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CASE RAPORT
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MINIMALNO INVAZIVNA TEHNIKA U TERAPIJI HIPODONCIJE GORNJIH LATERALNIH SEKUTIĆA - PRIKAZ SLUČAJA

MINIMALLY INVASIVE TECHNIQUE IN THE TREATMENT OF HYPODONTIA OF THE UPPER LATERAL INCISORS – CASE REPORT

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Sažetak

Hipodoncija gornjeg lateralnog sekutića je druga po učestalosti, iza drugog donjeg premolara (izuzimajući treće molare). Ova razvojna anomalija može predstavljati funkcionalni i estetski problem. Postoji veći broj modaliteta terapije hipodoncije maksilarnog lateralnog sekutića.
***Cilj** rada bio je da se prikaže minimalno invazivna tehnika izrade direktnih kompozitnih faseta u terapiji hipodoncije gornjeg latetalnog sekutića i kontrolni nalaz nakon tri godine.*

***Ključne reči:** hipodoncija (hipodontia), dentalne fasete (dental veneers), dentalni kompoziti (dental composite), minimalno invazivno (minimally invasive)*

Abstract

Hypodontia of the upper lateral incisor, according to its frequency, is the second most frequent one, coming after hypodontia of the second lower premolar (excluding third molars). This developmental anomaly can represent a functional and an aesthetic problem. There is a large number of modes in the treatment of hypodontia of the maxillary lateral incisor.
***The** objective of this study is to present a minimally invasive technique of constructing direct composite veneers in the treatment of hypodontia of the upper lateral incisor, and control results after three years.*

***Key words:**: hypodontia, dental veneers, dental composite, minimally invasive*

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Uvod

Odontogeneza predstavlja složen proces tokom kojeg se dešava interakcija epitela i mezenhima. Za pravilan razvoj zuba veoma je značajna aktivacija signalnih puteva (Shh, FGF, BMP i Wnt) i pravilna funkcja velikog broja gena, među kojima su najznačajniji MSX1 i PAX9 [1-3]. Poremećaji tokom razvoja zuba mogu uzrokovati izostanak formiranja pojedinačne klice zuba (hipodoncija), formiranje većeg broja zubnih klica (hiperdoncija), izmenjenu morfologiju zuba i poremećaj u strukturi zubnih tkiva.

Hipodoncija ili smanjen broj zuba zahvata stalnu denticiju češće od mlečne denticije. Nekoliko studija je pokazalo da su gornji lateralni sekutići najčešći zubi koji nedostaju, praćeni gornjim i donjim drugim premolarima[4-7]. Nedostatak lateralnih sekutića je značajan sa estetskog aspekta. Ortodontsko protetski tretman je osnovna terapija, naročito kada je nedostatak zuba udružen sa promenama u obliku i veličini prisutnih zuba, veličini vilice, što rezultira dijastemama i velikim međuprostorima u zubnom luku. Normalan okluzalni odnos i estetika ne mogu se uvek postići ortodonskim tretmanom [8].

Hipodoncija se javlja kod 20% celokupnepopulacije[3]. Prevalencija hipodoncije, ukoliko se izuzmu treći molari, iznosi između 6% i 7% [9, 10]. Hipodoncija je češća kod žena nego kod muškaraca, češća je u donjoj vilici nego u gornjoj[10]. Donji drugi premolar i gornji lateralni sekutić su zubi koji najčešće nedostaju (izuzev trećih molara) [9].

Hipodoncija gornjeg lateralnog sekutića može predstavljati funkcionalni i estetski problem. Terapeut se susreće sa velikim izazovom pri terapiji ove anomalije. Modaliteti terapije koji se mogu sprovesti za dati slučaj su:

1) ortodontsko zatvaranje prostora pomeranjem svih zuba mezijalno, uz naknadno premodelovanje očnjaka u lateralni sekutić direktnim ili indirektnim restauracijama [11],

2) ortodontsko pomeranje očnjaka distalno, uz stvaranje prostora za izradu fiksnog rada[11],

Introduction

Odontogenesis is a complex process during which the interaction of epithelium and mesenchyme takes place. The activation of signaling pathways (Shh, FGF, BMP and Wnt) and proper function of a large number of genes, among which the most important are MSX1 and PAX9, [1-3] are very important for the proper tooth development. Disorders during tooth development can cause the absence of formation of a single tooth bud (hypodontia), formation of several tooth buds (hyperdontia), altered tooth morphology and disorders in tooth tissue structure.

Hypondontia or reduction of tooth number affects the permanent dentition more often than deciduous dentition. The several studies have shown that the upper lateral incisors are most usual teeth that get affected by hypodontia, followed by the upper and lower seconds premolars[4-7]. The reduced number of lateral incisors is of particular significance for aesthetics. Orthodontic-prostetic treatment is a basic requirement for those patients, especially for those combining hypodontia with changes in the shape and size of the available teeth and variation in dental-jaw, resulting in diastema and tremata. The normal occlusal relationships and aesthetics are not always achievable by orthodontic treatment [8].

Hypodontia affects 20% of the total population[3].The prevalence of hypodontia, excluding third molars, is between 6% and 7% [9,10]. Hypodontia is more frequent in women than in men, it is more frequent in the lower than in the upper jaw [10]. The second lower premolar and upper lateral incisor are the most frequently missing teeth teeth (except third molars) [9].

Hypodontia of the upper lateral incisor can represent a functional and aesthetic problem. The therapist faces a great challenge in treating this anomaly. The modes of treatment which can be conducted in this case are:

1) Orthodontic closing of the space by moving all teeth mesially with subsequent modeling of the canine into a lateral incisor with direct or indirect bonding [11].

2) Orthodontic distal movement of the canine and creating the space for making a fixed appliance [11].

3) ortodontsko pomeranje očnjaka distalno, uz stvaranje prostora za ugradnju mini implantata [11, 12],
4) izrada direktnih ili indirektnih resturacija, uz preoblikovanje očnjaka u lateralni sekutić [13].

S obzirom da izrada direktnih kompozitnih restauracija spada u minimalno invazivne metode bez uklanjanja zubnog tkiva, odlučili smo se za ovaj vid terapije [14]. Ovaj vid terapije u osnovi treba da reši dva problema: problem estetike i zatvaranje dijastema između postojećih zuba.

Prikaz slučaja

Pacijentkinja stara 35 godina javila se u Kliniku za stomatologiju Fakulteta medicinskih nauka u Kragujevcu radi zbrinjavanja obostrane hipodoncije gornjih lateralnih sekutića (Slika 1, 2, 3.). Kliničkim pregledom ustanovljeno je dobro parodontalno zdravlje svih postojećih zuba u interkaninom sektoru, očuvani međuvilični odnosi, sa prisutnim incizalnim odnosom prednjih zuba, uz postojanje očnjačkog vođenja obostrano.

Preoblikovanje očnjaka u lateralne sekutiće urađeno je pomoću direktnih delimičnih kompozitnih faseta slojevitom tehnikkom izrade. Pre početka izrade parcijalnih kompozitnih faseta, labijalna, mezijalna, distalna i incizalna trećina lingvalne površine gleđi su blago nahrapavljene prelaskom dijamantskog svrdla crvene boje oblika cilindra (Diamant burs, Edenta, St. Gallen, Switzerland) za turbinski kolenjak. Nakon ovog postupka, pomenute površine su jetkane 37% ortofosfornom kiselinom (Total Etch, Ivoclar Vivadent AG, Schaan, Liechtenstein) u trajanju od 30 sekundi. U trajanju od 30 sekundi, zubi su ispirani i posle toga posušeni i omogućen je „etch and rinse" protokol, koji omogućava najjaču vezu između kompozita i gleđi[15]. Postavljeni su retrakcioni konci veličine dve nule u predelu sva četiri prednja zuba (Ultrapak®, Ultradent, South Jordan Utah, USA) da bi se sprečilo curenje gingivalne tečnosti. Između sekutića je postavljena

3) Orthodontic distal movement of the canine and creating the space for inserting a mini-implant [11, 12].
4) Creating direct or indirect composite bonding with the modeling of the canine into a lateral incisor [13].

Since making direct composite bonding represents a minimally invasive method without removing tooth tissue, we have decided upon using this type of treatment [14]. This type of treatment should basically solve two problems: the problem of aesthetics and closing of diastemas between the existing teeth.

Case report

A female patient, aged 35, visited Dentistry Department of the Faculty of Medical Sciences in Kragujevac, for the treatment of hypodontia of the upper lateral incisors on both sides (Figure 1, 2, and 3). Clinical examination showed good periodontal health of all existing teeth in the intercanine sector, maintained jaw-to-jaw relation with the present incisal relation of the front teeth and existence of canine-protected guidance on both sides.

Modeling of the canine into lateral incisors has been performed using direct partial composite veneers, applying the incremental technique. Before making the partial composite veneers, labial, mesial, distal and incisal third of the lingual surface of the enamel had been made rough-surfaced using a red cylinder-shaped diamond bur (Diamant burs, Edenta, St. Gallen, Switzerland) with the application of the turbine handpiece. After this procedure, the above mentioned surfaces were etched by 37% phosphoric acid (Total Etch, Ivoclar Vivadent AG, Shaan, Liechtenstein) for 30 seconds. During 30 seconds, the teeth were rinsed, then air dried which allowed "etch and rinse protocol" to follow, an which provides the strongest bond between the composite and enamel [15]. Retraction cords sized double zero were set in the area of all four front teeth (Ultrapak®, Ultradent, South Jordan Utah, USA) in order to minimize the crevicular fluid flow. Between the incisors, a celluloid strip was placed with the help

celuloidna traka sa interproksimalnim kočićem radi sprečavanja prodora kompozita u taj prostor. Zubi su kondicionirani adhezivom (ExciTE F, Ivoclar Vivadent AG) i polimerizovani 20 sekundi (LED lamp, Satelec, Merignac, France). Restauracije su izrađene od univerzalnog nano-hibridnog kompozita (Tetric EvoCeram®, Ivoclar Vivadent AG) slojevitom tehnikom. Kompozit je postavljen na mezijalnu i distalnu površinu očnjaka i preoblikovan u lateralni sekutić, takođe je dodat kompozit na mezijalnu i distalnu površinu centralnih sekutića i tako je povećana njihova meziodistalna širina zbog estetskih merila i proporcije između sekutića (Slika 4, 5, 6.). S obzirom da je na levom prvom premolaru postojala kompozitna retauracija okluzalno, uklonjena je i prevedena u drugu klasu restauracije zbog smanjenja prostora između prvog premolara i očnjaka sa te strane (Slika 5.). Restauracije su potom obrađene i ispolirane uz pomoć diskova za finiranje i poliranje (Sof-Lex; 3M ESPE, St. Paul, MN, USA). Posebna pažnja je usmerena na obradu faseta u predelu gingivalnog ruba, za šta je korišćen tanak plamičasti dijamant žute boje (Diamant burs, Edenta), uz primenu crvenog turbinskog kolenjaka. Pacijentu su data detaljna uputstva o održavanju oralne higijene, upotrebe konca za zube i potrebe za redovnim kontolnim pregledima.

Na kontolnom pregledu nakon tri godine nisu uočene diskoloracije faseta u predelu zuba. Površni sloj faseta u predelu prelaza kompozita i gleđi je finim diskovima (Sof-Lex; 3M ESPE) nagrižen 37% ortofosfornom kiselinom (Total Etch, Ivoclar Vivadent AG) u trajanju od 30 sekundi (Slika 7.), nakon čega su svi zubi ispirani u trajanju od 30 sekundi, posle toga posušeni, zaštićeni adhezivom (ExciTE F, Ivoclar Vivadent AG) i polimerizovani 20 sekundi (LED lamp, Satelec) (Slika 8.). Pacijent je praćen tri godine. U toku kontrolnih pregleda, koji su sprovođeni na šest meseci, nije primećeno prisustvo oboljenja parodoncijuma.

of wedges interproximally in order to prevent composite to enter that space. The teeth were conditioned with adhesive (ExciTE F, Ivoclar Vivadent AG) and polymerized for 20 seconds (LED lamp, Satelec, Merignac, France). Bondings were made of universal nano-hybrid composite (Tetric EvoCeram®, Ivoclar Vivadent AG) using incremental technique. Composite was placed on mesial and distal surface of the canine and modelled into a lateral incisor. Also, the composite was placed on the mesial and distal surfaces of the central incisors and thus enhanced their mesiodistal width according to aesthetic measures and proportions between the incisors (Figure 4, 5, and 6). Since an occlusal composite bonding had already existed on the left first premolar, it was removed and transfered to the second class of bonding due to the reduction of the space between the first premolar and canine tooth on that side (Figure 5). After that, bondings were treated and polished with finishing and polishing discs (Sof-Lex; 3M ESPE, St. Paul, MN, USA). A special attention was given to the treatment of the veneers in the area of gingival edge using a thin yellow diamond (Diamant burs, Edenta) with the application of red turbine handpiece. The patient was given detailed instructions on maintaining oral hygiene, using dental floss and regular control examinations.

In a control examination after three years, no discoloration of veneers in the tooth area was detected. Surface layer of the veneer in the transition area between composite and enamel was finished with fine discs (Sof-Lex; 3M ESPE) and etched with 37% phosphoric acid (Total Etch, Ivoclar Vivadent AG) for 30 seconds (Figure 7). In duration of 30 seconds, all teeth were rinsed and after that air dried and protected with adhesive (ExciTE F, Ivoclar Vivadent AG,) and polymerized for 20 seconds (LED lamp, Satelec) (Figure 8). The patient was followed for three years. During control examinations performed every 6 months, the presence of paradentium diseases was not detected.

Slika 1. Klinički nalaz pre izrade direktnih kompozitnih faseta
Figure 1. Clinical finding before making direct composite veneers

Slika 2. Klinički nalaz pre izrade direktnih kompozitnih faseta
Figure 2. Clinical finding before making direct composite veneers

Slika 3. Klinički nalaz pre izrade direktnih kompozitnih faseta
Figure 3. Clinical finding before making direct composite veneers

Slika4. Klinički nalaz nakon izrade direktnih kompozitnih faseta
Slika4. Clinical finding after making direct composite veneers

Slika 5. Klinički nalaz nakon izrade direktnih kompozitnih faseta
Slika 5. Clinical finding after making direct composite veneers

Slika 6. Klinički nalaz nakon izrade direktnih kompozitnih faseta
Slika 6. Clinical finding after making direct composite veneers

Slika 7. Kontrolni nalaz nakon tri godine-nagrizanje rubova kompozita
Slika 7. Clinical finding after three-yearetching of composites edges

Slika 8. Kontrolni nalaz nakon tri godine-rubovi kompozita zaštićeni adhezivom
Slika 8. Clinical finding after three years – the composite edges are adhesive protecte

Diskusija

Direktni kompozitni viniri su sve popularniji u današnjoj stomatologiji zbog završavanja tretmana u jednoj poseti, brzih estetskih rezultata i niže cene tretmana u odnosu na indirektne fasete i druge navedene terapijske postupke[16]. Pre nego što se terapeut odluči za izradu direktnih kompozitnih vinira, treba da uzme u obzir socio-ekonomski status pacijenta, njegova očekivanja, stanje parodoncijuma datih zuba, prisustvo eventualnih ispuna, prisustvo endodontski tretiranih zuba i stepen održavanja oralne higijene.

Ovaj vid terapije predstavlja minimalno invazivno rešenje, jer se minimalno redukuje zubno tkivo uz visoke estetske rezultate, što je postignuto primenom savremenih kompozitnih materijala[17]. U slučaju odabira nekog drugog modaliteta terapije, došlo bi se do željenog rezultata, ali posle dužeg vremenskog perioda, zbog trajanja ortodontske terapije, ili bi, pak, morala da se vrši protetska korekcija svih zuba u frontalnom sektoru maksile, uz eventualnu endodonsku pripremu očnjaka. U interkaninom sektoru neophodna je izrada bezmetalnog keramičkog mosta kako bi se zadovoljile estetske vrednosti, pri čemu je neophodna obimna redukcija zubne supstance [18].

Pokazano je da je izrada direktnih restauracija kod mlade populacije odlično rešenje zbog estetskih vrednosti i niske cene[19]. Takođe, pacijenti sa visokim zadovoljstvom prihvataju direktne kompozitne restauracije [20]. Klinička ispitivanja su pokazala da mane kompozitnih materijala mogu biti prevaziđene primenom savremenih kompozitnih sistema [21-23]. Burke i saradnici su u svojoj kliničkoj studiji utvrdili da su tri četvrtine restauracija (77%) bile optimalne sa aspekta marginalne diskoloracije, dok su gotovo sve restauracije (99%) bile optimalne sa aspekta poklapanja u boji, nakon dve godine od izrade [21]. Korišćenje kompozitnih materijala različitih proizvođača, a istog tipa, pri izradi direktnih restauracija na prednjim zubima nije uticalo na njihov stepen opstanka, koji je iznosio 87,5% u periodu

Discussion

Direct composite veneers are more and more popular in contemporary dentistry due to the fact that treatment can be finished during one session, quick aesthetic results and lower price of the treatment compared to indirect veneers and other above mentioned therapeutic procedures[16]. Before the therapist decides upon constructing direct composite veneers, they should consider socioeconomic status of the patient, patient's expectations from the treatment, condition of periodontium of the teeth in question, possible presence of fillings, presence of endodontically treated teeth and the level of oral hygiene.

This type of treatment represents a minimally invasive solution since tooth tissue is minimally reduced with high aesthetic results, which is accomplished by applying contemporary composite materials[17]. In case of choosing some other mode of treatment the expected result would be accomplished, but after a longer period of time due to duration of orthodontic treatment, or it would be necessary to perform prosthodontics correction of all teeth in the frontal sector of the maxilla with possible endodontic treatment of the canine. In the intercanine sector, the construction of ceramic-only bridge would be necessary in order to fulfill aesthetic criteria, which would demand extensive reduction of teeth tissue [18].

It has been shown that construction of direct bonding in the young population is an excellent solution due to aesthetic values and low price[19]. Also, patients are very satisfied to accept direct composite bonding [20]. Clinical research has shown that shortcomings of composite materials can be overcome by using contemporary composite systems [21-23]. In their clinical study, Burke et al. have determined that three quarters of all bonding (77%) cases were optimal in the aspect of marginal discoloration, while almost all bondings (99%) were optimal in the aspect of color matching, two years after the construction[21]. Using composites of the same type made by different manufacturers in constructing direct bondings on the front teeth did not have any influence on their survival rate which was 87,5% in the period

od tri godine[22]. Druga klinička studija, Fresea i saradnika, pokazala je da je tokom petogodišnjeg perioda stepen opstanka direktnih restauracija 85% [23].

Izrada porcelanskih indirektnih vinira takođe pokazuje visok stepen opstanka, po rezultatima Guessa i saradnika stepen opstanka u petogodišnjem perodu iznosio je 97,5-100%[24]. Međutim, kod ovih vinira postoji mogućnost krte frakture koju je nemoguće reparirati, atricije antagonista i cena izrade je znatno viša u odnosu na direktne kompozitne fasete [25].

Zaključak

Terapijski efekti postignuti izradom faseta mogu biti dugotrajni ukoliko se postupak izrade adekvatno sprovede. Prednosti ovog tretmana su: očuvanje zdravog zubnog tkiva, redukcija broja poseta stomatologu, mogućnost jednostavne reparacije i dugotrajnost ovih restauracija. Nedostatak ovog tretmana u ovom slučaju je nemogućnost zatvaranja dijasteme u potpunosti sa leve strane zubnog luka zbog prevelikog međuzubnog prostora.

Zahvalnost

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of three years[22]. Another clinical study by Frese et al. has shown that during five years the survival rate of direct bondings was 85% [23].

Construction of ceramic indirect veneers also shows a high survival rate, and according to the results of Guess et al. thesurvival rate during five years was 97,5-100% [24]. However, with these veneers, there is a possibility of brittle fracture which is impossible to repair, attrition of antagonists, and the price of construction is significantly higher compared to direct composite veneers [25].

Conclusion

Therapeutic effects accomplished by construction of veneers can be long-lasting if the procedure of construction is adequately followed. The advantages of this treatment are: preservation of healthy teeth tissue, reduction in the number of visits to the dentist, possibility of simple reparation and longevity of these bondings. A shortcoming of this treatment in this case is impossibility of closing the diastema completely on the left side of teeth arc due to interdental space which is too big.

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