

Reconstruction of Endodontically Treated Teeth After Excessive Loss of Tooth Structure – Two Case Reports

Sonja Stojičić¹, Danimir Jevremović², Slavoljub Živković¹

¹Department of Restorative Dentistry and Endodontics, School of Dentistry, University of Belgrade, Belgrade, Serbia;

²Department of Prosthodontic Dentistry, School of Dentistry, University of Belgrade, Belgrade, Serbia

Summary

The prognosis of endodontically treated teeth depends not only on the success of the endodontic treatment, but also on the type of reconstruction. The use of fiber-reinforced resin (FRR) posts to restore endodontically treated teeth has gained popularity due to its mechanical and esthetic characteristics as well as properties of modern adhesive systems. The aim of this article was to show a clinical technique to reconstruct endodontically treated teeth with great loss of tooth structure using direct fiber-reinforced post systems and direct composite restorations. The first case was a patient with the fractured right second lower premolar. The tooth was endodontically treated and reconstructed thereafter. After the preparation of the root canal and cementation of a FRR post, particular attention was paid to the incremental and curing techniques adopted to reconstruct coronal part of the tooth. The second case was a patient with the fractured first right lower incisor. This tooth was treated in the same way. Direct composite reconstruction of endodontically treated teeth is an alternative to the prosthodontic therapy and can postpone prosthodontic therapy for a long time.

Keywords: endodontic treatment; fiber-reinforced resin post; composite resin

INTRODUCTION

The prognosis of endodontically treated teeth depends not only on the success of the endodontic treatment, but also on the type of the reconstruction and recovering the function. It means that the reconstruction of the coronal part of the tooth is important and integral part of the endodontic treatment [1, 2]. The significance of the coronal reconstruction is to prevent micro-leakage and recurrent infection of the root canal [3]. Allen et al. found higher success rate of the endodontic therapy for the teeth which were definitely reconstructed compared to the teeth without reconstruction [4]. Ray et al. noted that for the successful endodontic treatment, the coronal restoration of the endodontically treated teeth is more important than technically satisfactory obturation of the root canal [5]. Chugal et al. pointed out preoperative diagnosis for the success of endodontic therapy. They found a greater number of the teeth with periapical lesions which had temporary filling compared to permanently restored endodontically treated teeth [3]. For healing processes of the apical region after the endodontic treatment, physiological forces after the recovery of tooth function are very important [6].

It has been suggested that endodontically treated teeth dry over time and become more brittle and may fracture more easily than non endodontically treated teeth [2]. Today, it is believed that the loss of tooth structure during tooth preparation makes pulpless teeth more susceptible to fracture. Reeh et al. showed that tooth stiffness was reduced by 20% after an occlusal cavity preparation, 46% after two-surface cavity preparation and more than 63% after an MOD preparation [7]. The greatest loss in tooth stiffness is related to the loss of marginal ridge integrity.

Tooth dehydration and endodontic therapy are not related to mechanical characteristics of dentin [8, 9].

The reconstruction of the endodontically treated teeth may be carried out in different ways. Managing reconstruction immediately after the endodontic therapy is very important. This will prevent the recurrent infection after the endodontic treatment is completed [1].

There are no strict recommendations for conservative and prosthodontic reconstruction of the endodontically treated teeth. Usually, it is the result of a therapeutic approach and the financial capability of the patient. The most important parameter is the loss of tooth structure, the localization of the gingival demarcation but also functional needs. Prosthodontic rehabilitation is financially demanding and leads to the larger reduction in hard tissue, which is common during the preparation for a ceramic or a metal-ceramic crown.

Recently, endodontically treated teeth were considered weaker than vital teeth. Consequently, the recommended procedure was implantation of the intracanal post. Nowadays, it is well known that an intracanal post does not reinforce the tooth, but is only important as part of the core retention [10]. Furthermore, very often during the preparation for the post there are some failures, such as lateral perforations in the wall of the root canal. It is not only due to an inadequate preparation but also complicated root canal anatomy. After post cementation, there is a possibility of fracture of the root and therapy failure, especially if the post space had been enlarged [11]. However, it is essential to detect the real need for the post cementation in the root canal of endodontically treated teeth.

There are two types of root canal posts: prefabricated and custom-fabricated. According to the used materials

there are stainless steel, titanium, ceramic, zirconium and fiber reinforced resin posts which became very popular in 1990's. Posts may have cylindrical and conical shape and may be active and passive. Today, prefabricated posts are very popular because they are already prepared for cementation and, therefore, easy and simple to use. After the use of metal posts for a long time, the need for esthetic materials has led to the introduction of ceramic and, more recently, fiber reinforced resin posts. Beside the esthetic advantage, fiber reinforced resin posts are more flexible than metal posts with similar modulus of elasticity (stiffness) as dentin. This is of particular importance because of the reduced risk for root fracture. It is also important to point out that the cylindrical shape is more retentive than the conical one and has better force distribution to the tooth [2, 12, 13].

The aim of this article was to show a clinical technique to reconstruct endodontically treated teeth with the great loss of tooth structure using direct fiber reinforced post systems and direct composite restorations.

The reconstruction of two teeth with substantial loss of tooth structure is shown in this article. One of them was in the posterior part of the lower jaw (right second premolar) and the other was in the frontal part of the lower jaw (right second incisor). Both teeth had the same diagnosis, chronic apical periodontitis. Due to the great loss of tooth structure, the first proposed therapy plan was prosthodontic. Because of high cost, conservative therapy was finally managed.

CASE REPORT 1: LOWER RIGHT SECOND PREMOLAR

A female patient, 24 years of age, came to the School of Dentistry because of the fracture of the lower right second premolar. The coronal part of the tooth was missing. The fracture line was 1 mm above gingiva. Previously, the tooth had been endodontically treated but it needed endodontic retreatment (Figure 1a). On the diagnostic X-ray, the diagnosis of chronic apical periodontitis was confirmed. After the complete endodontic retreatment following the principles of access preparation, working length determination, instrumentation and irrigation, the root canal was filled with calcium-hydroxide dressing for 14 days. During the next visit definitive obturation of the root canal was performed using calcium-hydroxide-based sealer -Acroseal (Figure 1b) [14]. After five days, the tooth was definitively reconstructed. The post was cemented in the root canal to support coronal retention. The preparation of the root canal was performed using a special set of the rotary instruments number 1 (white ring; FRC Postek, Ivoclar-Vivadent, Schaan, Liechtenstein). After the preparation was completed, the root canal was irrigated with saline and dried using paper points. An adequate post was selected and adapted using a diamond disc. Then, the post was silanized using Monobond S for 30 s.

After etching root canal walls with 37% phosphoric acid for 10 s (Figure 1c), the bond was applied (Excite DSC) (Figure 1d) and dual cured, due to the restricted light access in the lower parts of the root canal. Excess mate-

rial was taken out using paper points, before polymerization. The bond was polymerized for 20 s. The post was then cemented using the dual cure cement (Variolink II, Ivoclar-Vivadent, Schaan, Liechtenstein).

The color of the composite cement was irrelevant (because of its intracanal application), but for the intimate contact between the post and the root canal walls in the apical part, the small viscosity catalyst was needed. The two components were mixed in 1:1 ratio and then the cement was introduced in the root canal using a lentulo spiral (Figure 1e).

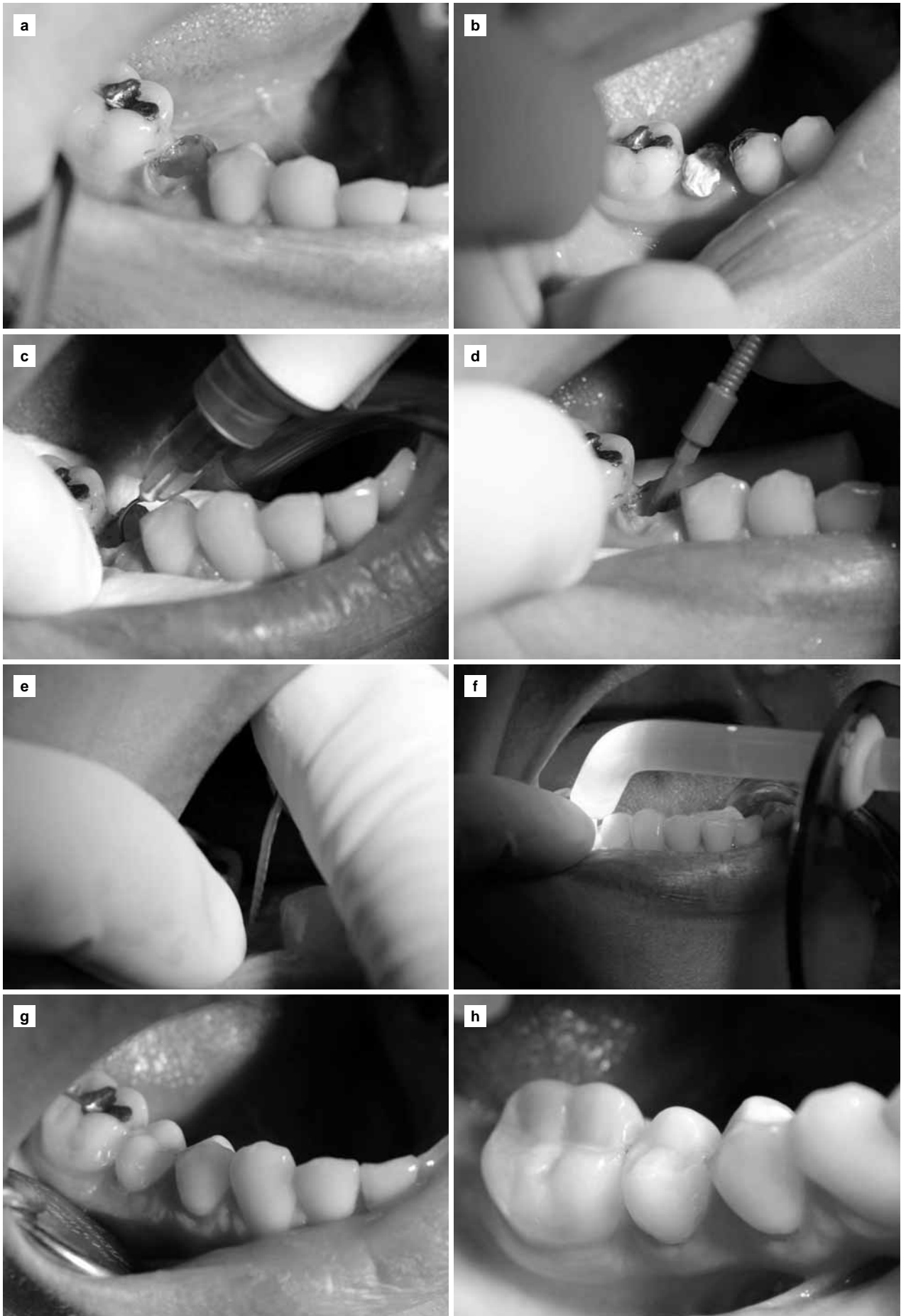
After the initial light polymerization for 40 s, the reaction between the cement components continued chemically in the unreached parts of the root canal (Figure 1f). The cemented post served as intracanal retention for the composite crown which was directly constructed, giving it shape and esthetic characteristics. Resin-based composite (Tetric Evo Ceram (Ivoclar-Vivadent, Schaan, Liechtenstein) was placed using the incremental technique with adequate instruments in 2-3 mm thick layers. Using a circular matrix for premolars, the complete crown was finished and the natural look of the tooth was achieved. The reconstructed premolar is shown in Figure 1g. After replacing amalgam fillings on teeth 44 and 47 with resin-based composites, complete esthetic goal was achieved (Figure 1h).

CASE REPORT 2: LOWER RIGHT FIRST INCISIVE

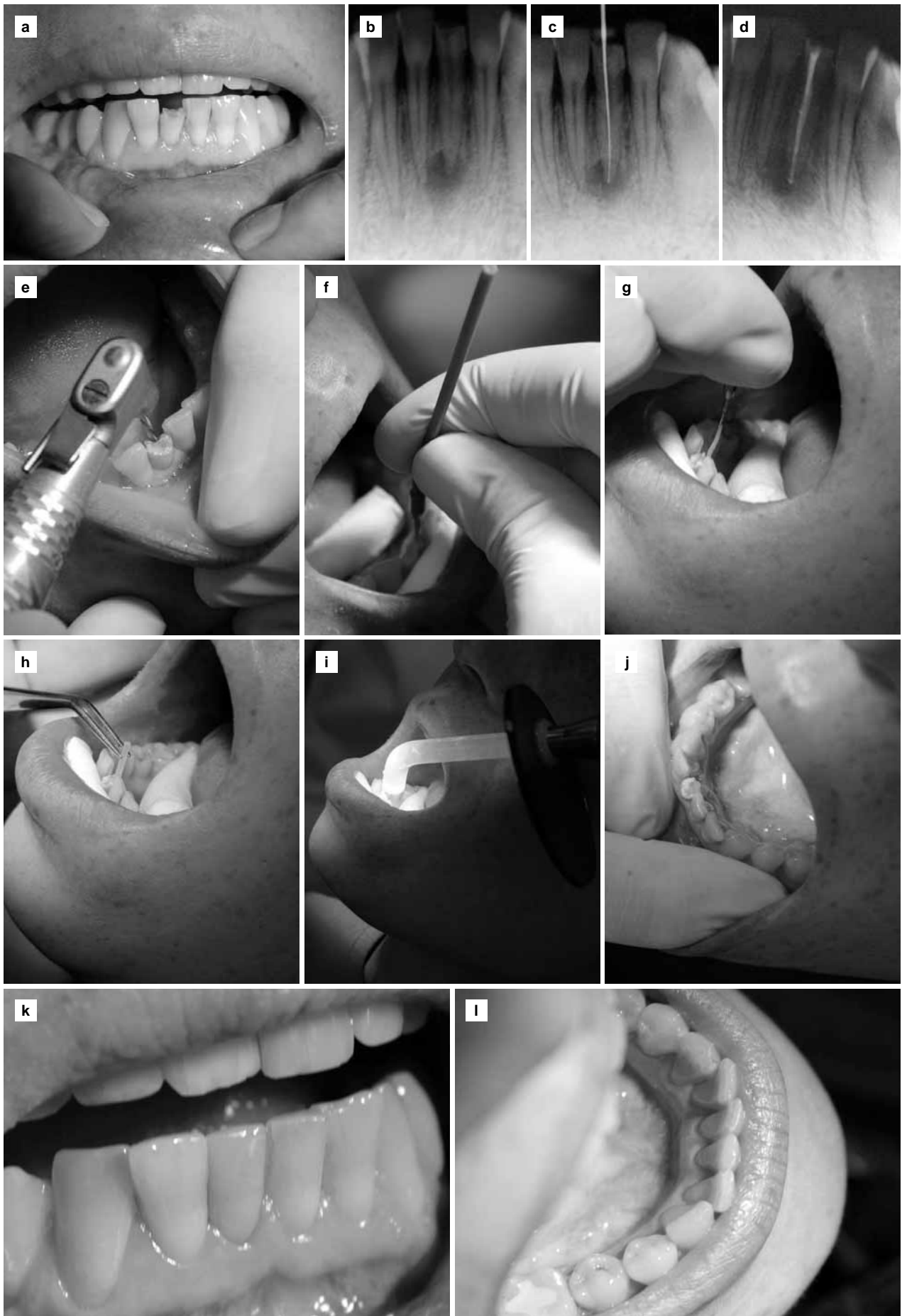
A female patient, 32 years of age, came to the School of Dentistry because of the fracture of the lower right first incisor (class III). The accident had happened one year earlier. The tooth was asymptomatic and the patient needed esthetic rehabilitation (Figure 2a). The diagnostic X-ray showed round-shaped translucency 3mm in diameter in the apical region of the tooth. Endodontic therapy was performed.

Endodontic treatment was done following the principles of access preparation, working length determination, instrumentation and irrigation. Between two sessions, the root canal was filled with calcium-hydroxide dressing for 14 days. During the next visit definitive obturation of the root canal was performed using the Acroseal paste (Figures 2b, 2c and 2d) [14]. After five days, the tooth was definitively reconstructed. As in the previous case, the post was cemented in the root canal to provide coronal retention. The preparation of the root canal was performed in the same way, using the special set of the rotary instruments number 1 (white ring; FRC Postek, Ivoclar-Vivadent, Schaan, Liechtenstein) (Figure 2e). After irrigation and drying of the root canal, an adequate post was selected and prepared for cementation. The post was silanized using Monobond S for 30 s.

The root canal walls were etched using 37% phosphoric acid for 10 s and then, the dual cured bond was applied and polymerized for 20 s (Excite DSC) (Figure 2f). The post was cemented using the dual cure cement (Variolink II, Ivoclar-Vivadent, Schaan, Liechtenstein) (Figures 2g, 2h, 2i and 2j).



Figures 1a-h. Restoration of lower right second premolar
Slike 1a-h. Restauracija drugog donjeg desnog premolara



Figures 2a-l. Restoration of lower right first incisive
Slike 2a-l. Restauracija donjeg desnog centralnog sekutića

The coronal part of the restoration was directly reconstructed using a celluloid matrix and the incremental technique with adequate instruments in 2-3 mm thick layers (Tetric Evo Ceram (Ivoclar-Vivadent, Schaan, Liechtenstein) (Figures 2k and 2l).

DISCUSSION

In this article two clinical cases were described. The best solution in these cases was either a total or partial ceramic crown and an inlay, where in the latter one it is important to point out the way of distributing forces to the rest of the tooth substance [15]. It has been shown that ceramic material, due to its stiffness, distributes forces directly to the tooth, while resin material absorbs part of the forces [16]. Also, similar modulus of elasticity of the post and resin composite crown makes this combination more favorable than the post and ceramic pair [17].

Good characteristics of this procedure are efficacy, speed and financial aspect. This treatment is possible to perform in one session, which makes it suitable in urgent cases, when it becomes easy to restore the tooth esthetically and functionally [15]. It is simple, efficient and successful using the latest techniques and principles of adhesive dentistry. It is even possible to finish the ceramic crown in only one session using CAD/CAM technology but it is not available for all patients. Though this treatment is classified as temporary restoration, in some circumstances it can be a long-time solution [18]. Mannocci et al. showed that there is no difference in therapeutic success between endodontically treated teeth reconstructed with ceramic or direct resin composite crowns [19]. Direct reconstruction of endodontically treated teeth is very useful in cases with uncertain prognosis when definitive restoration has to be delayed.

However, although there are many good characteristics of the direct restoration of endodontically treated teeth, it is not applicable in every case. Negative characteristics of resin materials are well known: polymerization contraction and crack formation in places of insufficient adhesion. Also, adhesion for root dentin and dentin of the pulp chamber bottom is weaker compared to coronal dentin which is mostly lost. Complete isolation from saliva is imperative during the placement of resin composite fillings [11]. It is very hard or impossible to place a direct resin composite restoration if the demarcation is subgingival, no matter if it is due to fracture or caries. In such cases ceramic crown is a better solution. Also, esthetic is superior in ceramic crowns, especially in frontal teeth.

Recently, it has been suggested that fiber reinforced resin posts are used more than metal posts during restoration of endodontically treated teeth. Beside their esthetic advantage, fiber reinforced resin posts have better biomechanical characteristics than metal posts. They are more elastic than metal posts and have a better distribution of forces to the root. For that reason, they are more preferable for reconstruction of endodontically treated teeth. Root fracture is less common after the use of fiber reinforced resin posts compared to metal posts. Also, it is easy

to remove fiber reinforced resin posts if necessary [15]. One possible failure is post debonding. Cagidiaco et al. found post debonding in 4.3% cases after two years in 162 teeth and pointed out the significance of the amount of remained tooth structure for debonding [20].

Many authors have reported success in the reconstruction of endodontically treated teeth using direct resin composite fillings. Deliperi reported success in the reconstruction of endodontically treated upper molars using direct reinforced resin composite fillings after three years [21]. One of the most valuable parameters for the successful therapy is the amount of remaining coronal tooth structure.

In a five-year study of endodontically treated molars using direct resin composite fillings, after one, three and five years the percentage of success was 96%, 88% and 36%. Also, resin composite fillings had higher percentage of success than amalgam fillings [22]. The criteria for this type of reconstruction were: the presence or absence of the periapical lesion, margins of the filling and microleakage, color stability, pigmentation and post debonding [15]. In their study, on a follow up after 30 months, 100 endodontically treated teeth showed satisfactory results.

The clinical case number 1 was the tooth with a completely destroyed coronal part 1 mm above gingiva. After one year, the periapical translucency was absent, the color was stable and without marginal pigmentation. The clinical case number 2 was the tooth with a horizontal fracture 4 mm above the gingiva. After one year, there was no periapical translucency whilst color stability and intact margins were maintained.

CONCLUSION

Restoration of endodontically treated teeth with excessive loss of tooth structure using direct composite reconstruction is an alternative to the prosthodontic therapy, which may be postponed for a long time. This type of restoration is simple, efficient, requires no special technical or laboratory equipment and can be performed easily in every dental practice.

REFERENCES

1. Schwartz RS, Fransman R. Adhesive dentistry and endodontics: materials, clinical strategies and procedures for restoration of access cavities – a review. *J Endodon.* 2005; 31:151-65.
2. Cheung W. A review of the management of endodontically treated teeth. Post, core and the final restoration. *J Am Dent Assoc.* 2005; 136:611-9.
3. Chugal NM, Clive JM, Spångberg LS. Endodontic treatment outcome: effect of the permanent restoration. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2007; 104:576-82.
4. Allen RK, Newton CW, Brown CE Jr. A statistical analysis of surgical and nonsurgical endodontic retreatment cases. *J Endod.* 1989; 15:261-6.
5. Ray HA, Trope M. Periapical status of endodontically treated teeth in relation to the technical quality of the root filling and the coronal restoration. *Int Endod J.* 1995; 28:12-8.
6. Reeh ES, Messer HH, Douglas WH. Reduction in tooth stiffness as a result of endodontic and restorative procedures. *J Endod.* 1989; 15:512-6.

7. Huang TJ, Schilder H, Nathanson D. Effects of moisture content and endodontic treatment on some mechanical properties of human dentin. *J Endod.* 1992; 18:209-15.
8. Sedgley CM, Messer HH. Are endodontically treated teeth more brittle? *J Endod.* 1992; 18:332-5.
9. Peroz I, Blankenstein F, Lange KP, Naumann M. Restoring endodontically treated teeth with posts and cores – a review. *Quintessence Int.* 2005; 36:737-46.
10. Schwartz RS, Robbins JW. Post placement and restoration of endodontically treated teeth: a literature review. *J Endod.* 2004; 30:289-301.
11. Cagidiaco MC, Goracci C, Garcia-Godoy F, Ferrari M. Clinical studies of fiber posts: a literature review. *Int J Prosthodont.* 2008; 21:328-36.
12. Živković S. Rendgenografska procena uspeha ponovnog tretmana endodontski lečenih zuba. *Stom Glas S.* 2000; 47:103-6.
13. Živković S, Jević B, Blažić L, Lazić V. Rendgenografska analiza restauracije endodontski lečenih zuba. *Stom Glas S.* 2002; 49:14-9.
14. Cohen S, Hargreaves KM. *Pathways of the Pulp.* 9th ed. St. Louis: Mosby; 2006.
15. Grandini S, Goracci C, Tay FR, Grandini R, Ferrari M. Clinical evaluation of the use of fiber posts and direct resin restorations for endodontically treated teeth. *Int J Prosthodont.* 2005; 18:399-404.
16. Santos MJ, Bezerra RB. Fracture resistance of maxillary premolars restored with direct and indirect adhesive techniques. *J Can Dent Assoc.* 2005; 71:585.
17. Akkayan B, Gülmez T. Resistance to fracture of endodontically treated teeth restored with different post systems. *J Prosthet Dent.* 2002; 87:431-7.
18. Piovesan EM, Demarco FF, Cenci MS, Pereira-Cenci T. Survival rates of endodontically treated teeth restored with fiber-reinforced custom posts and cores: a 97-month study. *Int J Prosthodont.* 2007; 20:633-9.
19. Mannocci F, Bertelli E, Sherriff M, Watson TF, Ford TR. Three-year clinical comparison of survival of endodontically treated teeth restored with either full cast coverage or with direct composite restoration. *J Prosthet Dent.* 2002; 88:297-301.
20. Cagidiaco MC, Radovic I, Simonetti M, Tay F, Ferrari M. Clinical performance of fiber post restorations in endodontically treated teeth: 2-year results. *Int J Prosthodont.* 2007; 20:293-8.
21. Deliperi S. Direct fiber-reinforced composite restoration in an endodontically-treated molar: a three-year case report. *Oper Dent.* 2008; 33:209-14.
22. Nagasiri R, Chitmongkolsuk S. Long-term survival of endodontically treated molars without crown coverage: a retrospective cohort study. *J Prosthet Dent.* 2005; 93:164-70.

Address for correspondence

Sonja Stojičić

Klinika za bolesti zuba

Stomatološki fakultet

Rankeova 4, 11000 Beograd

Srbija

Email: cokamala@yahoo.com

Mogućnosti rekonstrukcije endodontski lečenih zuba s velikim oštećenjima krunice – dva prikaza iz prakse

Sonja Stojičić¹, Danimir Jevremović², Slavoljub Živković¹

¹Klinika za endodonciju, Stomatološki fakultet, Univerzitet u Beogradu, Beograd, Srbija;

²Klinika za stomatološku protetiku, Stomatološki fakultet, Univerzitet u Beogradu, Beograd, Srbija

KRATAK SADRŽAJ

Prognoza endodontski lečenog zuba ne zavisi samo od uspešno izvedene endodontske terapije, već i od pravilne restauracije zuba i njegovog vraćanja u funkciju. Kompozitni kočici ojačani vlaknima poslednjih godina dobijaju na popularnosti u rekonstrukciji endodontski lečenih zuba zahvaljujući svojim estetskim i biomehaničkim osobinama, te mogućnosti ostvarivanja adhezivne veze za zub. Cilj ovog rada je da na primerima iz prakse ukaže na mogućnost konzervativne terapije endodontski lečenih zuba s velikim oštećenjima krunice primenom kompozitnih kanalnih kočica. Kod jedne pacijentkinje s frakturom donjeg desnog drugog premolara obavljeno je najpre endodontsko lečenje, a potom je urađena konzervativna restauracija. Posle preparacije prostora za kanalni kočic i njegovog cementiranja, krunični deo zuba je restauriran direktnim kompozitnim ispunom slojevitom tehnikom. Na isti način je lečen i donji desni centralni sekutić druge pacijentkinje. Restauracija devitalizovanih zuba s opsežnim lezijama konzervativnim lečenjem je dobra alternativa protetičkoj restauraciji, koja protetički tretman može odložiti za duži vremenski period.

Ključne reči: endodontsko lečenje; kompozitni kanalni kočic; kompozitni materijal

UVOD

Prognoza endodontski lečenog zuba ne zavisi samo od uspešnog lečenja kanala korena, već i od načina restauracije zuba i njegovog povratka u funkciju. To znači da je restauracija kruničnog dela zuba važan i sastavni deo endodontske terapije [1, 2]. Značaj restauracije krunice ogleda se, pre svega, u sprečavanju krunične mikropropustljivosti i ponovne infekcije kanala korena zuba [3]. Alen (*Allen*) i saradnici [4] su zapazili da se veći procenat uspeha endodontskog lečenja može očekivati kod zuba koji su konačno rekonstruisani ispunima u odnosu na one gde je izostala konačna restauracija zuba. Rej (*Ray*) i Trop (*Trope*) [5] su zaključili da je krunična rekonstrukcija značajnija za ishod endodontski lečenih zuba od tehnički korektno izvedene opturacije kanala. Čugal (*Chugal*) i saradnici [3], međutim, ukazuju na to da je u stvari preoperativna dijagnoza endodontski lečenog zuba značajniji faktor od konačne restauracije zuba. Oni takođe navode da se češće nalazi zub s apektnim parodontitisom i privremenim ispunom nego sa stalnim ispunom [3]. Fiziološko opterećenje zuba koje se postiže pravovremenom restauracijom krunice i vraćanjem zuba u funkciju značajno utiče na procese zarastanja [6].

Među stomatolozima je dugo vladalo mišljenje da endodontsko lečenje čini zube krtijim i, samim tim, podložnijim lomljenju. Naime, smatralo se da je dehidracija zuba nastala gubitkom zubne pulpe najodgovornija za gubitak elastičnosti zuba [2]. Novija istraživanja pokazuju da je ipak najvažniji faktor zbog kojeg je endodontski lečen zub podložniji frakturama upravo gubitak velike količine zubne supstance nastao preparacijom zuba. Ri (*Reeh*) i saradnici [7] su ustanovili da se otpornost zuba smanjuje za 20% posle preparacije jednopovršinskog kaviteta, za 46% nakon dvopovršinske preparacije, a čak za 63% posle MOD reparacije. Takođe je naglašen značaj očuvanja marginalnog grebena u očuvanju otpornosti zuba. Ispitivanja su pokazala da dehidracija zuba i endodontsko lečenje ne utiču na mehaničke osobine dentina [8, 9].

Restauracija devitalizovanih zuba može imati multidisciplinarni pristup. Veoma je značajna imedijatna rekonstrukcija

zuba nakon završenog lečenja kanala korena. Na taj način se maksimalno sprečava ponovna kontaminacija endodontskog prostora zuba [1].

Granica razdvajanja konzervativne i protetičke rehabilitacije nije precizno određena, pa je odluka o određenoj vrsti terapije često stvar izbora terapeuta ili finansijskih mogućnosti pacijenta. Najznačajniji parametar je obim oštećenja krunice, lokalizacija gingivalne demarkacije i funkcionalni zahtevi. Protetička rekonstrukcija često iziskuje značajna sredstva, uz neizbežna obimna smanjenja tvrdih zubnih tkiva, koja su tipična za preparativni dizajn punih čaurastih retinera.

Donedavno se smatralo da su endodontski lečeni zubi slabiji od vitalnih zuba i da ih je potrebno ojačati implantiranjem intrakanalnog kočica. Danas se zna da intrakanalni kočic uglavnom ne ojačava zub, već služi samo za retenciju kruničnog dela restauracije zuba [10]. Štaviše, tokom preparacije prostora za kočic u kanal korena zuba dolazi do bočnih perforacija zidova kanala, kao posledica neadekvatne preparacije ili složene anatomske strukture kanala korena. Takođe, koren u koji je implantiran kočic je podložniji lomljenju, što dovodi do neuspešnog lečenja, naročito ako nastane predimenzioniranje prostora za kočic [11]. Stoga je potrebno postaviti pravu indikaciju za upotrebu kočica prilikom konačne restauracije krunice endodontski lečenih zuba.

Postoje različite vrste kanalnih kočica, koji mogu biti fabrički ili individualno urađeni. Prema vrsti materijala, kočici mogu biti od nerđajućeg čelika, titanijumski, od keramike i cirkonijuma, a od devedesetih godina dvadesetog veka naročito su popularni kompozitni kočici ojačani vlaknima. Kočici mogu imati cilindričan ili koničan oblik i mogu biti aktivni ili pasivni. Jasno je da danas fabrički kočici imaju prednost u odnosu na individualno urađene kočice zbog lake i jednostavne upotrebe. Posle duge upotrebe metalnih kočica javila se potreba za estetskim materijalom, pa su se pojavili najpre keramički, a kasnije i kompozitni kočici ojačani vlaknima koji imaju mnoge strukturne prednosti. Pored estetskog značaja, prednost ovih kompozitnih kočica nad metalnim je u tome što oni imaju sličan modul elastičnosti kao i dentin zuba, što značajno umanjuje

moćnost nastanka frakture korena zuba. Ne sme se zaboraviti ni bolji prenos sila na dentin zuba cilindričnim kočićem u odnosu na kočić konusnog oblika [2, 12, 13].

Cilj ovoga rada je da na primerima iz prakse ukaže na mogućnost konzervativne terapije endodontski lečenih zuba s velikim oštećenjima krunice primenom kompozitnih kanalnih kočića. Prikazane su dve pacijentkinje s velikim oštećenjima krunica: kod jedne u bočnom segmentu donje vilice (donji desni drugi premolar), a kod druge u prednjem delu vilice (donji desni centralni sekutić). Kod oba zuba postavljena je dijagnoza hroničnog apeksnog parodontitisa. S obzirom na veličinu oštećenja zuba, pacijentkinjama je najpre predložena protetička rehabilitacija bezmetalnim krunama, ali ona, zbog finansijskih razloga, nije urađena. Stoga je kao alternativa metal-keramičkoj krunici predložen konzervativni tretman, kao palijativni vid lečenja.

PRIKAZ PRVOG SLUČAJA: DONJI DESNI DRUGI PREMOLAR

Pacijentkinja stara 24 godine javila se na Stomatološki fakultet Univerziteta u Beogradu zbog frakture donjeg desnog drugog premolara. Kruničnog dela nije bilo. Linija preloma je bila milimetar iznad gingive. Zub je bio ranije endodontski lečen, ali je bilo neophodno uraditi ponovni endodontski tretman (Slika 1a). Nakon što je načinjen dijagnostički rendgenski snimak, potvrđena je dijagnoza hroničnog zapaljenja apeksnog parodonticijuma. Posle endodontskog lečenja zuba po svim pravilima preparacije pristupnog kaviteta, odontometrije, preparacije i irigacije kanala, kanal je interseansno tretiran pastom na bazi kalcijum-hidroksida tokom 14 dana. Zatim je pri sledećoj poseti stomatologu kanal konačno opturisan pastom Acroseal na bazi kalcijum-hidroksida (Slika 1b) [14]. Nakon pet dana zub je konačno restauriran. Zbog velikog oštećenja kruničnog dela zuba, bilo je neophodno implantirati kočić u kanal korena za retenciju kruničnog dela restauracije. Preparacija kanala urađena je odgovarajućim proširivačem za kompozitni kočić br. 1 (beli prsten; FRC Postek, Ivoclar-Vivadent, Schaan, Liechtenstein). Nakon preparacije kanal je ispran fiziološkim rastvorom i posušen papirnim poenima. Odgovarajući kočić iz seta je odabran i skraćen na željenu dužinu dijamantskim diskom. Kočić je potom silaniziran Monobondom S tokom 30 sekundi.

Posle nagrizanja zidova posušenog kanala korena 37-procentnom fosfornom kiselinom tokom 10 sekundi (Slika 1c), primenjen je bond (Excite DSC) (Slika 1d). Bond je bio dvojnovezujući, zbog nemogućnosti prodora svetlosti u dublje delove kanala. Višak bonda je pre polimerizacije uklonjen papirnim poenima. Bond je polimerizovan 20 sekundi. Fiksiranje kočića urađeno je dvojnovezujućim kompozitnim cementom (Variolink II, Ivoclar-Vivadent, Schaan, Liechtenstein).

Boja kompozitnog cementa u ovom slučaju nije bila od značaja (zbog njegove intrakanalne primene), ali je, zbog intimnog naleganja kočića na zidove kanala u apeksnom delu, korišćen katalizator niskog viskoziteta. Baza i katalizator umešeni su u odnosu 1:1, a zatim je cement lentulo spiralom unesen u kanal (Slika 1e).

Posle inicijalne svetlosne polimerizacije u trajanju od 40 sekundi, cement se vezao hemijskom polimerizacijom u nedostupnim delovima kanala (Slika 1f). Kočić sada služi kao intrakanalna retencija kompozitu, koji krunici daje oblik i estetske

osobnosti. Korišćen je kompozit Tetric Evo Ceram (Ivoclar-Vivadent, Schaan, Liechtenstein). Nanesen je slojevitom tehnikom odgovarajućim instrumentima u debljini 2-3 mm. Pomoću cirkularne matrice za premolare potpuno je rekonstruisan prirodni izgled zuba. Izgled rekonstruisanog premolara prikazan je na slici 1g. Potpun estetski efekat postignut je zamenom amalgamskih restauracija kompozitnim na zubima 44 i 47 (Slika 1h).

PRIKAZ DRUGOG SLUČAJA: DONJI DESNI CENTRALNI SEKUTIĆ

Pacijentkinja stara 32 godine javila se na Stomatološki fakultet Univerziteta u Beogradu zbog frakture treće klase donjeg centralnog sekutića. Anamnestički su dobijeni podaci o povredi zuba nastaloj godinu dana ranije. Zub je bio bez simptoma, a pacijentkinja je zahtevala estetsku rehabilitaciju (Slika 2a). Dijagnostički rendgenski snimak pokazao je rasvetljenje u apeksnoj regiji zuba okruglog oblika, prečnika 3 mm. Obavljeno je lečenje inficiranog kanala korena.

Endodontsko lečenje je izvedeno po svim pravilima preparacije pristupnog kaviteta, odontometrije, preparacije i irigacije kanala. Interseansna medikacija je urađena pastom na bazi kalcijum-hidroksida tokom 14 dana. Pri narednoj poseti stomatologu obavljena je konačna opturacija kanala korena pastom Acroseal (Slike 2b, 2c i 2d) [14]. Pet dana kasnije zub je konačno restauriran. I u ovom slučaju implantiran je kompozitni kočić ojačan vlaknima. Preparacija kanala urađena je na isti način kao i u prethodnom slučaju, proširivačem za kompozitni kočić br. 1 (beli prsten; FRC Postek, Ivoclar-Vivadent, Schaan, Liechtenstein) (Slika 2e). Nakon irigacije i posušivanja kanala, odgovarajući kočić je odabran i pripremljen za cementiranje. Kočić je silaniziran Monobondom S tokom 30 sekundi.

Kanal korena tretiran je 37-procentnom fosfornom kiselinom tokom 10 sekundi, a zatim je primenjen dvojnovezujući bond i polimerizovan 20 sekundi (Excite DSC) (Slika 2f). Kočić je fiksiran dvojnovezujućim kompozitnim cementom (Variolink II, Ivoclar-Vivadent, Schaan, Liechtenstein) (Slike 2g, 2h, 2i i 2j).

Krunica je potpuno estetski restaurirana slojevitom tehnikom odgovarajućim instrumentima u debljini 2-3 mm kompozitnim materijalom (Tetric Evo Ceram-Ivoclar-Vivadent, Schaan, Liechtenstein) pomoću celuloidne matrice (Slike 2k i 2l).

DISKUSIJA

U ovom radu opisani su klinički slučajevi gde je najbolje rešenje bilo da se urade keramičke krunice ili alternativno delimične krune ili onlej, međutim, kod poslednjih treba imati u vidu način prenosa pritiska s ovih restauracija na preostalu zubnu supstancu [15]. Pokazano je da keramičke nadoknade, zbog svoje krutosti, imaju tendenciju da napone rasporede direktno na zub, dok se određen deo napona kod kompozitnih nadoknada apsorbuje u okviru samog ispuna [16]. Takođe, sličnost modula elastičnosti kočića i kompozitnog ispuna čini ovu kombinaciju efikasnijom od para kočić i keramička nadoknada [17].

Potencijalno dobre strane navedenog postupka odnose se, pre svega, na njegovu efikasnost i brzinu izvođenja, ali i na finansijski aspekt. Naime, ovakav tretman moguće je izvesti tokom jedne posete stomatologu, što ga čini idealnim za hitne slučajeve,

kada je pacijent pri jednoj poseti estetski i funkcionalno zbrinut [15]. On je jednostavan, efikasan i nada sve uspešan ukoliko se primenjuju savremene tehnike i principi adhezivne stomatologije. Iako je jednoseansnu keramičku krunu danas moguće uraditi CAD/CAM tehnologijom, ipak ona nije dostupna većini pacijenata. Mada se ovakav tretman smatra privremenim, u nekim slučajevima može trajati jako dugo [18]. Mannoči (*Mannocci*) i saradnici [19] su pokazali da ne postoji razlika u terapijskom uspehu kod endodontski lečenih zuba koji su restaurirani keramičkim krunicama, odnosno direktnim ispunom od kompozita. Značaj ovakve terapije je važan kod endodontski lečenih zuba s nesigurnom prognozom, kada je potrebno sačekati neko vreme pre obavljanja konačne restauracije.

I pored dobrih strana koje ovakvo lečenje pokazuje, ne treba preceniti njegove mogućnosti. Loše osobine kompozita su dobro poznate: on se kontrahuje tokom polimerizacije stvarajući pukotine na mestima najslabije adhezije. Takođe, adhezija je mnogo slabija za korenski dentin i dentin na podu kavuma, nego s kruničnim dentinom, koji je u najvećoj meri izgubljen. Suvo radno polje je apsolutni zahtev za proces postavljanja kompozitnog ispuna [11]. Restauracija direktnim kompozitnim ispunom je teško izvodljiva kod pacijenata sa subgingivalnom lokalizacijom demarkacije, bilo da je u pitanju lomljenje devitalizovanog zuba ili oštećenje usled karijesa. U tom slučaju se savetuje izrada keramičke krune. Po pitanju estetskih zahteva, krunica je „superiornija“ u odnosu na kompozitne materijale, naročito ako je u pitanju rekonstrukcija zuba u prednjem delu zubnog niza.

Poslednjih godina kompozitni kočići ojačani vlaknima se sve više koriste u rekonstrukciji endodontski lečenih zuba umesto ranije korišćenih metalnih kočića. Pored prednosti u estetskom smislu, koji je na strani kompozitnih kočića, njihova biomehanička svojstva su takođe vrlo značajna. Naime, kompozitni kočići su fleksibilni, za razliku od metalnih, koji su rigidni, i samim tim obezbeđuju povoljniji prenos pritiska na preostali deo zuba. Frakture korena posle primene kompozitnih kočića su ređe u poređenju s metalnim kočićima, a takođe se lako uklanjaju iz kanala zuba [15]. Njihov neuspeh je najčešće problem komplikovanog cementiranja, odnosno čestog rascementiranja. Kagidačo (*Cagidiaco*) i saradnici [20] su zabeležili

rascementiranje kočića u 4,3% slučajeva nakon dve godine na uzorku od 162 zuba i naveli značaj preostale količine zubne supstance na mogućnost rascementiranja kočića.

Uspeh konzervativne rekonstrukcije endodontski lečenih zuba zabeležilo je nekoliko autora. Deliperi (*Deliperi*) [21] nakon tri godine beleži uspeh konzervativne rekonstrukcije endodontski lečenog gornjeg molara rekonstruisanog direktnim ojačanim kompozitnim ispunom. Kao jedan od najvažnijih parametara uspešnog lečenja uzima se količina preostale supstance u kruničnom delu zuba.

U petogodišnjoj studiji endodontski lečenih molara koji su konzervativno rekonstruisani posle jedne, dve i pet godina procenat uspešnosti lečenja bio je 96%, 88%, odnosno 36% [22]. Takođe, kompozitni ispuni su imali veći procenat uspeha u odnosu na amalgamske ispune [22]. Na efikasnost ovakvog vida rekonstrukcije konzervativno lečenih zuba praćenjem kriterijuma kao što su prisustvo ili odsustvo periapeksne lezije, izgled rubova ispuna i mikrocurenje, stabilnost boje, pigmentacije i rascementiranje kočića ukazuju i Grandini (*Grandini*) i saradnici [15]. U njihovoj studiji tokom koje je 30 meseci posmatrano 100 endodontski lečenih zuba dobijeni su zadovoljavajući klinički rezultati.

Prvi klinički slučaj koji je prikazan u ovom radu bio je zub s potpunim nedostatkom kruničnog dela milimetar iznad gingive. Posle godinu dana na kontrolnom pregledu zub je bio bez periapeksnog procesa, promene boje i marginalnih pigmentacija. U drugom slučaju prikazan je desni donji centralni sekutić s horizontalnom frakturom krunice visine 4 mm, koji je godinu dana nakon lečenja na kontrolnom pregledu takođe bio bez periapeksnog procesa, promene boje i marginalnih pigmentacija.

ZAKLJUČAK

Rekonstrukcija devitalizovanih zuba s opsežnim lezijama konzervativnim lečenjem je realna alternativa protetičkoj rekonstrukciji, koju može odložiti za duži vremenski period. Ovaj vid restauracije je jednostavan, efikasan i može se realizovati u svakoj stomatološkoj ordinaciji, bez posebnih tehničkih i laboratorijskih zahteva.