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Utjecaj ortodontskog liječenja na resorpciju alveolarne kosti kod pacijenata s parodontnom bolešću: prikaz niza slučajeva

Impact of Orthodontic Treatment on Crestal Bone Resorption in Periodontally Compromised Patients: a Case Series

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Sažetak

Svrha: Kako se povećava broj pacijenata s parodontnom bolešću koji se podvrgavaju ortodontskom liječenju (OL-u), a nema izvještaja specifično fokusiranog na utjecaj OL-a u slučaju pregradnje alveolarne kosti (PAK-a), odlučili smo se za retrospektivnu studiju. **Ispitanici i postupak:** Kod dvadeset i šestoro pacijenata ortodontski je liječeno 445 od 645 zuba. Unutar alveolarne kosti srednja im je visina iznosila 0,47 posto prije OL-a. Rendgensko snimanje i χ^2 -test upotrijebljeni su za procjenu razlike u PAK-u. **Rezultati:** Nije bilo gubitka zuba. Pokazali smo da (1) OL ne djeluje štetno na potpurnu kost liječenog zuba, a s obzirom na to da su srednje vrijednosti resorpcije alveolarne kosti iznosile 0,03 milimetra kod liječenih i 0,26 milimetara kod neliječenih zuba (2), nije bilo statističke razlike u PAK-u između liječenih i neliječenih zuba, tako da (3) duljina aktivnog OL-a nije kritični čimbenik za PAK. **Zaključak:** OL je kod pacijenata s parodontnom bolešću moguće obaviti i postiže se dobar učinak na PAK.

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Uvod

Zahtjevi za ortodontsko liječenje (OL) posljednjih su nekoliko godina sve češći zbog estetskih potreba stanovništva. Ortodoncija je kod odraslih sve popularnija jer omogućuje pomicanje i poboljšanje poredanosti pacijentovih zuba, bez obzira na tehniku. Pacijentima s parodontnom bolešću može biti potrebno parodontno liječenje u kombinaciji s OL-om. OL je kod njih moguće obaviti, no uključuje uklanjanje upale i okluzijskih smetnji (1-9).

Premda je opsežno, ortodontskim se liječenjem ne može isključiti kasniji mogući razvoj parodontne bolesti, no može biti korisno kao dio sveobuhvatnog plana liječenja pacijenta koji već ima parodontnu bolest. Detaljnim kliničkim pregledom liječnik mora ustanoviti stanje pacijentova zdravlja zubi, uključujući trenutačno razaranje ili manjkavosti zuba i potpornih tkiva, te pacijentovu sposobnost da postigne i održava dobru oralnu higijenu. Tijekom liječenja u obzir se moraju uzeti dva glavna kriterija:

- 1) pacijent mora često dolaziti na parodontno liječenje i održavanje zuba;
- 2) moraju se primijeniti minimalne ortodontske sile.

Introduction

Orthodontic treatment (OT) requests are growing up in the last few years, due to the esthetical needs of the population. Adult orthodontics is increasing in popularity as it is becoming more feasible to move and improve the alignment of a patient's teeth, irrespective of the technique. Patients with a compromised periodontal condition may require periodontal treatment in conjunction with OT. OT of these patients is possible and would involve removal of inflammation and occlusal interference (1-9).

Although comprehensive OT cannot preclude the possibility of periodontal disease developing later, it can be a useful part of the overall treatment plan for a patient who already has periodontal involvement. A careful clinical examination must determine the patient's dental health status, including any existing destruction or deficiencies of the teeth and their support, as well as the patient's ability to achieve and maintain good overall oral hygiene. Two major criteria should be considered in the treatment of these patients:

- 1) the patient should be seen frequently for periodontal maintenance and

Nakon liječenja prijeko je potrebno kratkoročno i dugoročno šinirati zube. Takvim se ortodontskim pristupom poboljšavaju i održavaju zubna estetika i funkcija (1-9).

Premda je sve više pacijenata s ugroženom parodontnom potporom, o tome je samo nekoliko izvještaja u literaturi, a većinu čine opisi slučajeva (4-9).

Tako su Re i suradnici (3) procijenili učinak OL-a kod pacijenata liječenih kombinacijom kirurške i nekirurške parodontološke terapije. Analizirali su dubinu sondiranja i postotak krvarenja nakon sondiranja. Autori su pokazali da je kombinirano ortodontsko-parodontno liječenje poboljšalo stanje gingive na kraju liječenja, te upozorili da OL ima specifičnu indikaciju u liječenju uznapredovalog adultnog parodontitisa.

Budući da je sve više pacijenata s parodontnom bolešću koji se podvrgavaju ortodontskom liječenju, a nema podataka specifično fokusiranih na utjecaj OL-a kad je riječ o resorpciji alveolarne kosti, odlučili smo u našoj studiji evaluirati niz slučajeva.

Materijali i metode

Pacijenti

Od siječnja 2000. do prosinca 2005. godine liječeno je 26 pacijenata (sedamnaest žena i devet muškaraca) s medianom starosti od 45 godina. Srednja duljina aktivnog OL-a bila je 15 mjeseci, a srednja duljina razdoblja praćenja nakon liječenja iznosila je 16 mjeseci.

Kako bi se mogli uključiti u studiju, sudionici su se birali prema sljedećim kriterijima: patološkoj migraciji zuba s dijastemom (svih 26 pacijenata), gubitku zuba zbog parodontne bolesti (pet slučajeva), ukriženom zagrizu (četiri slučaja) i dobroj kontroli oralne higijene. Desetero njih imalo je dentalnu malokluziju II. klase i troje III. klase (ukupni *score* plaka). Dodatno, pacijenti su morali pristati sudjelovati u programu kontrola.

Kriteriji za nesudjelovanje bili su pacijenti koji puše više od 20 cigareta na dan ili piju više od litre vina, lokalna terapija zračenjem u usnoj šupljini, protutumorska kemoterapija, bolesti jetara i bubrega te krvne i autoimune bolesti usne šupljine i loša oralna higijena, zatim imunosuprimirani pacijenti i oni koji uzimaju kortikosteroide te trudnice.

Prikupljanje podataka

Prije OL-a bili su obavljani radiološki pregledi – istraživači su se koristili periapikalnim i ortopantomogramskim rendgenskim snimkama.

Za svakog pacijenta bila je procijenjena visina parodontne kosti kalibriranim pregledom rendgenskih snimki. OL je skeniran, prebačen u računalo i za klasifikaciju pohranjen u nekomprimiranom TIFF formatu.

Nakon toga je svaki dokument bio obrađen operativnim sustavom Windows XP Professional, uporabom programa Photoshop 7,0 (Adobe, San Jose, CA) i prikazan na 17" SXGA TFT LCD monitoru s NVIDIA GÈ Force FX GO 5600

2) minimal orthodontic forces should be applied.

After treatment, splinting of the teeth is necessary both short- and long-term. With this orthodontic approach, both dental aesthetics and function improve and can be maintained (1-9).

Although there are an increasing number of orthodontic patients with periodontal compromised support, few reports are available in literature and the vast majority is case report (4-9).

Re et al. (3) evaluated the effectiveness of OT in patients who received a combined surgical and nonsurgical periodontal therapy. Probing depth and percentage of bleeding on probing were analyzed. The Authors demonstrated that the combined orthodontic-periodontal treatment gave an improvement in the gingival health status at the end of the treatment and thus showing that OT has specific indication in the therapy of severe adult periodontitis.

Since the number of patients with periodontitis undergoing to OT are increasing and no reports specifically focus on the impact of OT on crestal bone resorption, we therefore decided to perform a study evaluating a case series.

Materials and Methods

Patients

In the period between January 2000 and December 2005, 26 patients (17 women) with a median age of 45 years were treated. The mean active OT was 15 months and the mean post-treatment follow-up period was 16 months.

Subjects were screened according to the following inclusion criteria: pathologic tooth migration with diastema (all 26 patients), lost teeth related to periodontal disease (5 cases), 10 and 3 dental class II and III malocclusion respectively and crossbite (4 cases), controlled oral hygiene (overall plaque score <20%),¹⁰ and the absence of any lesions in the oral cavity (such as lichen, leukoplakia and erythroplakia); in addition, the patients had to agree to participate in a check-up program.

The exclusion criteria were as follows: patients smoking more than 20 cigarettes/day or drinking more than a liter of wine per day, localized radiation therapy of the oral cavity, antitumor chemotherapy, liver, blood and kidney diseases, immunosuppressed patients, patients taking corticosteroids, pregnant women, autoimmune diseases of the oral cavity, poor oral hygiene.

Data collection

Before OT, radiographic examinations were done with the use of periapical and orthopantomograph x-rays. In each patient, periodontal bone levels were evaluated by the calibrated examination of x-rays. OT were scanned, transferred to a computer and saved in an uncompressed TIFF format for classification.

Each file was processed with the Window XP Professional operating system using the Photoshop 7.0 (Adobe, San Jose, CA), and shown on a 17" SXGA TFT LCD display with a NVIDIA GÈ Force FX GO 5600, 64 MB video card (Ac-er Aspire 1703 SM-2.6). Each image was modified using the

i 64 MB videokarticom (Acer Aspire 1703 SM-2,6). Svaka slika modificirana je uporabom funkcije *fit-on-screen* (maksimalno povećanje prozora) te su učinjene potrebne prilagodbe kontrasta, svjetla i povećanja. Mjerenja su bila obavljena pri najvećoj mogućoj rezoluciji pomoću opcije programa s mrežom i mjerkom koristeći se različitim metričkim ljestvicama. Kako su se znale dimenzije referentnog zuba, i nakon lociranja različitih referentnih točaka na rendgenogramima (razina grebena alveolarne kosti i ukupna duljina zuba) bilo je moguće obaviti linearna mjerenja na računalu te tako proporcionalnim metričkim izračunom usporediti poznate dimenzije zuba s dimenzijama na rendgenogramima. Na taj se način mogla odrediti udaljenost od mezijalnog i distalnog kontakta kost-zub (izraženo u desetinkama milimetra) i mjera resorpcije marginalne kosti. Proporcionalni izračun mjerenja omogućio je da se ustanovi - tamo gdje ga je bilo - bilo kakvo izobličenje na rendgenskim snimkama za daljnji probir te je tako pogreška tijekom analize smanjena na minimum.

Mjerenja su se bilježila prije OL-a i na kraju razdoblja praćenja. Obavljena su mezijalno i distalno od svakog zuba, a zatim se računala udaljenost između vrška zuba i najkoralnije točke kontakta kosti i zuba. Rendgenske snimke bile su kalibrirane uporabom internog standarda, a to je bila dimenzija zuba. Razina kosti zabilježena prije OL-a bila je referentna točka za daljnja mjerenja. Mjerenje se zaokruživalo na najbližih 0,1 milimetara.

Sondiranje parodontnih džepova u ovoj se studiji nije uzelo u obzir, jer je debljina gingive znatno varirala ovisno o statusu upale.

Standardne duljine zuba (korištene za izračun proporcija) bile su sljedeće: u gornjoj čeljusti središnji sjekutić = 22,5 mm, bočni sjekutić = 22 mm, očnjak = 26,4 mm, prvi pretkutnjak = 21 mm, drugi pretkutnjak = 21 mm, prvi kutnjak = 22,5 mm, drugi kutnjak = 21 mm i treći kutnjak = 21 mm; u donjoj čeljusti središnji sjekutić = 20,7 mm, bočni sjekutić = 22 mm, očnjak = 25,5 mm, prvi pretkutnjak = 22,5 mm, drugi pretkutnjak = 23 mm, prvi kutnjak = 21,5 mm, drugi kutnjak = 20 mm i treći kutnjak = 20 mm. Te vrijednosti odgovaraju pacijentima bijele rase (11).

Određivala se i stopa preživljenja (SP-a) te stopa uspjeha (SU). SP je definiran kao broj zuba zadržanih na mjestu nakon razdoblja praćenja. SU je bio određen prema sljedećim kriterijima:

- 1) odsutnosti trajne boli ili dizestezijske;
- 2) odsutnosti gnojne parodontne infekcije;
- 3) odsutnosti trajne resorpcije parodontne kosti veće od 1,5 mm tijekom prve godine i 0,2 mm/na godinu tijekom idućih godina.

Navedeni parametri upotrebljavaju se u implantologiji diljem svijeta (12).

Ta vrijednost od jednog i pol milimetra također se dobije ako se uzme u obzir odstupanje manje od 10 posto u pregradnji alveolarnog grebena prije liječenja i nakon njega. Budući da je srednja duljina zuba 22 milimetra, a korištena 14 i pol (=2/3), jedan i pol milimetar približno je 10 posto duljine korištena.

fit-on-screen function (maximized screen) and the necessary adjustments in contrast, brightness and magnification were made. The measurements were taken at the highest level of resolution possible through the "grid and ruler" program options using various metric scales. Knowing the known dimensions of a reference tooth and having located various points of reference on the profiles of the x-rayed fixtures (bone crestal level and total length of tooth), it was possible to take linear measurements on the computer and thus execute a proportional metric calculation comparing the known dimensions of the tooth with those of the examined x-ray images. This made it possible to establish the distance from the medial and distal of bone-tooth contact (expressed in tenths of a millimeter) as an expression of marginal bone resorption. The proportional calculation of the measurements also made it possible to establish, where present, any distortion in the x-ray images for further screening, thereby reducing the margin of error of the analysis to a minimum.

Measurements were recorded before OT and at the end of the follow-up period. The measurements were carried out medially and distally to each tooth, calculating the distance between the apex of tooth and the most coronal point of contact between the bone and the tooth. The x-rays were calibrated by using an internal standard that was a tooth dimension. The bone level recorded before OT was the reference point for the following measurements. The measurement was rounded off to the nearest 0.1 mm.

Periodontal probing was not considered in the present study as the thickness of gingival greatly varies with the inflammation status.

Standard teeth lengths (used to make proportions) were as follows: in upper jaw central incisor = 22,5 mm, lateral incisor = 22 mm, cuspid = 26,4 mm, first premolar = 21 mm, second premolar = 21 mm, first molar = 22,5 mm, second molar = 21 mm and third molar = 21 mm; in lower jaw central incisor = 20,7 mm, lateral incisor = 22 mm, cuspid = 25,5 mm, first premolar = 22,5 mm, second premolar = 23 mm, first molar = 21,5 mm, second molar = 20 mm and third molar = 20 mm. These values are referred to Caucasian patients (11).

Survival (SVR) and success rate (SCR) were evaluated. SVR is defined as the number of tooth still in place at the end of the follow-up period. SCR was evaluated according to the following criteria:

- 1) absence of persisting pain or dysesthesia;
- 2) absence of periodontal infection with suppuration, and
- 3) absence of persisting periodontal bone resorption greater than 1,5 mm during the first year and 0,2 mm/years during the following years.

These are the same parameters used worldwide in implantology (12). This value of 1,5 mm is the same obtained by considering a tolerance of less than 10% in crestal bone remodeling before and after treatment. Since the mean tooth length is 22 mm and the root is 14.5 mm (=2/3), 1,5 mm is about 10% of the root length.

Ortodontsko liječenje

Svi pacijenti bili su podvrgnuti OL-u uporabom tehnike straight wire te se rabila NiTi žica s povećanjem promjera od 0,014, 0,016, 0,018, i 0,16 x 0,022 inča. Svrha je bila poravnati i nivelirati zube, zatvoriti dijasteme, korigirati dentalnu klasu II i III te ukriženi zagriz. Na kraju liječenja očajnici i sjekutići gornje i donje čeljusti bili su povezani šinom pomoću žice *wildcat* nalijepljene na lingvalnu stranu zuba.

Parodontološko liječenje

Svi su pacijenti dolazili na mjesečne kontrole, a profesionalno čišćenje zuba obično se obavljalo svaka tri mjeseca. Kirurški zahvati bili su kod troje pacijenata izvedeni prema sljedećem protokolu: pet dana antimikrobna profilaksa s jednim gramom amoksicilina dva puta na dan, počevši jedan sat prije kirurškog zahvata. Za lokalnu anesteziju liječnici su se koristili infiltracijom artikaina/epinefrina (1:100.000), a za postkirurško analgetsko liječenje ordinirali su tri dana po 100 miligrama lijeka Nimesulide dva puta na dan. Operacija reznja bila je obavljena prema Widmanu, a kiretaža je obavljena kako bi se uklonili parodontni džepovi i upalno tkivo. Šavovi su bili izvađeni nakon sedam dana. Svi su pacijenti dobili upute o oralnoj higijeni.

Statistička analiza

Za testiranje statistički značajnih razlika između skupina bio je odabran χ^2 -test. Najprije se gledao ukupan broj zuba zadržanih na mjestu na kraju razdoblja praćenja (stopa preživljenja – SP). Nakon toga isti su se statistički postupci rabili za analizu održanja grebena parodontne kosti kao kliničkog pokazatelja uspjeha (stopa uspjeha – SU). Razlika između vrha zuba i najkoronalnije točke kontakta između kosti i zuba definirana je kao grebensko-zubno-spojište (GZS) i računala se prije liječenja i tijekom praćenja. Delta GZS-a je razlika između GZS-a na posljednjoj kontroli i GZS-a zabilježenog prije OL-a. Delta GZS-a su medijani stratificirani prema različitim varijablama.

Rezultati

Četiri stotine trideset i tri zuba bilo je praćeno kod žena (67,2%), a 212 kod muškaraca (32,8%).

Prosječna dob bila je 44,3 godine - 42,6 kod žena i 47,7 kod muškaraca. Tri stotine dvadeset i šest zuba (50,5%) bilo je u gornjoj čeljusti, a 318 (49,5%) u donjoj. Od toga je bilo 295 (45,7%) jednokorijenskih te 350 (54,3%) pretkutnjaka i kutnjaka. Specificirano - bilo je 195 (30,2%) sjekutića, 100 (15,5%) očajnika, 175 (27,1%) pretkutnjaka i 175 (27,1%) kutnjaka. Srednja vrijednost visine zuba unutar alveolarne kosti iznosila je 0,47 posto prije OL-a (60% se smatralo normalnom vrijednošću s obzirom na to da korijen zauzima 2/3 duljine zuba, tj. 66% - ali se priznavalo odstupanje od 10%, tj. 6%). Prosječno trajanje aktivnog OL-a bilo je 15 mjeseci - kod desetoro pacijenata je aktivno liječenje bilo kraće od 12 mjeseci (srednja duljina 6,5 mjeseci), a kod ostalih je srednje trajanje aktivnog liječenja bilo 20 mjeseci. Tijekom aktivnog liječenja petero je pacijenata imalo apsces - troje sa-

Orthodontic treatment

All patients who underwent the OT performed with straight wire technique by using NiTi wire with increasing diameters of 0.014, 0.016, 0.018, and 0.16 x 0.022 inch. The aims were to align and to level teeth, to close diastemas, to correct dental class II and III and crossbite. At the end of the treatment cuspids and incisors of both upper and lower jaws were spinted together by means of the wildcat wire bonded in the lingual part of teeth.

Periodontal treatment

All patients were included in a monthly recall and professional hygiene was usually performed every three months. Surgical procedures were performed in 3 patients with the following protocol: an antimicrobial prophylaxis was administered with 1 g amoxicillin twice daily for 5 days starting 1 hour before surgery. Local anesthesia was induced by infiltration with articaine/epinephrine (1:100.000) and post-surgical analgesic treatment was performed with 100 mg Nimesulide twice a day for 3 days. Widman flaps were performed, scaling and root planning were done to remove periodontal pockets and inflammatory tissues. Sutures were removed after 7 days. Oral hygiene instructions were provided.

Statistical Analysis

The χ^2 test was used to show statistically significant differences between the groups. The global number of teeth still in place at the end of the observation period (i.e. survival rate – SVR) was first used. In addition the same statistical analyses were applied to the periodontal crestal bone maintenance, an indicator of clinical success (i.e. success rate - SCR). Specifically, the difference between the tooth apex and the most coronal point of contact between the bone and the tooth was defined as the Crestal Tooth Junction (CTJ) and calculated before treatment and during follow-up. The delta CTJ is the difference between the CTJ at the last check-up and the CTJ recorded before the OT. The delta CTJ medians were stratified according to the variables of interest.

Results

Four hundred and thirty three teeth (67.2%) were in female whereas 212 (32.8%) were in male. The mean age was 44.3 years, 42.6 and 47.7 years for teeth in women and in men, respectively. Three hundred and twenty six (50.5%) and 318 (49.5%) teeth were in upper and lower jaws. There were 295 (45.7%) single root elements and 350 (54.3%) pre-and molars. Specifically there were 195 (30.2%) incisors, 100 (15.5%) cuspids, 175 (27.1%) premolars and 175 (27.1%) molars. The mean value of tooth high into alveolar bone was 0.47% before OT (60% was considered the normal value since root is 2/3 of the tooth length – i.e. 66% - but a tolerance of 10% - i.e. 6% - was admitted). The average length of the active OT was 15 months; in 10 patients the active therapy was performed in less than 12 months (mean 6.5 months) whereas in the remaining the mean active treatment was 20 (mean value) months long. During the active treatment 5 patients have abscess: three patients have single tooth

mo na jednom zubu (14, 16 i 38), a dvoje na dvama zubima (12 i 13 te 37 i 47).

Tijekom OL-a nije bio izgubljen ni jedan zub (SP = 100%) i zato je resorpcija grebena alveolarne kosti uzeta kao indikator SU-a.

Srednje vrijednosti resorpcije grebena alveolarne kosti bile su 0,03 milimetra kod liječenih i 0,26 milimetara kod neliječenih zuba. Kod liječenih zuba 244 (54,8%) nije pokazalo gubitak kosti ili je čak imalo više kosti. Kod 201 zuba prosječan gubitak kosti iznosio je 1,59 milimetara i 79 ih se (17,8%) smatralo neuspjehom. Srednji dobitak kosti na liječenim zubima prikazan je u Tablici 1. Nije bilo statističke razlike između liječenih i neliječenih zuba, ako se uzmu u obzir jednokorijenski (sjekutići i očnjaci) i višekorijenski zubi (pretkutnjaci i kutnjaci) (Pearsonov hi-kvadrat = 3,468).

Na Tablici 2. je broj liječenih i neliječenih zuba te njihov klinički ishod: nije bilo statističke razlike. Tablica 3. prikazuje utjecaj duljine aktivnog liječenja (više ili manje od jedne godine) te klinički ishod: također nije bilo statističke razlike.

abscess (14, 16 and 38) whereas two patients have abscess on two elements (12 and 13 and 37 and 47, respectively).

No tooth was lost during the OT (i.e. SVR = 100%) and thus crestal bone resorption was considered an indicator of SCR.

The means crestal bone resorption was 0.03 mm and 0.26 mm in treated and untreated teeth, respectively. In treated teeth, 244 (54.8%) have no bone loss or even bone gain. In the remaining 201 the average bone loss was 1.59 mm and 79 (17.8%) were considered failures. Specifically, treated teeth have the mean bone gain reported in Table 1. There was no statistical difference between treated and untreated teeth crossed with teeth with single (i.e. incisors and cuspids) and multiple roots (pre and molars) (Pearson chi-square = 3.468).

Table 2 reports the number of treated and untreated teeth and their outcome: no statistical differences were detected. Table 3 shows the impact of active treatment length (more or less than 1 year) and clinical outcome: again no statistical differences were detected.

Tablica 1. Prikazane su srednje vrijednosti dobitka marginalne kosti u milimetrima i u zagradama broj zuba. U stupcima su liječeni i neliječeni zubi, a redcima vrste zuba. Table 1 Mean values of marginal bone gain in mm and numbers of teeth are reported out and in parenthesis, respectively. In columns are treated and untreated teeth whereas in rows are types of teeth.		Liječeni • Treated	Neliječeni • Untreated
		Sjekutići • Incisors	+0.11 (159)
Očnjaci • Cuspids	+0.30 (80)	+0.24 (20)	
Pretkutnjaci • Premolars	+0.17 (139)	+0.33 (36)	
Kutnjaci • Molars	+0.65 (67)	+0.67 (108)	

Tablica 2. Broj liječenih i neliječenih zuba i njihov klinički ishod. Podaci su računani u mm resorpcije alveolarnog grebena. Pearsonov hi-kvadrat test = 1.613. Table 2 Number of treated and untreated teeth and their outcome. Data are calculated in mm of crestal bone resorption. Pearson chi-square test = 1.613		Ortodontsko liječenje • Orthodontic treatment	Uspjeh • Success	Neuspjeh • Failed	Ukupno • Total
		Da / Yes		366	79
Ne / No		156	44	200	
Ukupno / Total		522	123	645	

Tablica 3. Usporedba duljine aktivnog liječenja (dulje ili kraće od jedne godine) i kliničkog ishoda. Podaci su izračunati u milimetrima resorpcije alveolarnog grebena. Pearsonov hi-kvadrat test = 0,554. Table 3 Comparison between length of active treatment (more or less than 1 year) and clinical outcome. Data are calculated in mm of crestal bone resorption. Pearson chi-square test = 0.554		Duljina ortodontskog liječenja • Length of orthodontic treatment	Uspjeh • Success	Neuspjeh • Failed	Ukupno • Total
		Jednu godinu ili kraće / One year or less		185	48
Dulje od jedne godine / More than 1 years		337	75	412	
Ukupno / Total		522	123	645	

Rasprava

Budući da sve više odraslih pacijenata zahtijeva OL, ortodonti će se sve češće susretati s pacijentima oboljelima od adultnog parodontitisa. Kako je pregradnja osnova ortodontskog liječenja, kod odraslih pacijenata najvažnija su parodontna pitanja zbog veće podložnosti alveolarne kosti patološkom gubitku (1-9).

U ovom radu niz od 26 pacijenata i 645 zuba bio je vrjednovan uporabom rendgena. Sondiranje parodontnih dže-

Discussion

Because the number of adult patients seeking OT is increasing, orthodontists are becoming more likely to encounter patients with adult periodontitis. Periodontal issues, due to the basic remodeling treatment of orthodontic, are of major concern in adult patients due to the increased susceptibility of the alveolar bone to pathological bone loss (1-9).

Since the number of patients with periodontitis undergoing to OT are increasing and no reports specifically focus

pova nije se uzelo u obzir, jer je debljina gingive znatno varirala ovisno o statusu upale.

Bilo je moguće pokazati da:

- 1) OL ne utječe štetno na potpurnu kost liječenih zuba jer je srednja resorpcija kosti alveolarnog grebena bila 0,03 milimetra kod liječenih i 0,26 milimetara kod neliječenih zuba;
- 2) između liječenih i neliječenih zuba nije bilo statističke razlike u pregradnji alveolarnog grebena (Tablica 2.)
- 3) duljina aktivnog OL-a nije kritični čimbenik (Tablica 3.).

Naši rezultati slažu se s dosadašnjim istraživanjima u kojima je jasno dokazana indikacija za OL kod pacijenata s parodontnom bolešću (3). U našoj studiji 54,8 posto liječenih zuba nije imalo gubitak kosti ili je čak imalo više kosti. U preostalih 45,2 posto prosječan gubitak kosti iznosio je 1,59 milimetara i 79 (17,8%) ih se smatralo neuspjehom. To pokazuje da visok postotak ozbiljno ugroženih zuba ima veliku pregradnju alveolarnog grebena unatoč odgovarajućem liječenju (s uporabom blagih ortodontskih sila i parodontnim praćenjem).

Nakon prijma pacijenta važno je detaljnim kliničkim pregledom ustanoviti stanje zubnoga zdravlja, uključujući razaranja ili manjkavosti potpornih tkiva te pacijentovu sposobnost da postigne i održi dobru oralnu higijenu. Treba imati na umu dva osnovna kriterija:

- 1) pacijent treba redovito dolaziti na parodontološko održavanje i
- 2) moraju se primijeniti minimalne ortodontske sile.

Nakon liječenja obvezno je šiniranje zuba.

Parodontološko praćenje je obvezno, ali ne štiti potpuno od pojave apscesa koja je povezana s prirodnim tijekom bolesti. Premda su bile planirane mjesečne kontrole, tijekom OL-a petero je pacijenata dobilo apscese na sedam zuba. Ključna je suradnja pacijenta, a potrebna je i odgovarajuća dnevna oralna higijena kod kuće.

Zaključak

Ortodontsko liječenje pacijenata s parodontnom bolešću je moguće, a svrha mu je ukloniti okluzalni disbalans i omogućiti uspostavu okruženja kako bi se bolje moglo održavati zdravlje parodonta. Ortodontskom liječenju tih pacijenata potreban je drugačiji pristup, a to znači češće kontrole, sustave sila te retenciju i kontrolu plaka tijekom liječenja i nakon njega.

Zahvala

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on the impact of OT on crestal bone resorption, we therefore decided to perform a study evaluating a case series.

Here, a series of 26 patients and 645 teeth was evaluated by using x-ray. Periodontal probing was not considered in the present study as the thickness of gingival greatly varies with the inflammation status.

It was possible to demonstrate that:

- 1) no statistical difference in crestal bone remodeling was detected between treated and untreated teeth (Table 2), and
- 3) the length of active OT is not a critical factor (Table 3).

Our results are in agreement with those previously reported where indication for OT in periodontally compromised patients was clearly demonstrated (3). Here 54.8% of treated teeth have no bone loss or even bone gain. In the remaining 45.2% the average bone loss was 1,59 mm and 79 (17.8%) were considered failures. This means that a high percentage of severely compromised teeth have a high crestal bone remodeling although a careful treatment (with light orthodontic forces and periodontal surveillance) is performed.

It is important that at patient's admission a careful clinical examination determines the patient's dental health status, including any existing destruction or deficiencies of teeth' support, as well as the patient's ability to achieve and maintain good overall oral hygiene. Two major criteria should be taken in mind:

- 1) the patient should be seen frequently for periodontal maintenance and
- 2) minimal orthodontic forces should be applied.

After treatment, splinting of the teeth is mandatory.

Periodontal surveillance is mandatory but does not totally protect against abscess related to the natural course of the disease. Although we planned a monthly recall, 5 patients had abscess on 7 teeth during the OT. Patient's compliance is essential and an adequate daily oral hygiene at home is necessary.

Conclusion

TO of periodontally compromised patients is possible, it aims the removal of occlusal disequilibrium and it provides an environment for better periodontal health maintenance. A different approach to the OT of these patients is required in terms of frequency of controls, force systems, retention, and plaque control during and after treatment.

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Abstract

Objective: Since the number of patients with periodontitis undergoing the orthodontic treatment (OT) is increasing and no report specifically focuses on the impact of OT on crestal bone remodeling (CBR), we performed a retrospective study. **Materials and Methods:** Twenty six patients had OT on 445 over 645 teeth. The mean tooth high inserted into alveolar bone was 0.47% before OT. X-rays and χ^2 test were used to evaluate differences in CBR. **Results:** No tooth was lost. We have demonstrated that (1) OT has no adverse effect on bone supporting the treated teeth (since the mean crestal bone resorption was 0.03 mm and 0.26 mm in treated and untreated teeth, respectively) (2) treated and untreated teeth have no statistical difference in CBR, and (3) the length of active OT is not a critical factor on CBR. **Conclusion:** OT of periodontally compromised patients can achieve good results on CBR.

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Key words

Orthodontics; Periodontal Disease;
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