Clinical and Salivary Findings in Patients with Different Types of Orthodontic Brackets

Klinički i salivaarni nalazi pacijenata s različitim tipovima ortodonskih bravica

Abstract

Aim: Data regarding different types of orthodontic brackets and ligation and various clinical and salivary findings are scarce. Therefore, the aim of this study was to compare clinical and salivary findings in patients with different types of fixed orthodontic appliances. Subjects and methods: Decayed, missing and filled teeth index (DMFT) and plaque index, salivary flow rate, salivary pH and prevalence of white spot lesions were determined in 83 patients with different types of orthodontic brackets and ligation (metal passive self-ligating brackets, conventional metal brackets, mono-crystal brackets and polycrystalline active self-ligating brackets), before and six months after the beginning of fixed orthodontic treatment. The patients were recruited in a private dental office, in the period of two years. The group comprised 83 patients (mean age: 15.14 ± 1.66 years), including 52 women (mean age: 15.08 ± 1.68) and 31 men (15.24 ± 1.64). Statistical analysis was performed by use of dependent and independent samples t-test as well as one way ANOVA, Wilcoxon signed rank test and the Kruskal Wallis test. P-values below 0.05 (p<0.05) were considered significant. Results: DMFT and salivary flow have shown a significant increase, while salivary pH has shown a significant decrease in the observed time interval, in all patients irrespective of type of brackets and ligation. Among patients with different bracket material, no significant differences were found in any of the observed parameters. Conclusion: Although salivary flow rate is increased in patients with fixed orthodontic appliances which can have caries-protective effect, DMFT also increases and salivary pH decreases six months after the beginning of the treatment independently of bracket material or ligation type. All patients should receive instructions for precise oral hygiene and dietary habits before the beginning of fixed orthodontic therapy and at every dental check-up.

Key words

Orthodontic Appliances; Orthodontic Brackets; Saliva; Hydrogen-Ion Concentration; DMF Index; Dental Plaque Index

Introduction

Fixed orthodontic treatment can have multiple effects on oral health. The placement of orthodontic appliances leads to easier accumulation of microorganisms and food residues, which when left over time, may cause development of white spot lesions, caries, gingivitis and exacerbate periodontal disease (1,2). The process usually starts as enamel demineralization seen as white spots which further on might lead to the development of caries. Demineralization and remineralization processes are constantly taking place between tooth surfaces and accumulated plaque, due to saliva properties. Generally, salivary pH follows salivary flow rate. It is well known that lower pH in the oral cavity accelerates formation of aci-
duric bacteria (such as *S. mutans* and *Lactobacilli*), while higher pH maintains higher buffer capacity, which in turn decreases caries incidence (3).

Self-ligating brackets do not require additional parts to support the archwires and dental hygiene since they are easily maintained compared to conventional brackets. Therefore, the accumulation of plaque and development of white spot lesions should be decreased. Of course, other contributing factors such as oral hygiene habits, nutrition and use of additional remineralizing agents could influence this process.

Do Nascimento et al. (4), on the basis of the systemic review, concluded that there is no evidence in the published literature that conventional or self-ligating brackets are different with regard to the colony formation and adhesion of *Streptococcus mutans*. The same finding was reported regarding the periodontal status in patients with different bracket systems by Arnolds et al. (5), while Yang et al. (6) reported that there were no differences in plaque control between conventional and self-ligating brackets according to the published literature.

The aim of this prospective longitudinal study was to evaluate the influence of fixed orthodontic treatment on clinical and salivary parameters. The primary outcome was to assess the prevalence of decayed, missing and filled teeth (DMFT) before, and six months after the beginning of fixed orthodontic treatment in patients with different types of brackets and ligation. The secondary outcome was to determine the effect of orthodontic therapy on plaque index, salivary pH, salivary flow and the prevalence of white spot lesions in these patients.

**Material and methods**

This study was approved by the Ethical Committee of the School of Dental Medicine, University of Zagreb in Croatia (protocol approval number 36/2014.). All the participants signed informed consent according to Helsinki II. The inclusion criteria were that none of the patients was on the orthodontic therapy prior to this study, all upper front teeth were completely erupted, there were no signs of fillings or prosthetic structures on the buccal surfaces, participants were completely erupted, there were no signs of fillings or prosthetic structures on the buccal surfaces, participants were non-smokers and did not use any local therapies (antiseptics, fluorides or probiotics) during the last six months. The exclusion criteria were systemic diseases and oral piercing. The patients were recruited in a private dental office, in the period of two years. All patients who met inclusion and exclusion criteria and who signed informed consent were included in the study and randomly assigned to each of four treatment groups, depending on the type of brackets. A total of 83 patients were involved in the study (mean age: 15.14 ± 1.66 years), including 52 women (mean age: 15.08 ± 1.68) and 31 men (15.24 ± 1.64). Treatment planning and clinical practices were performed by a specialist orthodontist, A.J. There was neither allocation concealment nor blinding of the investigator.

Orthodontic therapy was carried out without extraction. Molar tubes were placed on first molar teeth. Conventional bracket dimension was 0.018 inch slot, and self-ligating 0.022 inch slot. There were 21 patients with monocrystalline brackets, a vish odrzava puferski kapacitet koji zauzvrat smanjuje incidence karijesa (3).

Samovezujuće bravice ne zahtijevaju dodatne dijelove za potporu lukova pa se dentalna higijena lakše održava u usporedbi s konvencionalnim bravicama. Stoga bi nakupljanje plaka i nastanak bijelih mrlja trebali biti smanjeni. Naravno, na taj proces mogu utjecati i drugi čimbenici kao što je održavanje oralne higijene, prehrana i primjena dodatnih remineralizirajućih sredstava.

Nascimento i suradnici (4) zaključili su na temelju sustavnog pregleda da u objavljenoj literaturi nema dokaza da postojo razlike u formiranju kolonija i adheziji *Streptococcus mutans* između konvencionalnih i samovezujućih bravica. Isto su zaključili i Arnoldi i suradnici (5) u vezi s parodontnim statutom pacijenata s različitim vrstama bravica, a Yang i suradnici (6) istaknuli su da na temelju dosad objavljene literature nema razlika u kontroli plaka između konvencionalnih i samo-

vezujućih bravica.

Ciđ ovog prospektivnog longitudinalnog istraživanja bio je evaluirati utjecaj fiksne ortodontske terapije na klične i salivarne parametre. Primarno se željela ustanoviti prevalencija karioznih i ekstrahiranih zuba te zuba s ispunom (KEP indeksa) prije nego što se pacijentima postave fiksne ortodontske naprave s različitim vrstama bravica i vezanja te šest mjeseci nakon toga postupka. Sekundarno se određivao učinak ortodontske terapije na indeks plaka, pH sline, količinu sline i prevalenciju bijelih mrlja kod tih pacijenata.

**Ispitanici i metode**

Istraživanje je odobrio Etički odbor Stomatološkog fakulteta Sveučilišta u Zagrebu (broj odobrenja: 36/2014). Svi sudionici potpisali su informirani pristanak prema Helsinskoj deklaraciji. Kriteriji za sudjelovanje bili su da nijedan od pacijenata prije nije bio na ortodontskoj terapiji; svi gornji prednji zubi potpuno su iznikli; na obraznim plohama nema znakova ispuna ili protetičkih restauracija; ispitanici su nepušaći i nisu upotrebljavali lokalnu terapiju (antiseptike, fluoride ili probiotike) u posljednjih šest mjeseci. Kriterij za isključivanje bile su sustavne bolesti i oralni piercing. Pacijenti su birani u privatnoj stomatološkoj ordinaciji tijekom dvije godine. Svi koji su odgovarali kriterijima za sudjelovanje potpisali su informirani pristanak i uključeni su u istraživanje te nasumično raspoređeni u jednu od četiri grupa, ovisno o vrsti bravica. U istraživanju su sudjelovala ukupno 83 pacijenata (srednja dob 15 do 15.14 ± 1.66 godina) – 52 žene (srednja dob 15.08 ± 1.68) i 31 muškaraca (15.24 ± 1.64). Planiranje terapije i klinički dio istraživanja obavila je specijalistica ortodoncije A. J. Nije bilo prikrivanja raspodjele, ni zasljepljivanja istraživača.

Ortodontska terapija provodena je bez ekstrakcija. Mo-

larne cjevčice stvorene su na prve krunjake. Dimenzija utora konvencionalne bravice bila je 0,018 inča, a samovezujućih 0,022 inča. Sudjelovao je ukupno 21 pacijent s monokristalnim keramičkim bravicama (Pure, Ortho Technology Inc., Tampa, FL, SAD), 21 pacijent s metalnim konvencionalnim bravicama (Mini Sprint Bracket, Forestdent Bernard Forster
ceramic brackets (Pure, Ortho Technology Inc., Tampa, FL), 21 patients with metal conventional brackets (Mini Sprint Bracket, Forestadent Bernard Forster GmBH, Pforzheim, Germany), 21 patients with metal passive self-ligating brackets (Lotus plus, Ortho Technology Inc., Tampa, FL) and 20 patients with polycrystalline active self-ligating brackets (Sensation, Ortho Technology Inc., Tampa, FL).

All parameters were measured before the beginning of fixed orthodontic treatment and six months after the beginning of fixed orthodontic treatment. Decayed, missing and filled teeth (DMFT) indices were registered according to the World Health Organization, WHO (7). Caries was detected by visual-tactile examination and use of Diagnodent in cervical areas of teeth 13, 12, 11, 21, 23, 16, 43, 33, 36. The number of scored teeth was 32 per patient. Plaque was measured according to the modified Silness Loe index (8) on the teeth 16, 12, 24, 44, 32. Unstimulated salivary flow rate was measured according to Navazesh et al. (9). Salivary pH was determined by pH strip which was immersed into the saliva sample for 10 s, and the color change was used to estimate the remaining pH according to the scale provided by the manufacturer. Diagnosis of the white spot lesions was made by use of Diagnodent pen (DIAGNOdent Pen, Kavo, Germany) according to the manufacturer’s recommendation. White spot lesions were included in DMFT index if they were clinically visible (Diagnodent score >21).

Statistical analysis

The Kolmogorov Smirnov test was used to assess if variables were normally distributed. Due to normal distribution of variables, dependent samples t-test and the Wilcoxon signed rank test were used for before/after comparisons. To assess differences within groups (among patients with different type of braces), one way ANOVA, the Kruskal Wallis and independent samples test were used. P-value below 0.05 (p<0.05) was considered statistically significant. The data were analyzed using SPSS version 20 Software.

Results

Significant difference in DMFT before the orthodontic treatment and six months after the beginning of the treatment was found (p<0.005). No significant difference in DMFT and plaque accumulation (assessed by Silness Loe index) before and after the beginning of treatment was found (Table 1) among patients with different brace material (Table 1). Median salivary pH before treatment was 7.7 (6.5-8.7) and 7.5 (6.5-8.4) after the treatment. A significant decrease was observed in salivary pH (p=0.005, Wilcoxon signed rank test). Among patients with different brace material, the difference in salivary pH in the observed time period was not significant (p=0.726 and 0.797, Kruskal Wallis test) (Table 2). Median salivary flow before the treatment was 0.5 (0.06-1.7) ml/min and 0.6 (0.1-9) ml/min after the beginning of treatment. Significant difference in salivary flow before and six months after the beginning of the treatment was found GmBH, Pforzheim, Njemačka), 21 pacijent s metalnim pasivnim samovezujućim bravicama (Lotus plus, Ortho Technology Inc., Tampa, FL, SAD) i 20 pacijenata s polikristalnim aktivnim samovezujućim bravicama (Sensation, Ortho Technology Inc., Tampa, FL, SAD).

Svi parametri određeni su prije početka fiksne ortodontске terapije i šest mjeseci nakon njezina početka. Indeks karijnih i ekstrahiranih zuba te zuba s ispunom (KEP) zabilježen je prema kriterijima Svjetske zdravstvene organizacije (7). Karijes je detektiran vizualno-taktilnom metodom i primjenom Diagnodenta u područjima vrata zuba 13, 12, 11, 21, 23, 16, 43, 33, 36. Broj pregledanih zuba po pacijentu bio je 32. Plak je mjerjen prema modificiranom indeksu Silness Loe (8) na zubima 16, 12, 24, 44, 32. Nesustavnost količine sline u mirovanju prema mjernoj ljestvici proizvođača. Dijagnostika bijelih mrlja postavljena je primjenom Diagnodenta (DIAGNOdent Pen, Kavo, Biberach, Njemačka) prema propisima proizvođača. Bijele mrlje bile su uključene u KEP indeks ako su bile klinički vidljive (vrijednost pod 0.05 nije smatrana statistički značajnom).

Statistička analiza

Kolmogorov-Smirnov test korišten je za procjenu normalnosti raspodijele. S obzirom na normalnu raspodjelu varijabli, za usporedbu prije i poslije postupka korišteni su t-test za zavisne uzorke i Wilcoxonov signed rank test. Za određivanje razlika među skupinama (među pacijentima s različitim vrstama bravica) korišteni su jednosmjerna ANOVA, Kruskal-Wallis test i test za nezavisne uzorke. P-vrijednost manja od 0.05 (p<0.05) smatrana je statistički značajnom. Podaci su analizirani primjenom verzije softvera 20 SPSS.

Rezultati

Ustanovljena je značajna razlika u KEP indeksu prije ortodontskog liječenja i šest mjeseci nakon toga postupka (p<0.005). Među pacijentima s različitim vrstama bravica prije liječenja i nakon toga nije uočena značajna razlika u KEP-indeksu i nakupljanju plaka (procijenjenom prema indeksu Silness Loe) (tablica 1.). Medijan salivarnog pH prije tretmana bio je 7.7 (6.5 - 8.7) i 7.5 (6.5 - 8.4) poslije tretmana. Uočen je značajan pad u salivarnom pH (p=0.005, Wilcoxonov signed rank test). Među pacijentima s različitim vrstama bravica, razlika u salivarnom pH u promatranom razdoblju nije bila statistički značajna (p=0.726 i 0.797, Kruskal-Wallis test) (tablica 2.). Medijan količine sline prije liječenja bio je 0.5 (0.06 -1.7) ml/min. i 0.6 (0.1 - 9) ml/min poslije početka liječenja. Pronađena je značajna razlika u količini sline prije početka liječenja i šest mjeseci poslije (p=0.005, Wilcoxonov signed rank test), no nije bilo značajne razlike u količini sli-
### Table 1

| Bracket type • Vrsta bravice | DMFT before • KEP prije | DMFT after • KEP poslije | Silness Loe before • Silness Loe prije | Silness Loe after • Silness Loe poslije |
|-----------------------------|--------------------------|---------------------------|----------------------------------------|----------------------------------------|
| I                           | 4.43 ± 4.3               | 5 ± 4.54                  | 0.30 ± 0.23                            | 0.37 ± 0.28                            |
| II                          | 7.71 ± 4.43              | 5 ± 4.54                  | 8.01 ± 5.35                            | 5.48 ± 5.14                            |
| III                         | 0.40 ± 0.31              | 0.30 ± 0.23               | 0.37 ± 0.34                            | 0.44 ± 0.28                            |
| IV                          | 0.5 ± 0.27               | 0.37 ± 0.28               | 0.32 ± 0.36                            | 0.40 ± 0.24                            |

Mean square • Srednji kvadrat 38.556 0.075 50.075 0.134
F 1.979 0.874 2.101 1.577
p (df=3) 0.124 0.458 0.107 0.201

All types of brackets • Sve vrste bravica 5.79 ± 4.49 6.56 ± 4.98 0.38 ± 0.29 0.4 ± 0.29
p <0.001 0.585

### Table 2

| Bracket type • Vrsta bravice | pH before • pH prije | pH after • pH poslije | WSL |
|------------------------------|-----------------------|------------------------|-----|
| N                           | Median • Med.         | Min.                   | Max. • Maks. | p (df=3) | Median • Med. | Min. | Max. • Maks. | WSL before • WSL prije (N, %) | WSL after • WSL poslije (N, %) | chi-square • hi-kvadrat | p (df=3) |
| I                            | 21                    | 6.1                    | 3.5         | 7.0      | 6.3                   | 2.5  | 7            | 18 (85.7%)                      | 3 (14.3%)                        |                            |         |
| II                           | 21                    | 6.1                    | 5.2         | 7        | 6.5                   | 5.5  | 7            | 14 (66.7%)                      | 7 (33.3%)                        |                            |         |
| III                          | 21                    | 6.5                    | 4.7         | 7        | 6.5                   | 5.3  | 7            | 19 (90.5%)                      | 2 (9.5%)                         |                            |         |
| IV                           | 20                    | 5.85                   | 5.4         | 4.5      | 0.726                 | 5.85 | 5.3          | 7.2                           | 0.797                          | 16 (80.0%)                    | (42.0%) 4.293                  |
| Total • Ukupno               | 83                    | 6                     | 3.5        | 8.5      | 6.5                   | 2.5  | 7.2          | 0.005                          | 67 (80.7%)                      | 16 (19.3%)                    | 0.723    |
Patients with Metal and Crystalline Conventional and Self-Ligating Orthodontic Brackets

Jurela i sur.

Clinical and salivary findings in orthodontic patients with different bracket types, different bracket material or ligation type. We observed a significant increase in DMFT index six months after the beginning of treatment (p=0.723, chi-square test), nor among patients with different brace material, in this time interval (df=3, p=4.293, Pearson chi-square test) (Table 2).

Discussion

The results from the literature review on comparison of clinical and salivary findings in orthodontic patients with different bracket types differ. Some authors point out that self-ligating brackets show more advantages than conventional brackets, in terms of oral health (1, 10-12). On the contrary, the results of our study have not found significant difference in DMFT, plaque accumulation, median salivary flow, median salivary pH or prevalence of white spot lesions in patients with different types of brackets and ligation.

The primary aim of our study was to assess the prevalence of DMFT before and six months after the beginning of fixed orthodontic treatment in patients with different types of brackets and ligation. Sudarevic et al. (13) reported a significant increase in DMFT index 12 weeks after the placement of fixed appliances. This is in concordance with our results which have shown significant increase in DMFT index six months after the beginning of the treatment in all patients (p<0.001), although we did not observe a statistically significant difference among patients with different brace material or ligation type. We observed a significant increase only in DMFT and salivary flow, while we observed a significant decrease of salivary pH. The increase in DMFT could be explained by significantly lowered pH and slightly higher plaque index. Also, our results indicate that increased salivary flow is not sufficient to decrease the risk for caries, and that other factors also influence oral health in orthodontic patients. The limitation of our study is that the number of participants was not calculated based on a power analysis, and we are aware of the fact that this diminishes the reliability of our results.

The second aim of our study was to determine the effect of orthodontic therapy on plaque index, salivary pH, salivary flow and the prevalence of white spot lesions.

Lindel et al. (14) reported that ceramic brackets tend to accumulate less long-term biofilm compared to the metal ones. Other authors (2, 13, 15) have not found significant difference in visible plaque index in patients with different types of brackets, which is also in concordance with our results. Plaque index was slightly, but not significantly, increased in the observed period in all patients, irrelevant of the bracket type. Our findings could be explained by the precise instructions in oral hygiene measures during each check-up and the resolving of crowding during the first 6 months.

Rasprava

Rezultati iz literature razlikuju se nakon usporedbe kliničkih i salivarnih nalaza ortodontskih pacijenata s različitim vrstama bravica. Neki autorii ističu da samovezujuće bravice imaju više prednosti negli konvencionalne, kad je riječ o oralnome zdravlju (1, 10 – 12). Nasuprot tomu, rezultati našeg istraživanja nisu pokazali značajnu razliku u KEP-indeksu, nakupljanju plaka, količini salivarnog pH ili prevalenciji bijelih mlrja kod pacijenata s različitim vrstama bravica i vezanja.

Primarni cilj ovog istraživanja bio je ustanoviti KEP indeks prije početka fiksne ortodontske terapije i šest mjeseci poslije kod pacijenata s različitim vrstama bravica i vezanja. Sudarević i suradnici (13) uočili su značajan porast KEP-indeksa 12 tjedana nakon postavljanja fiksnih naprava. To je u skladu s našim rezultatima koji su pokazali značajan porast KEP indeksa šest mjeseci nakon početka liječenja kod svih ispitanika (p < 0,001), premda nismo zapazili značajnu razliku među pacijentima s različitim vrstama bravica i načina vezanja.

KEP indeks i količina sline jedina su dva parametra za koje smo uočili značajan porast, a kod pH sline zabilježeno je značajno smanjenje. Porast KEP indeksa mogli bismo objasniti značajno sniženim pH i blago povišenim indeksom plaka. Naši rezultati također upućuju na to da porast količine sline nije dovoljan da smanji rizik od karijesa te da i drugi čimbenici utječu na oralno zdravlje ortodontskih pacijenata. Ograničenje našeg istraživanja jest to što broj ispitanika nije određen na temelju snage testa i svjesni smo da to umanjuje pouzdanost naših rezultata.

Sekundarno se u našem istraživanju želio ustanoviti učinak ortodontske terapije na indeks plaka, pH sline, količinu sline i prevalenciju bijelih mlrja. Lindel i suradnici (14) istaknuli su da keramičke bravice nakupljuju manje dugoročnog biofilma u usporedbi s metalnim. Drugi autori (2, 13, 15) nisu pronašli značajnu razliku u vidljivom indeksu plaka kod pacijenata s različitim vrstama bravica, što je također u skladu s našim rezultatima. Indeks plaka bio je lagano, no ne znatno, povećan kod svih pacijenata u promatranom razdoblju, neovisno o vrsti bravica. Naš nalaz može se objasniti detaljnim uputama o oralnoj higiјi tijekom svake kontrole i rješavanju zbijenosti zuba u prvih šest mjeseci ortodontske terapije, ali se također može pripisati Hawthornovu učinku (svijesti pacijenta da ga se pregledava i evaluira).
of orthodontic treatment, but they can also be attributable to the Hawthorne effect (patients’ awareness of being examined and evaluated).

Salivary pH was significantly decreased, which could be explained by our results of slightly increased plaque index measurements. More plaque deposits elevate acid levels in saliva, resulting in pH decrease. Consequently, physiologic response to maintain intraoral homeostatic conditions is to increase salivary flow rate, as seen in our results.

Unstimulated salivary flow was significantly increased for six months after the beginning of the treatment. This is partially consistent with the results of Arab et al. (16), which have shown gradual increase in unstimulated salivary flow rate at different time points, but their final measurement was at 18th week, and the increase was at that point not (yet) statistically significant. Some of the authors report significant increase only in stimulated salivary flow rate (17-19, 20), while others reported unchanged salivary flow rate (21) in patients with fixed orthodontic appliances. Also, all of the above mentioned studies assessed salivary flow rate at different time intervals and included smaller number of participants than in our study. It appears that fixed orthodontic appliances do not have the same intensity of mechanostimulatory effect in all patients, and that the effect is likely to change over time.

The prevalence of WSL after the beginning of orthodontic therapy was shown in 33.7% of our patients, which is similar to the results of Enie et al. (21) and Khalaf (22) who found the prevalence of WSL in 32.3% and 42% of patients. We have not observed statistically significant difference when compared to the prevalence of WSL before orthodontic therapy, nor between different types of brackets. It is known that oral hygiene habits are directly linked to the development of WSL (15, 21), and our groups of patients did not differ significantly by the results of plaque accumulation which could initiate enamel demineralization. Oral hygiene habits are most important factor for maintaining oral health in patients undergoing fixed orthodontic treatment.

Conclusions

It is shown that treatment with fixed orthodontic appliances, irrespective of bracket type and ligation, may influence intraoral homeostasis, as DMFT and salivary flow significantly increased while salivary pH significantly decreased in all groups of patients. In order to prevent from irreversible changes occurring in teeth, such as development of white spot and carious lesions, all patients should receive instructions for precise oral hygiene and dietary habits before the beginning of fixed orthodontic therapy and on every control examination.

Conflict of interest

None declared.

Salivary pH bio je značajno snižen, što se može objasni- ti našim rezultatima lagano povišenih vrijednosti pri mjere- nju indeksa plaka. Veće naslage plaka potiču porast razine ki- selina u slini, što ima za posljedicu sniženje pH. Kao rezultat toga, fiziološki odgovor za održavanje uvjeta intraoralne ho- meostaze jest da se poveća količina sline, kao što je vidljivo u našim rezultatima.

Nestimulirana količina sline bila je značajno povećana šest mjeseci nakon početka liječenja. To je dijelom u skladu s rezultatima Araba i suradnika (16) koji su pokazali postupni porast količine nestimulirane sline u različitim vremenskim intervalima, no njihovo posljednje mjerenje bilo je nakon 18 tjedana kada porast (još) nije bio statistički značajan. Neki autori istaknuli su znatni porast samo stimulirane količine sline (17 – 19, 20), a drugi nisu uočili promjenu u njezinoj količini (21) kod pacijenata s fiksnim ortodontskim napravama. U svim spomenutim studijama procjenjivale su se koli- čine sline u različitim intervalima i uključivala su manji broj ispitanika negoli naša studija. Čini se da fiksne ortodontske naprave nemaju isti intenzitet mehanostimulatornog učinka na sve pacijente i možda se učinak s vremenom promijeni. Prevalencija bijelih mlrja nakon početka ortodontske te- rapije kod naših pacijenata bila je 33,7 %, što je slično rezul- tatima Enie i suradnika (21) te Khalafa (22) koji su pronašli prevalenciju bijelih mlrja kod 32,3 % i 42 % pacijenata. Ni- smo pronašli statistički značajan razliku u usporedbi s prevale- lencijom bijelih mlrja prije ortodontske terapije ni među pa- cijentima s različitim vrstama bravica. Poznato je da su navike u održavanju oralne higijene izravno povezane s razvojem bijelih mlrja (15, 21) i naše skupine pacijenata nisu se značajno razlikovala u usporedbi s rezultatima nakupljanja plaka ko- ji bi mogli potaknuti demineralizaciju cakline. Oralne higij- enske navike najvažniji su čimbenik za održavanje oralnoga zdravlja pacijenata na fiksnoj ortodontskoj terapiji.

Zaključak

Pokazalo se da tretman fiksnim ortodontskim naprava- ma, neovisno o vrsti bravica i načinu vezanja, može utjecati na intraoralnu homeostazu zato što su KEP indeks i količina sline značajno porasli, a pH sline značajno se smanjio u svim skupinama pacijenata. Da bi se spriječile nepovratne promje- ne na zubima, poput razvoja bijelih mlrja i kariозnih lezija, svi pacijenti trebaju dobiti detaljne upute o oralnoj higijeni i prehrambenim navikama prije početka fiksne ortodontske te- rapije i na svakom kontrolnom pregledu.

Sukob interesa

Autori nisu bili u sukobu interesa.
Sažetak

Cilj: Podatci o kliničkim i salivarnim nalazima pacijenata s različitim vrstama ortodontskih bravica i vezanja (ligacije) doista su oskudni. Zbog toga je cilj ove studije bio usporediti kliničke i salivarno-nalaze pacijenata s različitim vrstama fiksnih ortodontskih naprava. 

Ispitani i postupci: Indeks karijinskih aktivnosti (KEP), indeks plaka, količina sline, pH sline i prevalencija bijelih mrlja određena je za 83 pacijenta s različitim vrstama ortodontskih bravica i vezanja (metalne pasivne samovezujuće bravice, konvencionalne metalne bravice, monokristalne bravice, polikristalne akutne samovezajuće bravice), prije početka ortodontske terapije i poslije toga tretmana. Pacijenti su, u razdoblju od dvije godine, birani u privatnoj stomatološkoj ordinaciji. Skupinu su činila 83 pacijenta (srednja dob 15,24 ± 1,64 god.). Statistička analiza radena je primjenom t-testa za zavisne i nezavisne uzorke te jednosmjernog testa ANOVA-e, Wilcoxonova signed rank testa i Kruskal-Wallisova testa. P-vrijednost manja od 0,05 (%) smatrana je statistički značajnom. 

Rezultati: KEP indeks i količina sline pokazali su značajan porast, a pH sline značajno se snižio u promatranom razdoblju kod svih pacijenata, neovisno o vrsti bravica i ligacije. Nije nadena statistički značajna razlika u promatranim parametrima među pacijentima s različitim ortodontskim bravicama.

Zaključak: Lako je količina salivacije povećana kod pacijenata s fiksnim ortodontskim napravama, što može imati protetivni protukarijenski učinak, KEP indeks također raste, a pH sline pada šest mjeseci nakon početka tretmana, neovisno o materijalu bravica i vezanja. Svi pacijenti trebali bi dobili detaljnije pute o oralnoj higiiji i prehranbenim navikama prije početka fiksne ortodontske terapije i na sva-kom kontrolnom pregledu.

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