruzijom frontalnih zuba obe vilice i blagom teskobom u donjem zubnom nizu. Pacijent je bio u terapiji pomoću aktivatora po Andresen-u oko 2 godine ali bez značajnog uspeha. S obzirom na ovu okolnost i uzrast pacijenta, nastavljena je terapija pomoću Herbst aparata 6 meseci, i fiksnog aparata još 7 meseci. Herbst aparatom je u kratkom periodu korigovan sagitalni odnos vilica, nakon čega je fiksnim aparatom samo postignut pravilan međuvilični i unutar niza odnos zuba.

Ključne reči: malokluzije, II klasa, Herbst aparat, terapija.

SUMMARY

In this case was described the treatment in 14.5 years old female patient with II/1 class of malocclusion. On the base of clinical findings, study cast analysis, analysis of orthopan and profile cephalograms, there were assess II/1 class of malocclusion with deep bite, bimaxilar protrusion of frontal teeth and mild crowding in lower jaw. Patient was inefficacy treated by Andresen's activator for two years. This occasion and patients age was reason to continue with the therapy by Herbst appliance for 6 months and fixed appliance 7 months more. By Herbst appliance was corrected sagital relation between jaws in very short treatment time and continuing treatment with fixed appliance was corrected intermaxilar teeth relation.

Key words: maloclusion, II class, Herbst appliance, therapy

Jedna od najčešćih ortodontskih nepravilnosti je distalan zagrižaj. Ova nepravilnost je pronađena još kod rane civilizacije. Smatra se da čak 27% malokluzija se može svrstati u malokluzije II klase[1]. Herbst aparat ili Bite Jumping Hinge appliance (po Herbstu) u prevodu bi značio aparat za pomeranje mandibule unapred. Izraz "BITE JUMPING" u bukvalnom prevodu bi značilo promenu u sagitalnom intermaksilarnom odnosu vilica zahvaljujući pomeranju mandibule unapred[2]. Svrstava se u grupu fiksnih funkcionalnih ortodontskih aparata i namenjen je za terapiju nepravilnosti II klase.

Danas se korekcija distalnog zagrižaja svrstava u poseban deo ortopedije vilica: funkcionalnu ortopediju, a aparati za korekciju ove anomalije se nazivaju funkcionalni aparati[3]. Mnogi autori su projektovali i iznalazili razne vrste ortodontskih aparata koji bi efikasno

One of the most common orthodontic anomalies is a distal bite. This anomaly is discovered at early civilisation. It is considered that even 27% of malocclusion could be classified into second class malocclusions. Herbst appliance or Bite Jumping Hinge appliance (according to Herbst). If translated, it would be an appliance which moves mandible forward. The expression "Bite Jumping" literary means a change of sagittal inter-maxillary relation of jaws thanks to movement of mandible forward. It is classified in the group of fixed, functional orthodontic apparatus and it is meant for the therapy of the second class of anomalies.

Nowadays, the correction of distal bite is classified as a special part of Jaw orthopaedic: functional orthopaedic and the apparatus for this anomaly correction is called functional apparatus. Many authors projected and found different kinds of orthodontic apparatus, which could

mogli da isprave ovu anomaliju. Aktivator (po Andresenu) je dugo godina važio kao jedan od najefikasnijih u terapiji zagrižaja II klase, mada je i taj aparat pretrpeo brojne modifikacije.

Emil Herbst na Međunarodnom Stomatološkom Kongresu u Berlinu (1909), prvi put prezentuje fiksni "bite jumping" aparat i naziva ga "Scharnier"(zglob). Ovaj aparat drži mandibulu u konstantnom protrudovanom položaju, aktivira muskulaturu pa je nazvan i fiksni funkcionalni aparat. 1934 god. E. Herbst prezentuje seriju radova i navodi indikacije za primenu ovog aparata:

1. Malokluzije II kl.
2. Olakšava lečenje nakon frakture ramusa mandibule
3. Veštački zglob nakon hirurške resekcije kondila
4. Problemi u TMZ, luksacije, bruksizam

Hans Pancherz, 1977 god. dolazi na ideju da modifikuje davno zaboravljeni "Scharnier" aparat i sa novim dizajnom, a u osnovi sličnim principom terapijske primene uvodi nov fiksni funkcionalni ortodontski aparat pod nazivom: Herbst aparat. U poređenju sa pokretnim funkcionalnim aparatima (aktivator, bionator, Frenklov aparat), nalazi njegove prednosti:

1. Aparat je fiksiran na zubima
2. Kooperativnost pacijenta
3. Deluje 24 h dnevno
4. Kratko vreme terapije (6 - 8 meseci)
5. Indikovan je i kod starijih pacijenata (čak i onih koji su završili rast).

Posle 1980 god. nakon puno objavljenih radova, raste interesovanje za primenu ovog aparata naročito među ortodontima Evrope i SAD-a. Poslednjih godina i ovaj aparat je pretrpeo mnoge promene tako da postoji puno varijacija istog. Promene, uglavnom, predstavljaju poboljšanja u smislu što komotnijeg nošenja i lakših pokreta donje vilice kod pacijenta tokom terapije.

Uobičajen proces koji se dešava prilikom terapije Herbst aparatom je remodelacija temporomandibularnog zgloba u smislu stvaranja predela resorpcije (prednji zid fose artikularis i prednja strana kondila ramusa mandibule) i predela apozicije (zadnji zid fose artikularis i zadnja strana kondila), kao posledica odgovarajućeg rasporeda predela pritiska i vuče[2,4]. Ta činjenica doprinosi efikasnosti ovakvog načina terapije.

Herbst aparat se sastoji od: 1. tube, koja diktira iznos sagitalne aktivacije (fiksirana je na gornjem molaru), 2.šipke, koja prolazi kroz tubu i omogućava pokrete donje vilice (fiksirana je na donjem premolaru), 3. pivota, koji su zalotovani na nosače u gornjoj i donjoj vilici i 4. šrafovi, kojima su tube i šipke prko pivota pričvršćeni za nosače. Herbst aparat je paran (levi i desni). Nosači mogu biti liveni ili pravljeni od kombinacije metalnih prstenova i žice. Objedinjuju više bočnih zuba i u gornjoj i u donjoj vilici radi pojačanja uporišta. U toku faze lečenja Herbst aparatom, najčešće se koristi segmentirani fiksni aparat u frontalnoj regiji gornje i donje vilice[2].

correct this anomaly. Activator (according to Andersen) meant for long to be the most efficient in the therapy of the second class bite, although this apparatus went through many modifications.

At the International Dental Congress in London (1909), Emil Herbst presented for the first time fixed "Bite Jumping" appliance and called it "Schamier" (joint). This appliance holds mandible in a constant protrusive position and activates muscles, so it is called fixed functional orthodontic apparatus. In 1934 E. Herbst presented a series of works and stated the indications for the use of this appliance:

1. Malocclusions
2. Relieves treatment after fracture mandible ramus
3. Artificial joint after surgical resection of condils
4. Problems in TMJ, luxation, bruxism

Hans Pancherz, in 1977 came to an idea to modify long forgotten "Scharnier" apparatus and with a new design, but basically on the same principles of therapeutic application, he introduced the new fixed functional orthodontic apparatus under the name of Herbst appliance. Comparing it to the movable functional apparatus (activator, bionator, Franklin's apparatus), he found its advantages;

1. Apparatus is fixed on the teeth
2. Co-operation of the patients
3. It works for 24 hours a day
4. Short time for the therapy (6-8 months)
5. Indicated at the older patients (even those who stopped growing)

After 1980, after many works had been published, the interest grew for this appliance use, especially among European and USA orthodontists. During those last couple of years the appliance went through many changes so there are many variations of it.

The usual process happening during the Herbst appliance therapy is remodelling of temporal mandible joint which means making an area of resorption (the front wall of fossa articularis and the front side of condile ramus of mandible) and area of apposition (the back wall of fossa articularis and the back side of condile), which as a consequence has adequate distribution of pressure and traction. That fact contributes to the efficiency of this kind of therapy.

Herbst appliance consists of: 1.tube, which determine the amount of sagittal activation (it is fixed on the low molar), 2.a bar, which passes through the tube and enables movements of the lower jaw (it is fixed on the lower premolar), 3. pivots which are fixed for the carriers in the upper and lower jaw and 4. screws, which are used to screw the tubes and bars through the pivot for the carriers.

Herbst appliance is even (left and right). The carriers could be moulded or made of metal rings and wire. They unite a number of side teeth in upper and lower jaw to strengthen the stronghold . During the treatment phases with Herbst appliance, segmented fixed apparatus in the front area of upper and lower jaw is most often used.

Kao i kod uobičajene pripreme za terapiju pokretnim funkcionalnim aparatima, i kod terapija ovim aparatom neophodna faza je uzimanje konstrukcionog zagrižaja. Konstrukcioni zagrižaj se uzima u incizalnom odnosu u sagitalnom pravcu ili u blagoj hiperkorekciji. Za razliku od pokretnih funkcionalnih aparata, dužina trajanja terapije Herbst aparatom je predvidiva i traje 6 – 8 meseci u zavisnosti od uzrasta pacijenta, izraženosti anomalije[5]…

Terapija ovim aparatom objedinjuje skeletne i dentoalveolarne promene.

At the therapies with this appliance the necessary phase is to take a constructional biteprint as a usual preparation for the therapies with movable functional apparatus. Constructional biteprint is taken in incisal relation into sagittal direction or in a gentle hypercorrection. In distinction to movable functional apparatus, the time needed for the therapy with Herbst appliance is predictable and it lasts 6 to 8 months, depending on the age of the patient, anomaly formation...

The therapy with this appliance unites skeleton and dentoalveolar changes.

Prikaz slučaja

U radu je prikazana terapija pomoću HERBST aparata kod devojčice uzrasta 14,5 godina, kod koje je dijagnostikovana malokluzija II klase 1.odelenja (Sl. 1). Pacijent je predhodno lečen pokretnim funkcionalnim aparatom (aktivator po Andresen-u) u trajanju oko dve godine. Terapija je bila bez uspeha najviše iz razloga slabe saradnje pacijenta. Zato je započeta terapija Herbst aparatom (Sl. 2) u aktivnom periodu od 6 meseci, a nakon toga još 7 meseci produžena terapija samo fiksnim aparatom.

Display of the case

In this work , the therapy with Herbst appliance is shown at the girl of 14 and a half years old, which was diagnosed with malocclusion of the 2nd class of the 1st section (picture 1). The patient was previously treated with movable functional apparatus (activator according to Andersen) during a period of two years. The therapy was unsuccessful mostly because of the bad cooperation of the patient. That is why the treatment with Herbst appliance was started (picture 2) in an active period of six months, and after that, seven months more only with the fixed appliance.

Slika 1. Pacijent pre terapije (anfas, profil i okluzija frontalno, bočno desno i levo).
Figure 1. Patient before the therapy (frontal, profile and occlusion frontal, lateral right and left).

Slika 2. Herbst aparat u kombinaciji sa fiksnim ortodontskim aparatom.
Figure 2. Herbst appliance in combination with fixed ortrhodontic appliance.

Intraoralnim nalazom utvrđena je okluzija II klase 1.odelenja sa povećanom dubinom preklopa sekutića od 6 mm (Sl. 1), povećanim incizalnim stepenikom od 6,5 mm, blaga teskoba u donjem zubnom nizu. Ekstraoralnom analizom stiče se utisak da punoća i dominacija slabo toničnih usana prikrivaju pravo stanje skeletnih i dentoalveolarnih struktura te je i po završetku terapije došlo do malih vidljivih poboljšanja profila (Sl. 3). Takođe se primećuje izražen mentolabijalni sulkus. Analizom profilnog kefalometrijskog snimka pre početka terapije (Sl. 4) utvrđen je sagitalni skeletni odnos donje i gornje vilice II klase, kao posledica mandibularnog retrognatizma. Vertikalni međuvilični ugao je bio smanjen, kao posledica konvergentnog rasta gornje i donje vilice, uz rast donje vilice rotacijom unapred. Dijagnostikovana je protruzija gornjih i donjih frontalnih zuba (Sl. 6).

Po završetku lečenja, načinjen je nov profilni kefalometrijski snimak i konstatovana je korekcija položaja donje vilice (Sl. 3, 5). Korigovan je položaj gornjih i donjih molara i frontalnih zuba, kao i skeletni međuvilični odnosi. Ovakav nalaz je potvrđen, kada je urađena analiza profilnog snimka glave po Pančerzu pre i posle terapije Herbst aparatom (Tab.1).

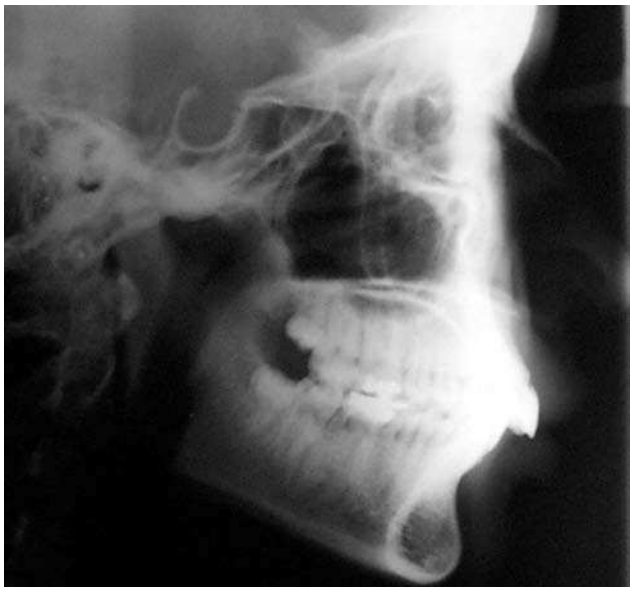
Analizom tomografskog snimka temporomandibularnog zgloba, pre i nakon završetka terapije Herbst aparatom (Sl. 7), utvrđeno je da je došlo do remodelacije fose artikularis i kondila mandibule (resorpcija prednjeg zida fose artikularis i resorpcija prednje strane kondila; sa druge strane apozicija na zarnjem zidu fose i apozicija na zadnjoj površini kondila mandibule). Ovakav nalaz je uobičajen kada je u pitanju terapija Herbst aparatom[4,5,6,7,8].

Intraoral findings showed occlusion of the 2nd class of the 1st section with increased depth of overlap of incisors of 6 mm (picture 1), increased incisal step of 6.5 mm, and slight tightness in the lower dental row. Extraoral analysis made an impression that the fullness and domination of low tonic lips, covered the real condition of skeletal and dentoalveolar structures, so at the end of the therapy there was small visible improvement of the profile (picture 3). There is noticeable mentum labial sulcus. Analyzing profile cephalometric x-ray before beginning of the therapy (picture 4), the sagittal skeletal proportion of the upper and the lower jaw of 2nd class was determined, as a result of retro-gnathal mandible. Vertical inter-jaw angle was decreased, as a result of convergent growth of the upper and the lower jaw, with the rotating forward growth of the lower jaw. There was diagnosed protrusion of the upper and the lower teeth (picture 6).

After the end of the therapy a new profile cephalometric x-ray was made and the correction of the position of the lower jaw was stated (pictures 3, 5).The position of the upper and lower molars and frontal teeth was corrected, as well as skeletal inter-jaw relations. This finding is confirmed, when the analysis of the head profile x-ray was made according to Pancherz, before and after the therapy treatment with Herbst appliance (table 1).

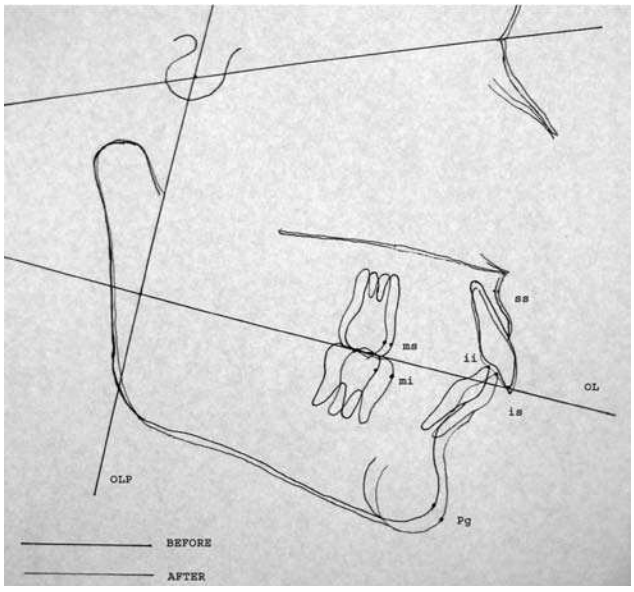
Analyzing tomographic x-ray of the temporal mandibular joint, before and after the end of the therapy treatment with Herbst appliance (picture 7), it is concluded, that there came to re-modelling of the fossa articularis and mandible condils (resorption of the front wall of the fossa articularis and resorption of the front side of the mandible condils; on the other side there were apposition of the back wall of the fossa and the apposition of the back surface of the mandible condils). These findings are common when the treatment with Herbst apparatus is applied.[4,5,6,7,8]

Slika 3. Pacijent posle terapije (anfas, profil i okluzija frontalno, bočno desno i levo).
Figure 3. Patient after the therapy (frontal, profile and occlusion frontal, lateral right and left).

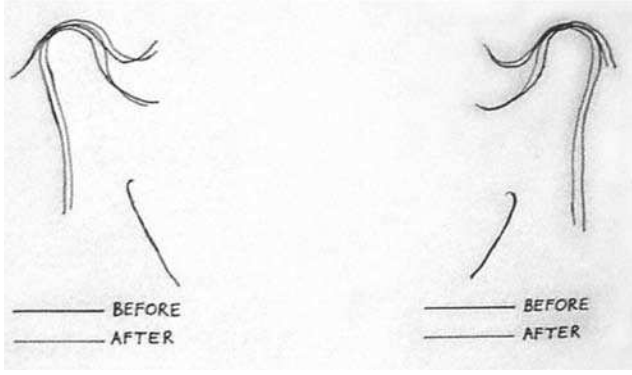


Slika 4. Profilni snimak glave pacijenta pre terapije.
Figure 4. Profile cephalogram of the patient before treatment

Slika 5. Profilni snimak glave pacijenta posle terapije.
Figure 5. Profile cephalogram of the patient after treatment.



Slika 6. Superpozicija profilnih snimaka glave pre (crno) i posle (crveno) terapije sa vidljivim skeletnim i dentoalveolarnim promenama.
Figure 6. Superimposition of profile cephalograms before (black) and after (red) the treatment with evident skeletal and dentoalveolar changes.



Slika 7. Superpozicija profilnih tomografskih snimaka TMZ sa vidljivom remodelacijom.
Figure 7. Superimposition of profile TMJ thomograms with evident remodeling.

Tabela 1. Analiza sagitalnih okluzalnih promena

Table 1. Analysis of sagital occlusal changes

ANALIZA PO PANCHERZ-u	Parametri (mereni do OLP)	Pre	Posle	Posle - Pre (D)	Korekcija Max.+ Mand.
Skeletal + Dental	ms mi	66.0 65.0	64.0 67.0	+ 2.0 + 2.0	Molarni odnos + 4.0
Skeletal + Dental	is ii	97.5 92.0	97.5 93.0	0 + 1.0	Preklop + 1.0
Skeletal	ss Pg	88.0 88.0	87.0 90.5	+ 1.0 + 2.5	Skeletna korek. + 3.5
Dental (Molari)	ms(D)-ss(D) mi(D)-Pg(D)	- -	- -	+ 1.0 - 0.5	Molari + 0.5
Dental (Incizivi)	is(D)-ss(D) ii(D)-Pg(D)	- -	- -	- 1.0 - 1.5	Incizivi - 2.5

Diskusija

U našoj ortodontskoj praksi, najčešće primenjivan aparat u terapiji malokluzije II klase je aktivator (po Andresen-u). Većina autora je pokušavala da prevaziđe osnovne mane aktivatora, a to su njegove dimenzije, dugo trajanje terapije (1,5 do 2 godine u proseku), smanjen prostor za jezik i nemogućnost govora. Kako aparat mora da se nosi minimum 16 časova dnevno, jasno je koliko teškoća zadaje pacijentima. Ovo je poseban problem, ako se zna da je idealno vreme za sprovođenje terapije ovim aparatom između 8-9 i 12-te godine života, kada su deca malo zainteresovana za ortodontsku terapiju, ne sarađuju na pravi način i pružaju otpor nošenju ovog aparata. Takođe, postavlja se pitanje: Na koji način sprovesti ortodontsku terapiju kod pacijenata sa dijagnozom nepravilnosti II klase koji su u silaznoj fazi rasta ili su završili rast?

U prikazanom slučaju, jasno je da u izboru terapijskog sredstva za lečenje navedene nepravilnosti, nije bilo adekvatno ponovo se osloniti na pokretni funkcionalni aparat. Izbor fiksnog funkcionalnog Herbst aparata je bio zadovoljavajući najviše iz razloga uzrasta i nesaradnje pacijenta. Uspešan terapijski rezultat proistekao je iz kombinacije skeletnih i dentoalveolarnih promena: premeštanje donje vilice unapred uz remodelaciju TMZ i distalizacija gornjih molara uslovili su dentoalveolarni odnos I klase po Angle-u, korekciju incizalnog stepenika i poboljšanje izgleda mekotkivnog profila u smislu njegovog ispravljanja (Sl. 3, 5, 6, 7).

Uspešna terapija Herbst aparatom je rezultat skeletnih i dentoalveolarnih promena. Idealan pacijent za ovakav način terapije bi bio sa dijagnozom: maksilarni prognatizam, mandibularni retrognatizam (ili kombinacija

Discussion

In our orthodontic praxis, the most often applied apparatus in the therapy of malocclusion of the 2nd class, is activator (according to Andresen). The majority of the authors tried to overcome the basic activator faults. They are: its dimensions, a long period of therapy (1.5 to 2 years on the average), minimized tongue space and disability of speech. As the apparatus should be worn for 16 hours a day it is clear how many difficulties it makes for the patients. This is the special problem, if it is known that the best period for this therapy appliance is 8-9 and 12 years of age, when children show very low interest in orthodontic therapy; they don't cooperate the right way and resist to wearing this apparatus. There is also a question: In what way to carry out an orthodontic therapy with the patient who is diagnosed with 2nd class anomaly and who are in the descending phase of growth, or their growth is completed?

In the case shown, it is clear that in the choice of the therapeutic means for the preceding anomaly it wasn't adequate to rely upon movable functional apparatus. The choice of fixed functional Herbst appliance was satisfying, mostly because of the age and uncooperativeness of the patient. The successful therapy result came from the combination of skeletal and dentoalveolar changes: the moving the lower jaw forward with remodelling TMJ and distallization of the upper molars conditioned dentoalveolar relation of the 1st class (according to Angle), correction of incisal step and improvement of the looks of the soft tissue profile according to its rectification (pictures 3,5,6,7).

The successful therapy with Herbst appliance is a result of skeletal and dentoalveolar changes. The ideal patient for this kind of therapy would be the one with the diagnosis: maxillary prognathism, mandibular retrognathism (or the combination of those two anomalies with not

ove dve nepravilnosti sa ne suiviše izraženom diskrepancom), povećan sagitalni intermaksilarni ANB ugao, blag skeletni otvoren zagrižaj (povećan vertikalni intermaksilarni B ugao), retruzija donjih, protruzija gornjih frontalnih zuba (ili kombinacija ove dve nepravilnosti), teskoba u gornjem zubnom nizu blage ili srednje izraženosti[2,9,10]. Kako je osnovna faza u izradi ovog aparata uzimanje konstrukcionog zagrižaja u incizalnom odnosu onda je to i objašnjenje terapije u smislu korekcije sagitalnih skeletnih odnosa uz remodelaciju TMZ (Herbst efekat). Sam položaj aparata u bukalnoj regiji i predeli njegove fiksacije neizostavno dovodi do distalizacije i intrudiranja gornjih molara (Headgear efekat) i mezijalizacije i intrudiranja donjih premolara (korekcija vertikalnog intermaksilarnog ugla). Kako se sile u donoj vilici direktno prenose na frontalne zube dolazi do protrudiranja donjih sekutića (Tab. 1, Sl. 6). Nakon završetka Herbst faze terapije, fiksnim ortodontskim aparatom se završava terapija i uspostavljaju pravilni interokluzalni odnosi (Sl. 3).

to too expressed discrepancy, increased sagittal intermaxillary ANB angle, mildly skeletal open bite (increased vertical intermaxillary B angle), re-trusion of the upper, protrusion of the lower frontal teeth (or the combination of those two anomalies), tightness in the upper teeth row of middle or medium expression.2,9,10. Since the basic phase in the making of this appliance is to take a constructional biteprint in incisal relation, then, that is the explanation of the therapy in the sense of the correction of sagittal and skeletal corrections with remodelling of TMJ (Herbst effect). The very position of the appliance in the buccal region, and the parts of its fixation obligatory leads to distalisation and intrusion of the upper molars (Headgear effect) and mesiosation and intrusion of the lower premolars (correction of vertical intermaxillary angle). As the forces in the lower jaw are directly transmitted to frontal teeth it comes to the protrusion of the lower incisors (table 1, picture 6). After the end of the Herbst therapy phase, the therapy is finished with fixed orthodontic apparatus and it provides the real interocclusal relations (picture 3).

Zaključak

HERBST aparat je efikasan u lečenju malokluzija II klase. Aparat deluje svih 24 časa dnevno i u relativno kratkom vremenu terapije daje izuzetne terapijske rezultate. Dentalne i skeletne promene (uključujući remodelaciju TMZ) kao rezultat terapije ovim aparatom, mogu biti dobar izbor umesto terapije ortodontskom kamuflažom, adaptacije rasta pomoću pokretnih funkcionalnih aparata ili odluke za hiruršku terapiju.

Conclusion

The Herbst appliance is efficient in treatment of malocclusion of the 2nd class. Appliance works 24 hours a day and in a relative short period of time, therapy shows the extreme therapeutic results. Skeletal and dental changes (including the remodellation of TMJ) as a result of the therapy with this appliance, could be a good choice instead of therapy with orthodontic camouflage, adaptation of the growth with the help of movable functional apparatus or decision to do the surgery .

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