Multidisciplinary approach in treatment of spacing: orthodontic treatment and partial veneers using the injectable composite resin technique

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SUMMARY

Introduction Patients with orthodontic diagnosis of spacing most often require a multidisciplinary approach, which includes orthodontic and following restorative treatment to enhance the esthetic outcome. The aim of this case report is to present management of spacing in the anterior region by orthodontic treatment followed by partial veneers using the injectable composite resin technique.

Case report In this case, leveling and alignment of dental arches and stable occlusion was achieved during orthodontic treatment, with the correction of upper and lower incisor inclination and closing the diastemas. Intraoral and extraoral esthetic parameters were evaluated on the photographs, and partial veneers on lateral incisors and canines were designed for the wax-up model. In the injectable composite resin technique, the silicone index was used to transfer the wax-up to composite restorations. The highly filled injectable composite resin was injected through the silicone index and light-cured. The restoration required only gentle polishing due to the great precision of the index.

Discussion Post-orthodontic recontouring in the anterior region is mostly done by direct composite restorations because they are cost-effective, minimally invasive, and the procedure is relatively simple. The injectable resin composite technique can be a solution for the same indication since it is less technique sensitive and gives predictable and great esthetic results, mostly without tooth preparation.

Conclusion Management of anterior spacing in adult patients requires a comprehensive approach for optimal esthetic and functional results. In this case, orthodontic treatment was followed by partial veneers on lateral incisors and canines, using the injectable composite resin technique as a simple and predictable solution for minor restorative interventions to solve morphological tooth abnormalities in the esthetic smile zone.

Keywords: spacing; orthodontic treatment; composite; partial veneers; injectable technique

INTRODUCTION

Anterior spacing and tooth size discrepancy is one of the most common features in adult dentition. Meeting patient's demands and expectations is the first step in deciding which treatment option is the best for optimal esthetic results. Orthodontics alone can give a great esthetic improvement, but multidisciplinary treatment is often needed for excellent treatment outcomes. Most often, orthodontic treatment is followed by restorative treatment [1, 2]. Direct restorations are done in one session, applying layers of composite directly to the tooth surface. Indirect restorations are preferred in complex cases, and they require collaboration with dental technicians [3]. Direct restorations are practical and have several advantages, such as saving the tooth structure; reversibility of procedure, lower cost to the patient, and the material can be added or removed easily, if necessary [1, 4, 5].

The injectable resin composite technique is a predictable dental procedure where a diagnostic wax-up is translated into composite restorations. It is an indirect/ direct technique that can be used to repair fractured teeth and restorations, provisional restorations, veneers, resurfacing occlusal wear on posterior composite restorations, and also in primary dentition for teeth with multiple caries or fractures [6, 7]. This technique is minimally invasive and relatively inexpensive compared to conventional ceramic veneers procedure, and tooth preparation is mostly not required [8].

The aim of this case report is to present management of spacing in the anterior region by orthodontic treatment followed by partial veneers using the injectable composite resin technique.

CASE REPORT

A 32 years old male patient presented to the dental office complaining about his smile's esthetic appearance. He did not like the misalignment of the anterior teeth as well as the spaces between them.

The main cause of spacing in his case was a discrepancy of tooth size and arch length. In his case, the labial frenulum was not prominent. In occlusion, molar and canine relation

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was class I on both sides. Cephalometric analysis did not show skeletal discrepancies, and both upper and lower incisors were proclined. Orthodontic treatment aimed to level and align dental arches, correct the upper and lower incisors' position, close the diastemas in the upper and lower dental arch, and achieve good occlusion. Since esthetics was very important for the patient even during the orthodontic treatment, ceramic braces (Radiance, American orthodontics, Roth prescription, slot 22) were chosen. Standard arch wire protocols were followed and power chains were used for closing the spaces between the teeth. (Figures 1, 2).

After 13 months of orthodontic treatment, all diastemas were closed and a stable static and functional occlusion achieved. Although all the spaces were closed in gingival areas of teeth, black spaces between upper lateral incisors and canines were visible in incisal parts. Recontouring of lateral incisors and canines was necessary to enhance the esthetic outcome (Figure 3). Direct composite buildups could be a solution in minimally invasive and non invasive cases, since they are esthetic, functional, and biologically sound treatment options for closing diastemas with clinically promising survival rates [1]. After explaining possible treatment options, the patient decided to take a restorative treatment based on the injectable resin composite technique because it offers esthetic and predictable results and no dental tissues preparation. For this technique, an adequate design of the restoration is needed. Intraoral and extraoral photos of the patient were taken with a digital camera (D3400, Nikon corporation) and esthetic parameters evaluated. The future shape of lateral incisors and canines were designed in Keynote software (Apple Corporation). According to this design, partial veneers wax-up was made (Figure 4) Two veneers were planned on distal incisal surfaces of upper lateral incisors and two on mesial surfaces of canines to enhance the smile esthetics.

Based on the wax-up, a transparent silicone index was made using a clear polyvinyl siloxane (Exaclear, GC Corp., Tokyo, Japan). Before making the silicone index, in order to hydrate, the plaster model was soaked in the cold water and left in for 5 minutes. Impression tray was
prepared using stoppers made of C - silicone (Zeta plus putty, Zhermack) to save the same silicone thickness in every part of the silicone key (Figure 5). Small perforations through the silicone index were made using the syringe of flowable resin composite (Figure 6). The perforations were made to the distal parts on the incisal edges of lateral incisors and canines’ mesial parts. The material chosen for this intervention was a highly filled flowable resin composite (G-ænial Universal Injectable, GC corporation). The teeth were cleaned using fluoride-free polishing paste. Choosing the right color was done at the very beginning of the procedure, using a small amount of the material (composite buds) on the lateral incisors and canines, which were then light-cured. Shade A2 was selected for the procedure (Figure 7). The adjacent teeth were isolated using Teflon tape. One lateral incisor’s polished enamel surface was etched with 37% phosphoric acid (37.5% Phosphoric Acid Gel, Kerr) for 40s, rinsed with water and air-dried. The universal adhesive (GC G-Premio Bond, GC Corporation) was applied to pre-etched surfaces with a micro brush for 10 sec, then air blown for 5 sec, and polymerized using a LED light-curing unit (3M Elipar™ DeepCure-S LED Curing Light) for 10 sec, according to manufacturers’ instructions (Figure 8). The silicone index was positioned carefully and flowable resin composite injected through the perforation made on the incisal part of the silicone index for right lateral incisor (Figure 9). The restoration was light-cured for 40 sec from labial, occlusal and palatal direction. The

Figure 6. Silicone index with incisal perforations for composite injection  
Slika 6. Silikonski ključ sa perforacijama u incizalnom delu koje će služiti za injektiranje kompozita

Figure 7. Determining the colour for the restoration using small amounts of composite; A2 chosen for the restoration  
Slika 7. Određivanje boje budućih nadoknada korišćenjem male količine kompozita; A2 izabran za buduće nadoknade

Figure 8. Phosphoric acid etching and bonding procedure  
Slika 8. Priprema gleđi ortofosfornom kiselinom i nanošenje bonda

Figure 9. Injection of highly filled flowable composite through perforations on silicone index  
Slika 9. Injektiranje tečnog kompozita kroz perforacije na silikon-skom ključu

Figure 10. Final clinical situation  
Slika 10. Klinička situacija na kraju procedure

Figure 11. Patient’s smile after orthodontic and restorative procedure  
Slika 11. Osmeť pacijenta posle završene ortodontske i restaurativne procedure
CONCLUSION

Management of anterior spacing, as one of the most common dental features in adult patients, requires a comprehensive treatment for optimal esthetic and functional results. In the presented case, orthodontic treatment was followed by partial veneers on lateral incisors and canines, using the injectable composite resin technique as a simple and predictable solution for minor restorative interventions in the esthetic smile zone.

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Multidisciplinarni pristup u terapiji rastresitosti: ortodontska terapija i delimične fasete tehnikom injektiranja kompozita

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UVOD
Rastresitost u prednjoj regiji zubnog niza i neusklađenost u veličini zuba i alveolarnog grebena predstavljaju veoma često pojavu kod odraslih pacijenata. Procena pacijentovih zahteva i očekivanja je prvi korak u odlučivanju koji je metod lečenja najbolji za postizanje optimalnih estetskih rezultata. Sama ortodontska terapija može dati značajne poboljšanja u odnosu na inizalnu situaciju, ali je često neophodan multidisciplinarni pristup za bolje rezultate terapije. Nakon ortodontske terapije najčešće je potrebno izraditi restorativnu proceduru kako bi se postizao optimalni estetski ishod.

KRATAK SADRŽAJ
Uvod: multidisciplinarni pristup u terapiji rastresitosti

Prikaz slučaja: uspješno rješavanje rastresitosti u prednjoj regiji zubnog niza uz pomoć ortodontske terapije i delimičnih faseta izrađenih tehnikom injektiranja kompozita.

Uvod
Rastresitost u prednjoj regiji zubnog niza i neusklađenost u veličini zuba i alveolarnog grebena predstavljaju veoma često pojavu kod odraslih pacijenata. Procena pacijentovih zahteva i očekivanja je prvi korak u odlučivanju koji je metod lečenja najbolji za postizanje optimalnih estetskih rezultata. Sama ortodontska terapija može dati značajne poboljšanja u odnosu na inizalnu situaciju, ali je često neophodan multidisciplinarni pristup za bolje rezultate terapije. Nakon ortodontske terapije najčešće je potrebno izraditi restorativnu proceduru kako bi se postizao optimalni estetski ishod. Prikaz slučaja
Cilj ovog prikaza slučaja je predstaviti slučaj uspješnog rješavanja rastresitosti u prednjoj regiji zubnog niza ortodontskom terapijom, praćenom izradom delimičnih faseta, tehnikom injektiranja kompozita.
 Za injekciju tehniku potreban je odgovarajući dizajn restauracije. Intraoralne i ekstrooralne fotografije pacijenta napravljene su digitalnim fotoaparatom (D3400, Nikon corporation) i na njima su analizirani estetski parametri. Budući oblik lateralnih sekutića i očnjaka dizajniran je u softveru Keynote (Apple Corporation) (Slika 4). Prema ovom dizajnu napravljen je voštan model u zubnoj laboratoriji. Planirane su dve delimične fasete na distalnim incizalnim površinama gornjih lateralnih sekutića i dve na mezijalnim površinama očnjaka.

Prema dizajnu voštanog modela napravljen je silikonski ključ od prozirnog polivinil-siloksa na (Exaclear, GC Corporation, Tokio, Japan). Pre izrade silikonskog ključa, u cilju hidratacije, gipsani model je potopljen u hladnu vodu i ostavljen pet minuta. Kašika za otisak je pripremljena pomoću stopera izrađenih od c-silikona (Zetaplus putty, Zhermack) kako bi se ostvarila jednaka debljina silikona u svakom delu silikonskog ključa (Slika 5). Uz pomoć kašike kojom će biti ubrizgan kompozit napravljene su male perforacije kroz silikonski ključ (Slika 6). Perforacije su napravljene na distalnim delovima incizalnih rubova lateralnih sekutića i mezijalnih delova očnjaka.

Materijal izbora za ovu intervenciju bio je tečni kompozit (G-aenial Universal Injectable, GC corporation). Zubi su očišćeni pastom za poliranje bez fluorida. Odabir boje kompozita obavljen je na samom početku intervencije, korišćenjem male količine materijala polimerizovane lampom na lateralnim sekutićima i očnjacima. Odabrana je boja A2 (Slika 7). Susedni zubi izolovani su pomoću tellon trake. Gled zuba predviđenog za restauraciju tretirana je 37,5% gel ortofosforne kiseline (Kerr) u trajanju od 40 s, isprana vodom i posušena vazduhom iz pustera. Univerzalni adheziv (GC G-Premio Bond, GC Corporation) u trajanju od 40 s, isprana zubi izolovani su pomoću teflon trake. Gleđ zuba predviđenog za restauraciju tretirana je 37,5% gel ortofosforne kiseline, izvrsno kompozita u trajanju od 40 s, isprana vodom i posušena vazduhom iz pustera. Univerzalni adheziv (GC G-Premio Bond, GC Corporation) u trajanju od 40 s, isprana zubi izolovani su pomoću teflon trake. Gleđ zuba predviđenog za restauraciju tretirana je 37,5% gel ortofosforne kiseline, izvrsno kompozita u trajanju od 40 s, isprana vodom i posušena vazduhom iz pustera. Univerzalni adheziv (GC G-Premio Bond, GC Corporation) u trajanju od 40 s, isprana zubi izolovani su pomoću teflon trake. Gleđ zuba predviđenog za restauraciju tretirana je 37,5% gel ortofosforne kiseline, izvrsno kompozita u trajanju od 40 s, isprana vodom i posušena vazduhom iz pustera. Univerzalni adheziv (GC G-Premio Bond, GC Corporation) u trajanju od 40 s, isprana zubi izolovani su pomoću teflon trake.

DISKUSIJA

Rešavanje rastresitosti zubnih nizova kod odraslih pacijenata često zahteva multidisciplinarni pristup za postizanje optimalnih rezultata. Nivelacija zuba i stabilna statička i funkcionalna okuluzija postignute su ortodontskom terapijom, dok se anomaliđe oblike zuba mogu rešiti indirektnim restauracijama (keramičkim ili kompozitnim) ili direktnim kompozitnim restauracijama.

Keramika je uvek bila materijal izbora za nadoknade u prednjoj regiji zubnog niza jer je biokompatibilna, hemijski stabilna i efikasna u reprodukciji prirodne translucenstnosti strukture zuba. S druge strane, keramičke fasete zahtevaju preciznu preparaciju, jer preparacija, između ostalih uzroka, može biti razlog loma nadoknada [3].

Tehnika injekciranja kompozita je relativno jednostavna i daje predvidiv ishod. U poređenju sa direktnim kompozitnim restauracijama, glavna prednost ove tehnike je to što je manje izazovna u smislu angažovanja terapeuta i kraće traje. Tehnika injekciranja kompozita najčešće ne zahteva preparaciju zubnih tkiva, što je vrlo važno u kontekstu očuvanja zdravih zubnih tkiva, posebno kod mlađih pacijenata [6–10]. U ovom slučaju je korišćen G-aenial Universal Injectable, univerzalni restaurativni kompozit visoke čvrstoće sa poboljšanim mehaničkim svojstvima i estetikom. Isti materijal korišćen je u studiji Hosaka et al. [10], dok je grupa autora u drugoj studiji [9] koristila drugi tečni kompozit G-aenial Universal Flo (GC Corporation). Klinička efikasnost ovih tečnih kompozita pokazala se sličnom efikasnosti pastastih kompozita u studiji koja je pratila efikasnost kod ispuna u bočnoj regiji, u trajanju od 36 meseci [11]. U studiji Lai i saradnika, koji su procenjivani isprava, hrapavost i promenu boje šest različitih tečnih kompozita, G-aenial universal Flo pokazao je bolja površinska svojstva posle abrazije zuba od ostalih testiranih kompozita [12].

ZAKLJUČAK

Rešavanje rastresitosti u zubnom nizu kod odraslih pacijenata zahteva složen tretman za postizanje optimalnih estetskih i funkcionalnih rezultata. U ovom slučaju ortodontska terapija je bila praćena izradom delimičnih faseta na lateralnim sekutićima i očnjacima, korišćanjem tehnike injekciranja kompozita kao jednostavnog i predvidivog rešenja za manje restaurativne procedure u estetskoj zoni osmeha.

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