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INFLUENCE OF AGE AND GENDER ON ALVEOLAR BONE DENSITY IN PATIENTS WITH FIXED PROSTHETICS

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ABSTRACT

Objective: The purpose of this study was to determine the effect of age and gender to the alveolar bone density of the patients having fixed prosthetic restorations.

Methods: 80 subjects of both genders with fixed prosthetics restorations were examined in this research. Retro-alveolar radiovisiography (RVG) images of the abutment teeth and of the homologous (control) teeth were done for all subjects. All RVG images were automatically digitalized and stored at computer equipped with Digora for Windows 2.5 software used for measurements of bone density in seven regions of interest (ROI) around the tooth root, all 10 pixels in size.

Results: The obtained data were processed using statistical method of single-factor multivariate analysis of variance (MANOVA), showing the following: at significance level of 5 %, there was no age and gender dependent difference of the alveolar bone density, except at ROI 6 of the control tooth (with Bonferonni adjustment pursued alpha level 0.007= 0.05/7) where statistically significant gender dependant difference was found. Men had significantly higher average value of alveolar bone density in that region (M=125.81) when compared to women (M=104.49).

Conclusion: No statistically significant effect of age and gender to tooth alveolar bone density as a linear combination of fixed prosthetics abutment teeth ROIs or control teeth ROIs (1, 2, 3, 4, 5, 6 and 7) was found.

Keywords: the alveolar bone density, age, gender, fixed prosthetics

Introduction

The alveolar bone reduction and apposition are affected by local and system-related factors. A patient's age, gender, body mass index, osteoporotic changes in the entire body, hormonal misbalance etc. are system factors [1]. Compressive and tensile forces, contacts of antagonists in occlusion, parafunction, oral hygiene, properly constructed crown or dental bridge are considered to be local factors contributing to apposition and resorption of bone tissue around an abutment tooth's root [2, 3].

Bone mass is being built in younger age and in the age of sexual maturity. The quantity of bone mass stabilizes in 30-ies reaches its highest value i.e. "bone mass peak" as a maximum mass. It is a result of normal growth and development of the body. Bone mass loss is a physiological process that may begin as early as in the third decade of human's life and is marked with a reduction in density and an increase in the bone tissue porosity. [4] A lack of oestrogen in menopause is the most common cause of the bone mass loss in women. In the first 5-7 years after menopause an average of 1-3% of bone mass is lost annually by the age of 70 when this process discontinues, but never stops, due to which women lose 35-50% of total bone mass when they reach old age [5, 6].

Degree of alveolar bone density may indicate a good function, a reduced function, or a loss of function of the abutment tooth.

The most common and straightforward method to determine the bone mass density is through a routine radiographic imaging. It takes at least 30%, and sometimes even 50 – 60% of bone mass loss in order to be able to detect osteopenia (bone loss) via X-ray. [7, 8]. With progress of IT technique, numerous methods (software) have been developed for more objective assessment of even minor changes in the alveolar bone density thus replacing subjective and inadequate methods. [9-13]

The aim of this research is to determine whether there is an age and gender-related difference in the alveolar bone density in patients with fixed prosthetics.

Subjects and Methods

A total of 80 subjects took part in the research, ageing from 20 to 50, of both genders, having fixed prosthetics (crown or dental bridge), during their regular examinations-ups at the Dental Prosthetics Department of the Faculty of Dentistry, University of Sarajevo. Inclusion criteria for the examinees were as it follows: to have a fixed prosthetics for at least three months, to have metal-ceramics fixed prosthetics, subgingival placement of the preparation margins, to have a homologous tooth or a tooth belonging to the same teeth group at the contra lateral side for comparison, both abutment tooth and the control tooth were in occlusion.

All included subjects were divided into two groups, depending on their gender: Group A female subjects ageing from 20 to 50 (41 subjects); and Group B male subjects ageing from 20 to 50 (39 subjects). All subjects were explained the purpose of the research and the benefit they may have from these examinations -up. Ethics Committee of the Faculty of Dentistry approved the research, and all subjects gave their written consents. Data of alveolar bone density measurements were entered into patients' records created for the purpose of this research. For each subject, the weight (in kilograms) and height (in centimetres) were noted in the records for the purpose of calculating BMI (body mass index). The values of plaque index (according to Silness and Loe) and gingival index (according to Loe and Silness) were examined, in order to evaluate oral hygiene, and entered in the records. For each patient, anamnestic data about longevity of fixed prosthetics were noted as well.

Retro-alveolar radiovisiography (RVG) images of abutment teeth and of homologous (control) teeth were done for all subjects with de.Götzen xgenus® digital (De Götzen Srl Via Roma, 45-21057 Olgate Olona (VA) – Italy). Xgenus® digital CCD sensors are equipped with new CsI (Cesium Iodide) scintillator giving best results regarding the noise reduction and the increasing of the spatial resolution of the digital x-ray images thus allowing better utilization of dose exposure. The program used for imaging was LR (low resolution) set as the initial standard option due to lower radiation dose the patients are exposed to. X genus digital sensors are available in two sizes. The

size one sensor was used for imaging teeth of intercanine sector, and sensor size two was used for post-canine sector teeth, as recommended by the manufacturer.

After radiographs were made, all automatically digitalised RVGs were stored at a computer equipped with the Digora for Windows 2.5 (Copyright, Sorodex, 2005) software performing the measurements of bone density. This density measuring function provides the information regarding relative values of pixels based on gray scale using 8 – relevant scale, from full black (0) to full white (255). Image calibration was automatic by means of Digora software options according to manufacturer recommendations. It improved the accuracy of measurements and minimised the errors.

After the image calibration process, measuring of the alveolar bone density followed. Seven regions of interest (ROI) were selected at each image, surrounding tooth root, as it follows (**Image 1**):

ROI 1 – 1 mm mesial from tooth root per alveolar edge

ROI 2 – 1 mm distally from tooth root per alveolar edge

ROI 3 – 1 mm mesial from the tooth root apex

ROI 4 – 1 mm distally from tooth root apex

ROI 5 – 1 mm vertically from the tooth root apex

ROI 6 – 1 mm mesial from half the range between ROI 1 and ROI 3

ROI 7 – 1 mm distally from half the range between ROI 2 and ROI 4

For multi-rooted teeth only one root (mesial) was selected for measurement in the same manner as described above.

The alveolar bone density was measured at each ROI by pointing the cursor to that particular point and the density and cursor location were shown, and those values were entered into the record card.

Major advantage of this software is the fact that it enables a zoom-in, so the image can be increased four times. This made the observation of details easier, and correct positioning of ROI.

Statistical analysis

Out of parametrical statistical methods, the single factor multivariate analysis of variance (MANOVA) was applied. The level of 5% (0.05) was taken as pursued alpha level, except in the case of subsequent comparisons at MANOVA where Bonferroni's

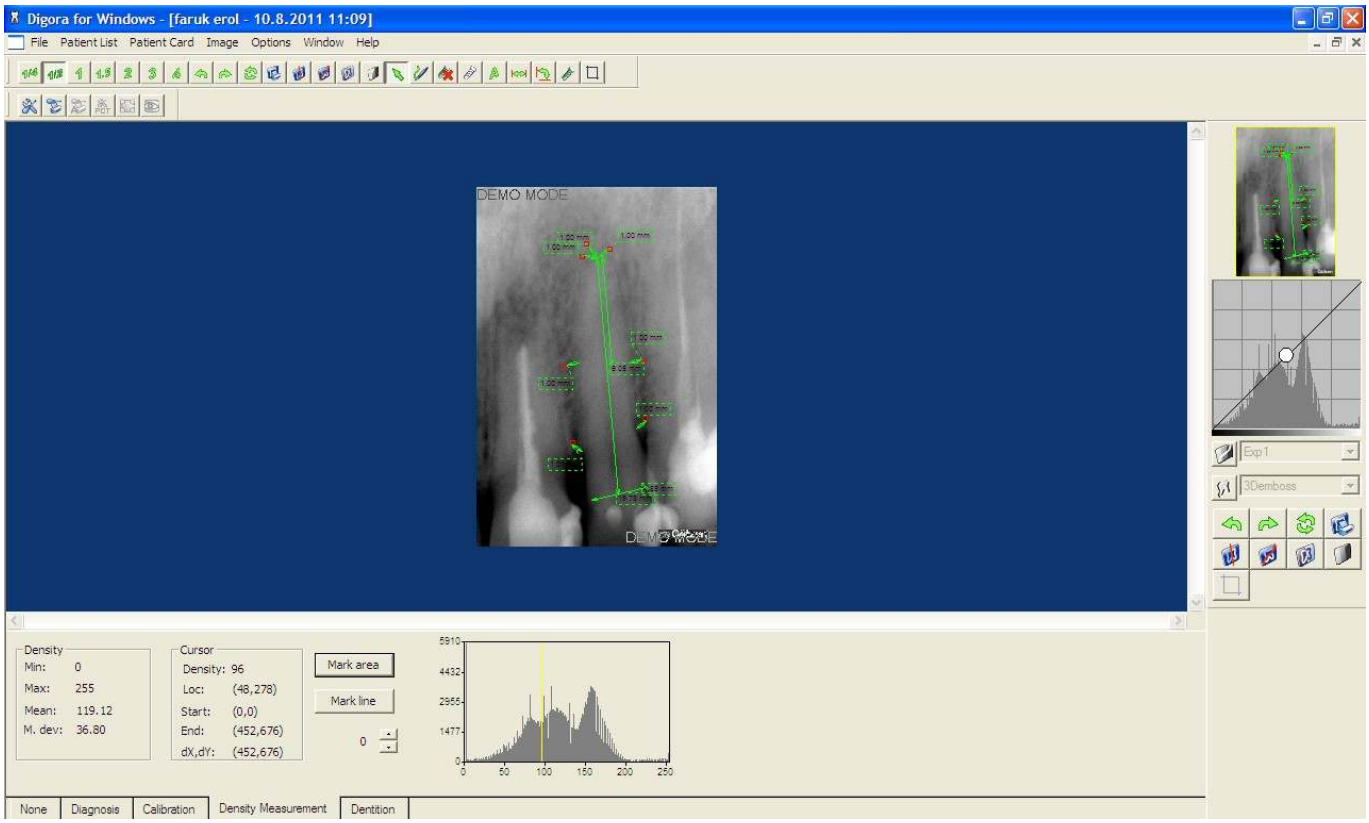


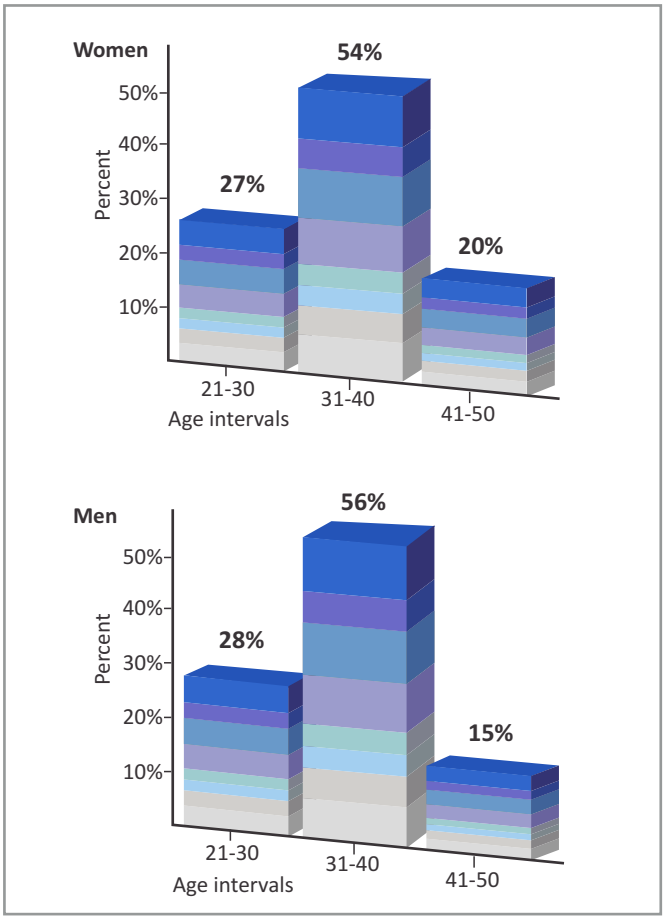
Image 1. Positions of ROIs

adjustment was used in order to reduce the probability (risk) of making the type I error. (i.e. declare the result as significant when it is actually not). It means that we divided the initial alpha level of 0.05 with the number of dependent variables (0.05 / 7=0.007).

Results

Total sample of subjects participating to the research study was n=80. Out of that number, 39 of them were males (48.8%), while 41 were females (51.3%). The mean age of male subjects was 34.56 *(95%CI; 34.56±2.265)* with a standard deviation of 7.22 years, whereas the mean age of female was 35.85 *(95%CI; 35.85±2.101)* with a standard deviation of 6.86 years.

Average values of male and female subjects' age are not statistically different; p= 0,415 (t= 0.819, df= 78). Proportions of gender age intervals in relation to total gender proportions are shown in **Graph 1**.



Graph 1. Gender and age-related interval ratios as opposed to gender ratios

Arithmetic mean of longevity of fixed prosthetics were 53 months for women and 51, 1 months for men respectively.

The single factor multivariate analysis of variance explored the impact of age differences (21-30, 31-40 and 41-50 yrs.) to tooth alveolar bone density at the abutment tooth and the ROI of control tooth. All seven dependent variables of ROI of the fixed prosthetic abutment teeth were included in the first analysis, and all seven dependent variables of the control teeth ROI were included in the second multivariate analysis of variance.

Table 1 shows the statistical values of the *Wilks' Lambda* test through the application of multivariate analysis of variance. As it may be observed in column Sig. (p=0.381), no statistically relevant influence of age to tooth alveolar bone density as a linear combination ROIs for fixed prosthetics abutment teeth (1, 2, 3, 4, 5, 6, and 7) was found.

	Value	F	Hypo-thesis df	Error df	Sig.	Partial Eta Squared
Wilks' Lambda*	0,812	1,08	14,000	138,000	0,381	0,099

** alpha significance level p<0.05*

Table 1. Multivariate test (effects of age onto the tooth alveolar bone density with linear combination of FPAT ROIs' variables)

As shown in **Table 2**, at second analysis pertaining to the variable of the control teeth ROIs, the *Wilks' Lambda* statistical values were presented applying the multivariate analysis of variance. As it may be observed at column Sig. (p=0.365), in this case, no statistically relevant influence of age to tooth alveolar bone density as a linear combination of ROIs for control tooth (1, 2, 3, 4, 5, 6, and 7) was found, either.

	Value	F	Hypo-thesis df	Error df	Sig.	Partial Eta Squared
Wilks' Lambda*	0,814	1,098	14,00	142,00	0,365	0,098

** alpha significance level p<0.05*

Table 2. Multivariate test (effects of age onto the tooth alveolar bone density with linear combination of CT ROIs' variables)

Single factor multivariate analysis of variance explored the influence of gender differences (men/women) to tooth alveolar bone density at fixed prosthetic abutment teeth ROIs and control teeth ROIs. As in the previous analysis, all seven dependent variables of fixed prosthetic abutment teeth ROIs were included in the first analysis, and all seven dependent variables of control teeth ROIs were included in the second multivariate analysis of variance.

Table 3 shows the *Wilks' Lambda* statistical values obtained through the application of multivariate analysis of variance. No statistical relevance was proven of gender to tooth alveolar bone density (p=0.193) as a linear combination for fixed prosthetic abutment tooth ROIs (1, 2, 3, 4, 5, 6 and 7).

In **Table 4**, the *Wilks' Lambda* statistical values are shown for the second analysis with regards to the control teeth ROIs variables, by applying the multivariate analysis of variance. In this case, the multivariate analysis of variance showed a statistically relevant difference of p<0.007 between genders of subjects at the values of linear combination of tooth alveolar bone density for control teeth ROIs (1, 2, 3, 4, 5, 6 and 7) with the effect size of 23.1%.

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Wilks' Lambda*	0,872	1,47	7,00	70,00	0,193	0,128

** alpha significance level p<0.05*

Table 3. Multivariate test
(effects of gender onto the tooth alveolar bone density with linear combination of FPAT ROIs' variables)

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Wilks' Lambda*	0,769	3,094	7,00	72,00	**0,007**	0,231

** alpha significance level p<0.05*

Table 4. Multivariate test
(effects of gender onto the tooth alveolar bone density with linear combination of CT ROIs' variables)

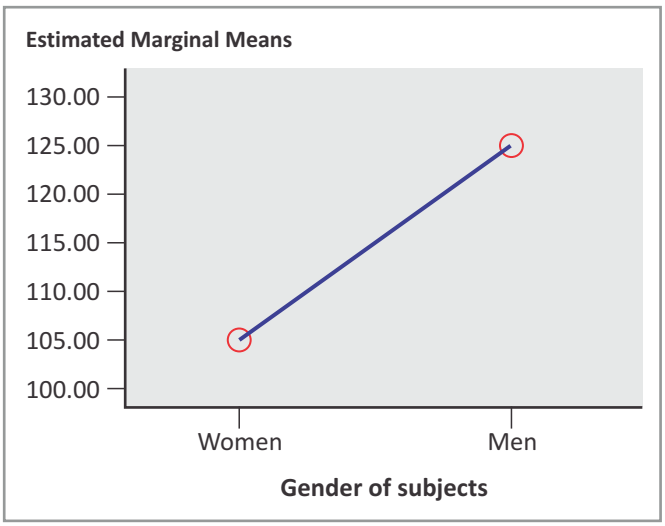
Looking the results of dependent variables in **Table 5** separately, the only difference between genders that reached statistical relevance (with Bonferonni's adjustment pursued alpha level of 0.007= 0.05/7) was in the case of the control tooth ROI 6 (p<0.004), with the effect size of 0.101 i.e. 10.1%.

Source	Dependent variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Gender	ROI 1 CT	207,283	1	207,283	0,188	0,666	0,002
	ROI 2 CT	47,060	1	47,060	0,035	0,852	0,000
	ROI 3 CT	2615,979	1	2615,979	2,521	0,116	0,031
	ROI 4 CT	2228,683	1	2228,683	2,225	0,140	0,028
	ROI 5 CT	741,505	1	741,505	0,693	0,408	0,009
	ROI 6 CT	9086,339	1	9086,339	8,805	**0,004**	0,101
	ROI 7 CT	4908,202	1	4908,202	5,370	0,023	0,064

** alpha significance level p <0.007 (with Bonferroni adjustment)*

Table 5. Tests of Between-Subjects Effects*

Reviewing the arithmetic means of the control teeth ROI 6 in relation to the gender of subjects, it may be seen that men had significantly higher average value of tooth alveolar bone density in this region (M=125.81) than women (M=104.49). The ratio of those differences is shown at **Graph 2**.



Graph 2. Estimated Marginal Means of ROI 6 CT (subjects' gender)

All patients, both sexes, had equalized average BMI values, with low frequency of extremes (underweight and obese class 1 and 2). There was no statistically significant effect of BMI on alveolar bone density as a linear combination of ROIs for *FPAT (fixed prosthetic abutment teeth)* (1, 2, 3, 4, 5, 6 and 7 (p=0,131)), as shown in **Table 6**.

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Wilks' Lambda*	0,755	1,468	14,000	136,000	0,131	0,131

** alpha level of significance p<0,05*

Table 6. Multivariate test (BMI influence on alveolar bone density in linear combinations of variables ROIs FPAT)

One-factor multivariate analysis of variance did not prove the relation between body mass index of subjects to the alveolar bone density as a linear combination of all dependent variables for the ROIs for CT (control teeth) (1, 2, 3, 4, 5, 6 and 7). (p=0,055), as shown in **Table 7**.

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Wilks' Lambda*	0,726	1,735	14,000	140,000	0,055	0,148

** alpha level of significance p<0,05*

Table 7. Multivariate test (BMI influence on alveolar bone density in linear combinations of variables ROIs CT)

			Plague Index CT			
			No visible plaque is seen (no scraping plaque)	Plaque can not be seen on the tooth (but by scraping plaque remains on the probe)	Plaque can be seen on the tooth	Total
Plague Index FPAT	No visible plaque is seen (no scraping plaque)	Count	23	38	1	62
		Plague Index FPAT	37,1%	61,3%	1,6%	100,0%
	Plaque can not be seen on the tooth (but by scraping plaque remains on the probe)	Count	6	8	4	18
		Plague Index FPAT	33,3%	44,4%	22,2%	100,0%
Total		Count	29	46	5	80
		Plague Index FPAT	36,3%	57,5%	6,3%	100,0%

** p< 0,006 (Pearson X^2 =10,223 , df=2 , C= 0,337)*

Table 8. Plague index fixed prosthetic abutment teeth in relation to the plaque index of the control teeth*

			Gingival Index CT			
			No inflammation	Mild inflammation	Moderate inflammation	Total
Gingival Index FPAT	No inflammation	Count	4	1	0	5
		Gingival Index FPAT	80,0%	20,0%	0,0%	100,0%
	Mild inflammation	Count	41	2	1	44
		Gingival Index FPAT	93,2%	4,5%	2,3%	100,0%
	Moderate inflammation	Count	22	8	1	31
		Gingival Index FPAT	71,0%	25,8%	3,2%	100,0%
Total		Count	67	11	2	80
		Gingival Index FPAT	83,8%	13.8%	2,5%	100,0%

**p=0,116 (Pearson X^2 =7,410, df=4,)*

Table 9. Gingival Index of FPAT compared to Gingival Index of CT *

No statistically significant differences were found in plaque and gingival index between fixed prosthetics abutment teeth and homologous (control) teeth, which can be seen in **Tables 8 and 9**.

Discussion

X-rays constitute the most straightforward, cost-effective, and accessible mean of linear measuring the resorption amount and density of the bone tissue. Radiation involved is minimal thus it may be regarded as a non-invasive method. [14]

In the case of radio-visiography the radiation level is up to 90% lower than in the case of traditional retroalveolar X –rays meaning that such low level of radiation is utterly negligible when compared to the benefits a patient may have from the information obtained from RVG images. [15, 16, 17]

Each image was obtained directly in digitalised form, and no RTG film developing or scanning of the image was required, whereby errors were eliminated especially those that may occur when developing a film, such as duration of developing, developer's concentration, developer's date of production, as well as errors that may occur when scanning images due to non-linearity of scanner, or glass surface stains. [18, 19]

Readings of the levels of gray at the ROIs may be performed through different image processing programmes. The Digora for Windows 2.5 (Copyright, Sorodex, 2005) programme was used in this research to read the average levels of gray within sample and for different linear measurements.

Although no statistically significant difference in the ratio of patient's age was found, we may say that in majority of measured ROIs a higher bone density was observed in subjects of younger age, 21-30 years, than in those aging from 41-50 years. Hence, there is a mild decline in the alveolar bone density in older subjects. It should be emphasized that the upper age limit in this research was 50.

Kovačević et al. did not find in their research a statistically significant difference in the alveolar bone density with regards to patients' age, which is in accordance with this research. [20]

Mazess et al. did not find in their research the age dependant difference in the bone density, either. Women aged only 20-39 participated in their research. [21]

Jager et al. reached a conclusion that there are no age dependent significant changes in the bone density. [22]

Our results showed that females had higher bone density at positions ROI 1 and ROI 2 both in the case of fixed prosthetics abutment teeth and in the case of control teeth in relation to males, which can be interpreted by better oral hygiene in female individuals. In all other measured regions, men have higher bone density both in case of fixed prosthetic carrier teeth and control teeth, although the only statistically significant difference was found at ROI 6 (position: mesial, root middle) of control teeth. We used Bonferroni's adjustment in order to reduce the probability (risk) of type I error (i.e. declaring the result as significant when it is actually not).

Finding in the research (that there is no statistically significant difference in the bone density between genders, except for control tooth ROI 6) may also be explained by the fact that the upper age limit of subjects was 50, and that women have not yet reached menopause when an increasing bone density loss occurs.

Kovačević et al. did not find a statistically significant difference between men and women in the alveolar bone density, which is in accordance with this research. [23]

In their study, Ning et al. did not find statistically significant difference in the alveolar bone density between men and women ageing from 35 to 44. [24]. In their other research the authors did not find difference in the alveolar bone density between men and women ageing from 35 to 54. They found higher alveolar bone density in men than in women ageing from 55 to 64. [25]

In their research, Ulm et al. measured the contents of minerals in the mandible bone (standardised area of the mandible body) with dual photon absorptiometry in 25 toothless lower jaw samples. The results showed that considering gender, there is a statistically significant difference. The values in women decline with age. [26]

In his research Von Wowern determined that the loss of mineral from the mandible bone is more extensive in older women than in older men. [27]

Results related to BMI index can be explained by the fact that most patients in this study had a body mass index within the normal limits. The difference would probably appeared if there were patients with significantly lower body mass index, and in this study, only one patient was underweighted thus having low body mass index.

Rebić et al. examined the effect of BMI on the mandibular bone density. At all points measured from the right and left side of the angulus mandible, mandibular bone density in the group with higher values of body mass index were higher than in the group with lower values of BMI, but there was no statistically significant difference. (28) Those results are in accordance to the findings of our study, because the bone density was higher in almost all ROIs in patients having higher BMI index compared to those with lower BMI values, but there were no statistically significant differences.

Control teeth had higher values of plaque index in relation to the fixed prosthetics abutment teeth (more plaque index 1). All prosthetics in this study were made of metal ceramic which is poorly receptive for plaque, and therefore better results (less accumulation of plaque) were found on prosthetic than on the control teeth.

Lövgren et al. in their research found less plaque accumulation on ceramic crowns than on the control (homologous) teeth. [29] Most of the patients in our research had a plaque index 0 or 1, bringing to the conclusion that the patients had a satisfactory level of oral hygiene. The same results were given by Bentley et al. for their findings. [30]

Conclusion

1. No statistically significant effect of age to the tooth alveolar bone density as a linear combination of fixed prosthetics abutment teeth ROIs or control teeth ROIs (1, 2, 3, 4, 5, 6 and 7) was found. A mild decline in the alveolar bone density was observed depending on age, both with fixed prosthetics abutment teeth and control teeth.

2. There is no statistically significant effect of subjects' age to alveolar bone density as a linear combination for fixed prosthetic abutment teeth ROIs (1, 2, 3, 4, 5, 6, and 7). A statistically significant effect was proven of the gender of subjects to alveolar bone density as a linear combination for control tooth ROIs (1, 2, 3, 4, 5, 6, and 7). The only difference between genders reaching the statistical significance (with Bonferroni adjustment pursued level) occurred in the case of control teeth ROI 6 variable. Women had a higher bone density at the positions ROI 1 and ROI 2 both around fixed prosthetic abutment teeth and around control teeth in relation to men. In all other measured regions, men have higher, although not statistically significant, bone density both around fixed prosthetic abutment teeth and of control teeth.

Declaration of interest

No conflict of interest

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GINGIVITIS AND GINGIVAL HYPERPLASIA IN PATIENTS DURING THE FIXED ORTHODONTIC THERAPY – A CASE-CONTROL STUDY

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ABSTRACT

Introduction: Fixed orthodontic therapy takes an important place in dental medicine with the aim of improving the appearance of dento-facial structures, in esthetic as well as functional sense. Structural elements of fixed orthodontic apparatus, such as brackets and ligatures, represent predictive spot for plaque accumulation, which may lead to changes in the gingiva. The most common changes are gingivitis and gingival hyperplasia.

Aim: To indicate a connection between therapies by means of fixed orthodontic apparatus and inflammatory changes in the gingiva, as well as the importance of multidisciplinary collaboration between the orthodontist and the periodontist.

Material and methods: The research included 60 students from the fourth, fifth and sixth year of the Faculty of Dentistry in Sarajevo. The students were divided into two groups. The first group consisted of 30 students having the therapy by means of fixed orthodontic apparatus (group A), and the second group consisted of 30 students not having the therapy (group B). Before the examination, all subjects have read and signed information consent for voluntary participation to the research. The subjects had one medical examination and went through periodontological anamnestic diagnostic protocol.

Results: Obtained results are statistically processed and discussed together with the results of other authors.

Keywords: Fixed orthodontic therapy, gingivitis, gingival hyperplasia.

Introduction

Orthodontic therapy takes an important place in dental medicine with the aim of improving the appearance of dento-facial structures, in esthetic as well as in functional sense. One type of orthodontic therapy is fixed orthodontic therapy being widespread due to its positive effects. Oral hygiene maintenance during fixed orthodontic therapy is difficult and requires education and motivation of patients, as well as additional effort from the patient's part. Structural elements of fixed orthodontic apparatus represent a predictive spot for dental plaque retention. As a result of plaque retention changes in periodontal structures often occur and most often these changes are gingivitis and gingival hyperplasia [1].

Gingivitis represents an inflammatory state of the gingiva which is induced by bacteria. There are also other etiological factors which may lead to disease such as viruses, hormones, heredity, systemic conditions, harmful habits, and so on. Clinical signs of gingival inflammation include enlargement of gingival outlines which occurs as a result of edema or fibrosis, changes of color to red or bluish-red, bleeding after sounding and pain. Gingivitis caused by plaque is considered the most common form of periodontal disease. It starts on the edges of the gingiva and spreads *per continuit*ies on the other parts of the gingiva and the periodontium [2].

Gingival hyperplasia represents an expression for a description of various forms of enlargement of the gingiva and is defined as disturbed enlargement of periodontal tissue [3, 4]. Even though it was neglected earlier, healthy gingiva is a prerequisite for the proper functioning of the entire organism. Noticeable gingival enlargement obstructs speech, masticating and eating, causes esthetic hindrance and increases the risk for the development of periodontology disease as well as systemic diseases [4]. The enlargement of the gingiva causes pain, gingival sensitivity and bleeding, pathological movement of teeth, occlusal and speech disorder. It can be the result of the functioning of different factors, such as the use of medications or genetic disorders [5-8]. The clinical appearance of gingival hyperplasia usually affects the labial surface of the gingiva of front teeth. Clinically, it usually begins in the area of interdental papilla, which becomes enlarged and spreads laterally until joining the papilla of the adjacent tooth. If the control of oral biofilm is at a satisfactory level, the bleeding upon irritation will be minimal, and enlarged gingival tissue will be firm and in a healthy pink color. If oral hygiene is poor, inflammation will be present, and gingival tissue will be red. There is a significant positive link between incidence and/or intensity of gingival enlargement and the amount of oral biofilm and calculus that is present. The enlargement is painless and progresses slowly, and in more difficult cases it can completely cover the teeth [9-12].

Gingival enlargements are usually classified in relation to clinical appearance and etiological factors.

Inflammatory gingival enlargements – Inflammation is recognized upon clinical examination, the gingiva is red, soft, shiny and easily bleeds after irritation. Inflammation is usually caused by poor oral hygiene and accumulation of oral biofilm, and it causes reactive enlargement of gingiva (focal reactive enlargement of the gingiva, inflammatory hyperplasia or epulis).

Non-inflammatory gingival enlargements – These enlargements are darker red or purple, can be firm or soft, and sometimes they bleed more easily. Predisposing factors are numerous: poor oral hygiene, specific hormonal states (puberty, pregnancy...), nutritional deficit (scurvy), blood dyscrasia (acute leukemia, lymphoma, aplastic anemia), genetic factors (epulis or Neumann's tumor), medications (anticonvulsants, phenytoin), immunosuppressive therapy (cyclosporine A), antihypertensive blockers of calcium channels (verapamil, diltiazem, nifedipine), systemic diseases (sarcoidosis, Crohn's disease, acromegaly) [13, 14, 15].

Numerous authors have researched the connection between fixed orthodontic apparatus therapy and the appearance of pathological changes in gingiva. They also discussed the question of its effect on gingiva. In 2016, Hadeel M. et al. conducted a research on a sample of 70 subjects divided into two groups (patients wearing fixed orthodontic apparatus and patients not wearing fixed orthodontic apparatus), ageing between 18 and 30 years, and they came to the conclusion that fixed orthodontic apparatus represents predictive spot for plaque accumulation leading to the inflammation of gingiva.

They also noted that patients with fixed orthodontic apparatus should attend regular control examinations and maintain adequate oral hygiene (16). In a research conducted in 2018, Amrinder S Tuli and Nitin Bhatnagar came to the conclusion that fixed orthodontic apparatus represents interference in maintaining adequate oral hygiene which may be a primary etiological factor leading to gingival hyperplasia. They have also pointed out the necessity of having both orthodontist and periodontologist multidisciplinary cooperation and they emphasized the significance of patient's motivation and education on proper oral hygiene maintenance [17].

Research hypothesis

Fixed orthodontic apparatus therapy affects the appearance of inflammatory changes in the gingiva.

Null hypothesis

There is no statistically significant difference of inflammatory changes in the gingiva in patients with fixed orthodontic apparatus and patients without fixed orthodontic apparatus.

Materials and Methods

The research was conducted at the Faculty of Dentistry in Sarajevo.

The research was conducted in the period ofrom January to March 2019.

60 students participating in the research are attending IV, V and VI year of study at the Faculty of Dentistry.

All subjects are ageing between 22 and 29 years.

Students are divided into two groups.

Group I includes 30 students being in the middle of fixed orthodontic apparatus therapy.

Group II includes 30 students not undergoing orthodontic therapy.

All subjects are systemically healthy and non-smokers.

The duration of therapy is between 2 months and 5 years.

Before the examination, all subjects read and signed information consent for voluntary participation to the study.

All participants attended one examination.

All participants will be subjected to periodontological anamnestic diagnostic protocol.

Periodontological anamnestic diagnostic protocol implies determining:

- Silness and Loe plaque index (IPL) – a score of 0-3, to quantify the presence of dental biofilm.
- Silness and Loe dental calculus index (CI) – a score of, to quantify the presence of supragin-gival and subgingival concrements.
- Silness and Loe gingival index (GI) – a score of 0-3, to quantify the degree of inflammation and alteration of the superficial periodontium.
- Muhlemann sulcus bleeding index (SBI) – a score of 0-5, to quantify the presence and intensity of gingival sulcus bleeding stimulated by a probe.
- Gingival hyperplasia (Pitting test).

All clinically examined parameters and obtained results will be entered into the charts specially designed for this research.

Results

Group A – Case group (patients with fixed orthodontic apparatus)

Group B – Control group (patients without fixed orthodontic apparatus)

Gender structure

	Male		Female		Total
	Number	%	Number	%	
Group A	7	23,3	23	76,7	30
Group B	12	40,0	18	60,0	30
Total	19	31,7	41	68,3	60

Table 1. Shows frequency (percentage) of gender structure in both examined groups and in total.

In group A there were 23 females (76, 7%) and 7 males (23, 3%), and in group B there were 18 females (60, 0%) and 12 males (40, 0%). In both groups there were 41 females (68, 3%) and 18 males (31, 7%).

The analysis of gender distribution indicates that there is no significant difference between the groups ($\chi 2$=1,926; df= 1; p=0,133; p>0, 05). In both groups, subjects of female gender represented the majority with 76, 7% in the case group and 60% in the control group.

Age structure – Age average per group

	Male	Female	Total
Group A	24,57±0,53	25,25±1,42	24,03±1,38
Group B	23,87±1,52	24,06±1,39	24,55±1,50
Total	25,00±1,20	23,95±1,45	24,29±1,45

Table 2. Shows the average age values of examined patients per group and in total.

The age average is 24 (24, 29). In group A (Case group) the age average is 24 (24, 03), and in group B (Control group) the age average is 25 (24, 55).

Statistical analysis by means of Student t test indicates that there is no significant difference between the groups according to age (p>0, 05; t=-1,383; df= 57; p=0,172)

The duration of orthodontic therapy

Duration of therapy (months)	
$\bar{X}$	16,07
SEM of $\bar{X}$	2,944
Median	10,00
SD	6,122
Min.	1
Max.	60

Table 3. The average duration of orthodontic therapy

Since the data exists only for the Case group, in this group the average duration of orthodontic therapy amounted to 16, 1±6, 1 months with the shortest therapy duration of 1 month and the longest duration of 60 months or 5 years.

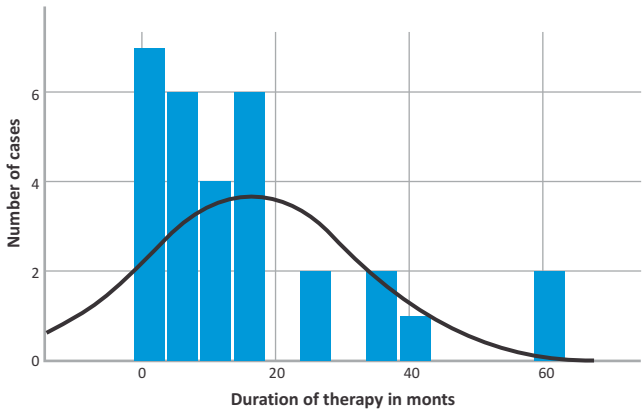

Chart 1. The average duration of orthodontic therapy

Gingivitis presence

	Gingivitis present		No gingivitis		Total
	Number	%	Number	%	
Group A	22	78,6	6	21,4	30
Group B	10	35,7	18	64,3	30
Total	32	57,1	24	42,9	60

Table 4. Shows the frequency (percentage) of the prevalence of gingivitis presence per examined group and in total

Gingivitis was considerably more present in the Case group (78, 6%) in relation to 35, 7% in the Control group. Statistical analysis indicates that there is a significant difference between the groups in relation to the presence of gingivitis (χ2=10,500; df= 1; p=0,001; p<0, 05).

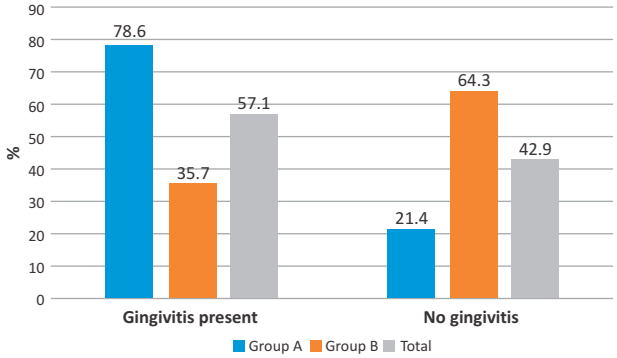

Chart 2. Presence of gingivitis per group

Also, the odds ratio analysis (odds ratio – OR) indicates that the examined patients in the case group have almost 11 times greater chance (OR=10,891: p=0,001) for the presence of gingivitis in relation to the examined patients in the control group.

Gingival hyperplasia presence

	Gingival hyperplasia present		No gingival hyperplasia		Total
	Number	%	Number	%	
Group A	18	66,7	9	33,3	27
Group B	3	10,3	26	89,7	29
Total	21	37,5	35	62,5	56

Table 5. Shows frequency (percentage) of the prevalence of gingival hyperplasia per examined group and in total

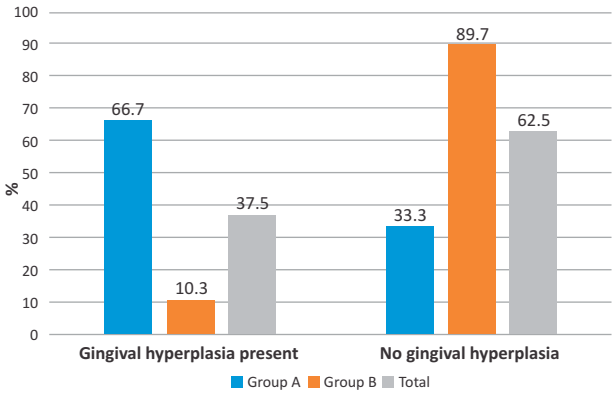

Chart 3. Gingival hyperplasia presence per group

Gingival hyperplasia was significantly more present in the Case group with 66, 7% in relation to 10,3% of the Control group subjects. Statistical analysis by means of chi-square test indicates the presence of significant difference between the groups ($\chi 2=18,924$; df=1; p=0,0001), while the OR totals 20,4, or in other words, the examined patients in the Case group have 20 times more chance for the development of gingival hyperplasia (OR=20,433: p=0,0001).

Plaque index

	Index 0		Index 1		Index 2	
	Number	%	Number	%	Number	%
Group A	6	20,0	23	76,7	1	3,3
Group B	4	13,3	26	86,7	0	0,0
Total	10	16,7	49	81,7	1	1,7

Table 6. Shows the frequency (percentage) of plaque index per examined group and in total

Chi-square test ($\chi 2=1,584$; df= 2; p=0,453) confirmed that there are no significant differences in plaque index frequencies per group. In 10 examined patients (16, 7%) index 0 was determined. In group A 6 subjects (20%) have an index 0, while in group B there are 4 (13, 3%) such cases. Index 1 is registered in 49 subjects (81, 7%) of which 23 are in group A (76, 7%) and 26 (86, 7%) in group B. Index 2 was registered only in 1 subject (1, 7%) and that is in group A (3, 3%).

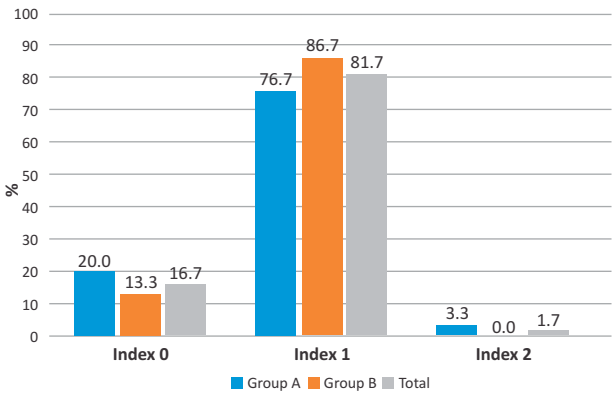

Chart 4. Representation of plaque index per group

Dental calculus index

	Index 0		Index 1		Index 2	
	Number	%	Number	%	Number	%
Group A	12	40,0	17	56,7	1	3,3
Group B	22	73,3	8	26,7	0	0,0
Total	34	56,7	25	41,6	1	1,7

Table 7. Shows the frequency (percentage) of dental calculus index per examined group and in total.

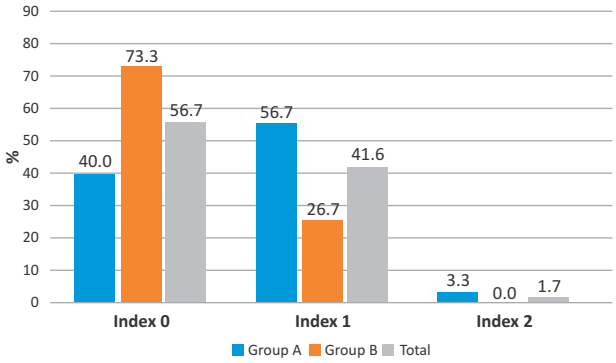

Chart 5. Representation of dental calculus index per group

Chi-square test ($\chi 2=12,441$; df= 2; p=0,002) confirmed that there are significant differences in the frequency of dental calculus index per group.

Gingival index

	Index 0		Index 1		Index 2	
	Number	%	Number	%	Number	%
Group A	3	10,0	10	33,3	17	56,7
Group B	13	43,3	14	46,7	3	10,0
Total	16	26,7	24	40,0	20	33,3

Table 8. Shows the frequency (percentage) of gingival index per examined group and in total

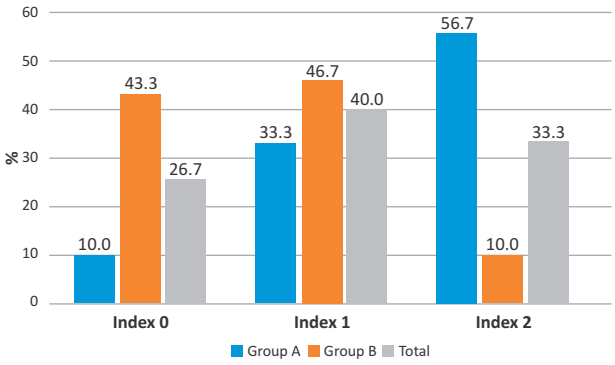

Chart 6. Representation of gingival index per group

Chi-square test (χ2=16,717; df= 2; p=0, 0001) confirmed that there are significant differences in gingival index frequency per group.

Sulcus bleeding index

	Index 0		Index 1		Index 2	
	Number	%	Number	%	Number	%
Group A	4	13,3	13	43,3	11	36,7
Group B	11	36,7	18	60,0	1	3,3
Total	15	25,0	31	51,7	12	20,0

Table 9. Shows the frequency (percentage) of sulcus bleeding index per examined group and in total.

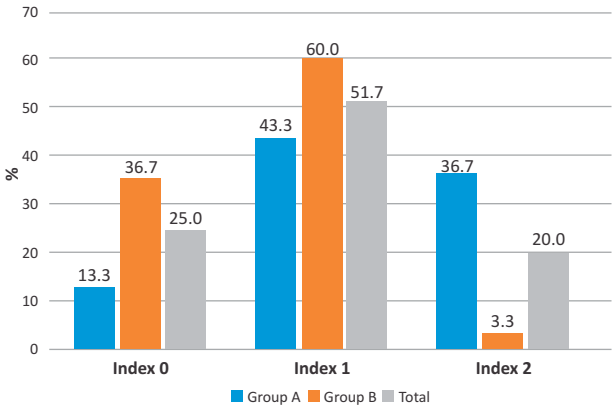

Chart 7. Representation of sulcus bleeding index per group

Chi-square test (χ2=14,406; df= 2; p=0,002) confirmed that there are significant differences in sulcus bleeding index frequencies per group.

Discussion

The results of our research showed that there is a connection between the therapy with fixed orthodontic apparatus and the changes in the gingiva manifested in the form_of gingivitis and gingival hyperplasia. Gingivitis is present in 78, 6 % of examined patients that are in fixed orthodontic apparatus therapy (Case group), while the gingivitis frequency in the group of patients not being in orthodontic therapy (Control group) occurs in 35, 7 %. The presence of gingival hyperplasia in patients with fixed orthodontic apparatus therapy is 66, 7 % in relation to the patients not being in fixed orthodontic apparatus therapy. The frequency of visible plaque in subjects that wearing fixed orthodontic apparatus is 3, 3 % - a score of 2, while this frequency in subjects not being in orthodontic therapy was 0, 0 % - a score of 2. Gingival sulcus bleeding in subjects being in fixed orthodontic apparatus therapy is 36, 7 % - a score of 2, and with subjects not being in orthodontic treatment, it is 3, 3 % - a score of 2. Gingival index for subjects being in orthodontic therapy is 56, 7 % - a score of 2, and in subjects not being in orthodontic therapy, it is 10, 0 % - a score of 2.

In research conducted by Karacaouglu Fatma et al. in 2016, they examined the frequency of occurrence of gingival disease in patients with fixed orthodontic work, both adolescents and adults. The conclusion of the study showed that the average occurrence of visible plaque and gingival inflammation increases during the orthodontic treatment [18]. This corresponds to the results of our research. A study conducted by Hedeel M. et al. in 2016 aimed to carry out a comparison of the state of periodontal health in patients wearing fixed orthodontic apparatus and those that are not orthodontic patients. Attained results indicate the fact that the fixed orthodontic apparatus increases the risk of dental plaque accumulation, which may lead to gingival inflammation. Plaque index scores, gingival index scores and sulcus bleeding index scores were significantly increased within the group that was in fixed orthodontic apparatus therapy in relation to the controls [16]. We found out in our research that there are no significant differences in plaque index frequencies per group, but that there are statistically

significant differences in gingival index frequencies per group. Thus, in the case study group as high as 56,7 % of subjects has a gingival index score of 2, while in the control group only 10,0 % has the same score. Additionally, our results confirmed that there are significant differences in sulcus bleeding index frequencies per group. In the case group, 36, 7 % of subjects had the sulcus bleeding index score of 2, while in the control group that score was 3, 3 %.

The plaque index result that did not indicate a statistically significant difference in our research is associated with the fact that the subjects were students of the Faculty of Dentistry, and that their oral hygiene maintenance knowledge is at a higher level. It is important to note that the calculus index in our subjects indicated a statistically significant difference. Dental calculus index is increased in the case group (3, 3 % - a score of 2), in relation to the control group (0 % - a score of 2). This speaks in favor of the fact that subjects in both groups have very good oral hygiene, and that the subjects with fixed orthodontic apparatus have problems with cleaning places being difficult to reach thus creating retentive spots for calculus formation.

In 2017 Alice Souza Pinto and associates published a study referring to gingival hyperplasia in orthodontic patients. The study showed that gingival hyperplasia occurs during orthodontic treatment [19]. This corresponds with our results showing that gingival hyperplasia was much more present in the case group with 66, 7 % in relation to 10, 3 % of subjects in the control group. In their research in 2019, Manuelli M et al. concluded that besides mechanical gingival damages in patients wearing fixed orthodontic apparatus, inflammatory changes in the gingiva are also present as a result of greater plaque accumulation, i.e. difficult oral hygiene maintenance [20]. Additionally, in 2017 Ryan K. published a study observing the effects of fixed orthodontic treatment on the gingival health and indicates that the patients in fixed orthodontic apparatus treatment have a high plaque index, as well as the gingival bleeding index [21].

The results of above-mentioned studies correlate with the results of our study – namely, that the fixed orthodontic apparatus treatment influences the development of gingival inflammation and gingival hyperplasia, with the emphasis on more difficult oral hygiene maintenance.

Conclusion

- More frequent changes in the gingiva, like gingivitis and gingival hyperplasia, are present in patients with fixed orthodontic apparatus.

- Changes in the gingiva are the result of more difficult oral hygiene maintenance due to the increased retentive surfaces.

- To accomplish success, in orthodontic as well as periodontal therapy, it is necessary to achieve good education and motivation of patients as well as oral hygiene maintenance and to emphasize the significance of multidisciplinary cooperation between the orthodontist and periodontologist.

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THE ORTHODONTIC TREATMENT NEEDS IN PATIENTS REFERRED TO ORTHODONTIST

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ABSTRACT

The objective: The aim of this study was to examine and establish compliance in determining the need for orthodontic treatment by general dental practitioners or non-orthodontic specialties and orthodontists.

Material and methods: The study included 100 patients referred to an orthodontist by general practitioners or non-orthodontic specialties. The research included a period of three months during which referrals of patients who applied to the Clinic for Orthodontics at the Faculty of Dentistry with clinics of the University of Sarajevo were reviewed and analyzed. After examination by an orthodontist specialist, compliance was aligned with regard to determining the need for orthodontic treatment by general dental practitioners or non-orthodontic specialties and orthodontists. Results: An analysis of the need for orthodontic treatment showed that an orthodontic treatment was required in 83 (83%) patients, while orthodontic treatment was not needed in 17 (17%) patients.

Conclusion: The research showed that there is no statistically significant difference in determining the need for orthodontic treatment by general dental practitioners or non-orthodontic specialties and orthodontists. It is necessary to provide guidelines that would facilitate recognition of individual malocclusions, complexity of case, and timely referral of patients to orthodontist, and therefore to obtain correct referral letters.

Key words: orthodontic treatment need, general dental practitioners, non-orthodontic specialties, malocclusion

Introduction

Lately, orthodontics have noticed an increasing number of patients starting the therapy. For an overview of orthodontics, patients usually come to their own initiative (parents or society initiative) or they are referred by their chosen primary dentist [1]. Approximately 70% of patients are referred to orthodontist by a doctor of dental medicine, who is more critical than patient in relation to assessing the need for treatment [2]. In a large number of cases, the final outcome of the therapy depends on dentist's existing knowledge and time when the patient is referred to orthodontic therapy. As there is inconsistency on the best time to begin orthodontic treatment, patients in orthodontic examination are commonly referred too late, i.e. when the tooth replacement has already been completed, at the time of permanent dentition. In individual cases, due to untimely visit to the orthodontist's, it is impossible to avoid the extraction of permanent teeth, and treatment duration is extended [1]. The referral letters for orthodontic clinics usually arrive from a children's dentist and general practice dentist. Although the general practice dentists are generally aware of the available treatment options and the best time for application of the intervention, it is crucially important for the children's dentists and general practice dentists to be well informed on the exact diagnosis and problems of early malocclusion [3].General dentists and non-orthodontic specialists may play essential role in education and motivation of their patients in relation to principals and practicing of orthodontic therapy, which may be very beneficial for patient's lifestyle. Therefore it is very important to recognize and identify their level of knowledge and stance regarding orthodontic therapy [4].

In most countries, the requests for orthodontic therapy are increasing. Therefore, the rational planning of population-based orthodontic measures is essential for assessing the necessary funds in order to provide this service. This emphasizes the importance of epidemiological researches in order to understand and cognize the degree of prevalence of different types of malocclusions and needs for orthodontic treatment [5].

Clarifying the orthodontic treatment need was one of the main reasons for establishing a number of occlusal indices. The use of such indices allows the individuals with a high rate of need for therapy to be recognized as a priority when funds for orthodontic practice are limited or when the availability of therapy is unequally distributed. Similarly, the individuals with low rate of need for therapy are protected from potential risks of unnecessary treatment [6].

Oral health care services financed from public funds are rarely sufficient to answer to unlimited number of requests for orthodontic services. Therefore, patient selection is indispensable to ensure that the therapy is provided to those mostly in need, those who would mostly benefit from the therapy in all probability [7].

Orthodontic anomalies are associated with psychosocial problems, poor periodontal condition and weakened masticatory functions, and as such, they should be treated as a health problem. The variability of social, economic and cultural factors may influence the perception of individuals regarding the need for orthodontic therapy [8].

It is very difficult to define and classify the malocclusions, mostly due to the variations of perception of this problem among individuals, and obviously among patients and practitioners. Orthodontic patients expect orthodontic therapy to improve their dental and facial aesthetics, and consequently their popularity and social success. While patients expect the results that define social and cultural standard of beauty in reference groups, or in society in general, orthodontists prefer to use parameters and indices to diagnose the problem and plan later treatment [9].

The aim of this study was to examine and establish compliance in determining the need for orthodontic treatment by general dental practitioners or non-orthodontic specialties and orthodontists.

Material and Methods

The study included 100 patients who were referred to orthodontist by general practice dentist or by some other dental specialist. Patients aged 5 to 17 years; 53 persons were female and 47 persons

were of male gender. The research included three months period (April, May, June, 2017) during which referrals of patients who applied to the Clinic for Orthodontics at the Faculty of Dentistry with Clinics of the University of Sarajevo were reviewed and analyzed.

For all subjects involved in research, the following data were collected:

1. Gender of patient
2. Age of patient
3. Who referred the patient to orthodontist
4. Correctness of referral letter: without diagnosis, with correct diagnosis, with incorrect diagnosis
5. Diagnosis by orthodontic specialist at Clinic for Orthodontics of Faculty of Dentistry with Clinics in Sarajevo
6. Assessment of orthodontic treatment need: treatment needed, no treatment needed
7. In which period orthodontic treatment is needed; treatment needed in later period (patient referred too early), treatment needed at time of visit (patient referred timely) and treatment was needed even earlier (patient referred late).

After the examination by the specialist orthodontist, the harmonization was compared regarding determination of need for orthodontic treatment/diagnosis by the general practice dentist or other specialty dentist and orthodontist, i.e. how many patients were correctly and timely referred to orthodontist, and how many of them did not need orthodontic treatment at all or were simply referred too early.

The criterion used by dentists to recognize the need for orthodontic therapy and on which basis they referred the patients to orthodontist is not known.

Orthodontic specialists at Clinic for Orthodontics of the Faculty of Dentistry with Clinics in Sarajevo determined the need for orthodontic treatment based on occlusal index using Angle's classification.

The occlusion analysis was performed in three anatomical planes (sagittal, vertical and transversal) and this is in intercanine (frontal) and transcanine (lateral) region.

Depending on the degree of deviation in any plane, orthodontists made decision regarding the need for orthodontic treatment.

Statistical analysis

The results were analyzed using SPSS computer program for statistical analyses (*SPSS-Statistical Package for Social Sciences*) version 13.0 (*Chicago, IL, USA*).

A *Shapiro-Wilk* test was used to estimate normality of the distribution of continuous variables.

The significance of difference for continuous independent variables that followed normal distribution is tested by means of *Student t-test*, and results are shown as mean value (X) and standard deviation (SD).

Qualitative data are shown as absolute numbers and percentages (%) of values and are analyzed by *Chi square* test (χ^2). Values $p<0.05$ are considered as statistically significant.

Results

The research included 100 (100%) patients referred to orthodontist, of them 47 (47.0%) were male and 53 (53.0%) were female patients. The average age of patients involved in the research was 11.14±2.95 years. The minimum age was 5 years and maximum age was 17 years. The male patients were of average age 10.79 ± 2.91 years, with minimum age of 5 years and maximum age of 17 years. The female patients were of average age 11.45±2.97 years, with minimum age of 6 years and a maximum age of 17 years.

The observed difference in average age of patients in relation to gender was not statistically significant ($p=0.262$; $p>0.05$).

The largest number of patients referred to orthodontist, 53 (53.0%), had referral letters from general practice dentists, 45 (45.0%) were referred by specialists in children's and preventive dentistry, 1 (1.0%) of patients was referred by specialist in oral surgery, and, also, 1 (1.0%) patient was referred by specialist in oral medicine and periodontics.

Of the total number of referral letters, 100 (100.0%), 96 (96.0%) were without diagnosis, while 4 (4.0%) referral letters were with diagnosis. The

representation of referral letters without diagnosis was statistically significant greater in relation to the representation of referral letters with diagnosis (χ^2=84.64; p<0.0005).

Of the total number of referral letters sent to orthodontist with diagnosis, 3 (75.0%) had correct diagnosis, while 1 (25.0%) was with incorrect diagnosis.

The referral letters with correct diagnosis were sent by: general practice dentist - 1 (33.3%), specialist in oral surgery - 1 (33.3%) and specialist in oral medicine and periodontics - 1 (33.3%). Only 1 (100%) referral letter was registered with incorrect diagnosis, which was sent by general practice dentist.

Figure 1. shows the analysis of representation of different diagnoses established by specialist orthodontist.

Analysis of need for orthodontic treatment by specialist orthodontist showed that orthodontic treatment was needed in 83 (83%) patients, while orthodontic treatment was not needed in 17 (17%) patients

Figure 3. shows the representation of need for orthodontic treatment based on the information who sent the referral letters.

Of the total number of patients, orthodontist assessed that 13 (15.7%) patients were referred too early to orthodontist, and that they would need orthodontic treatment in later period, 62 (74.7%) patients were referred timely, while 8 (9.6%) patients were referred to orthodontist late, i.e. they needed orthodontic treatment much earlier (**Figure 4**.)

Figure 5. shows the representation of patients as per adequate time for orthodontic treatment.

According to the orthodontists' assessment, the largest number of patients referred by general practice dentist, 35 of them or 66.0%, referred timely and needed orthodontic treatment at the time of visit to the orthodontist. Of the total number of patients referred to the orthodontist by specialist in children's and preventive dentistry, 25 of them or 55.6% referred timely to the orthodontist. Specialist in oral surgery referred 1 (100%) patient and specialist in oral medicine and periodontics referred 1 patient to orthodontist who referred timely (**Figure 6**.)

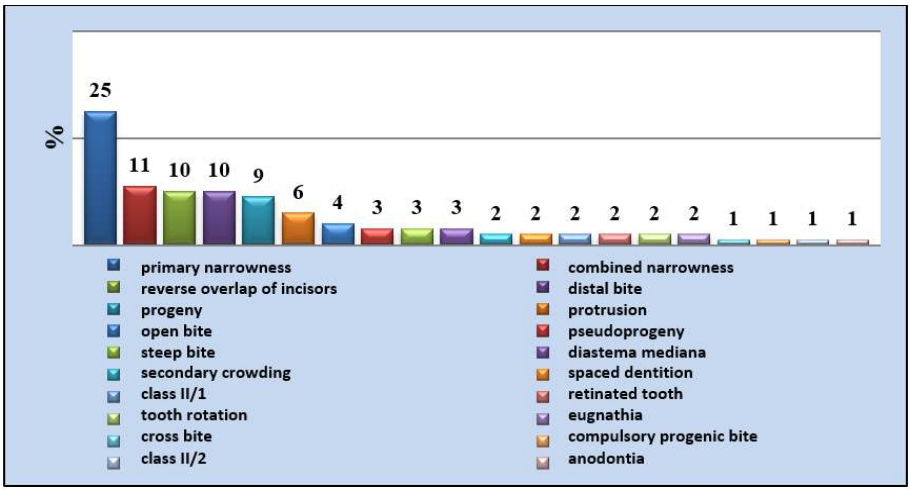

Figure 1.
Representation of diagnoses established by specialist orthodontist

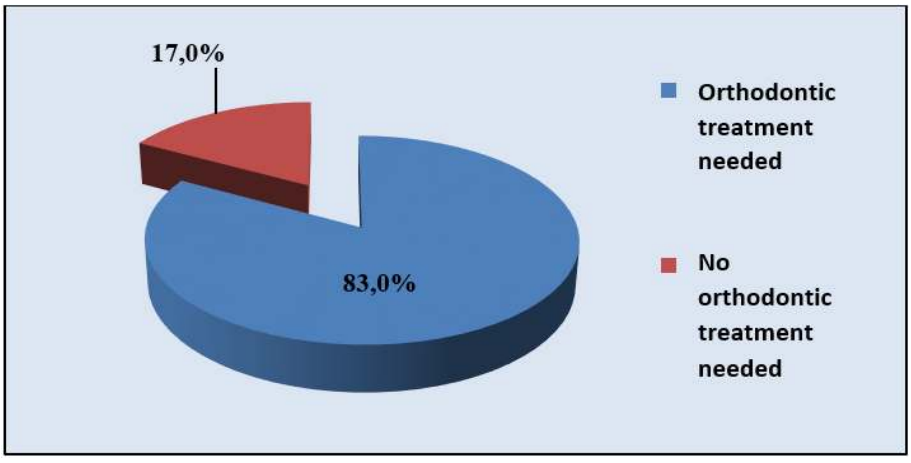

Figure 2.
Representation of patients based on need for orthodontic treatment assessed by orthodontist

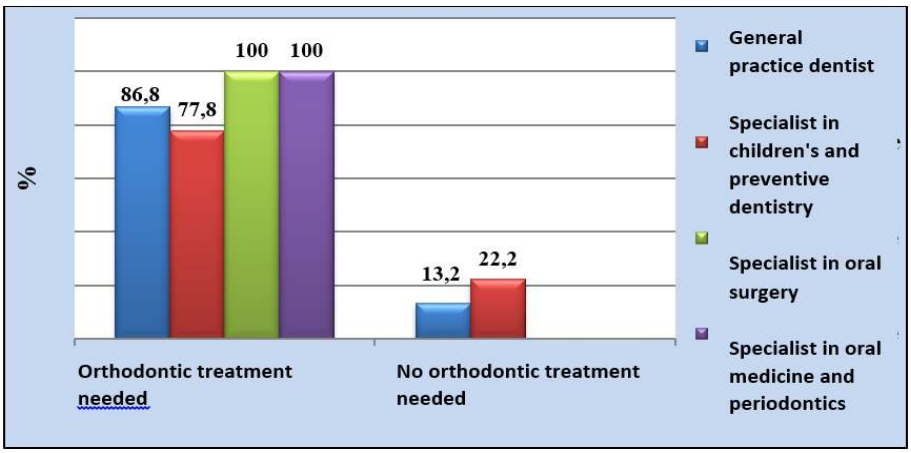

Figure 3.
Representation of need for orthodontic treatment based on who issues referral letters

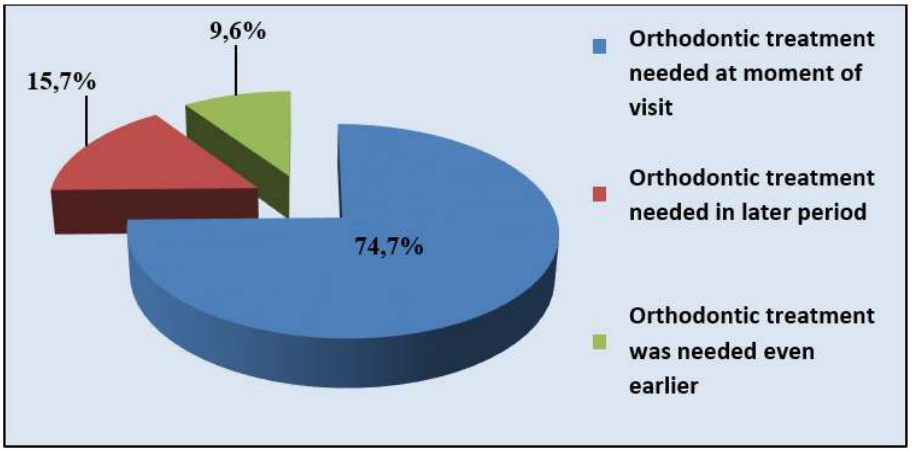

Figure 4.
Representation of patients based on need for orthodontic treatment assessed by orthodontist in relation to the optimal treatment time

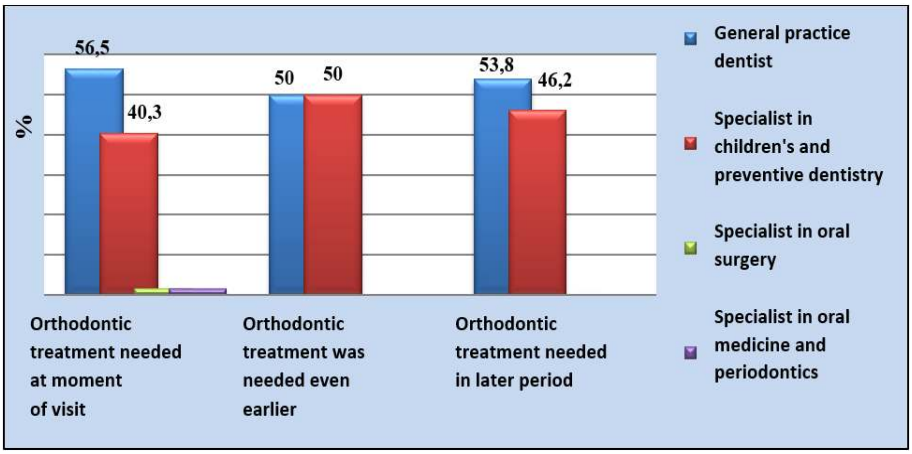

Figure 5.
Representation of need for orthodontic treatment based on who issues referral letters in relation to the optimal treatment time

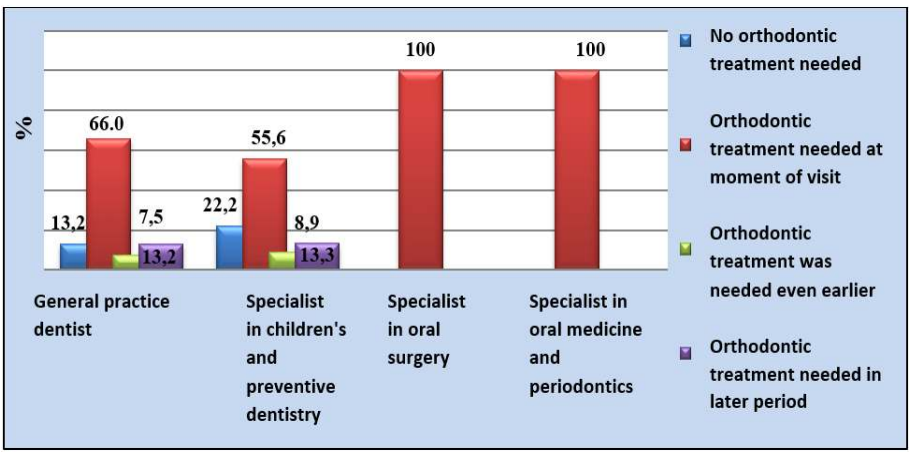

Figure 6.
Representation of need for orthodontic treatment based on opinion of orthodontist and based on who issues referral letters

Discussion

Many scientific studies researched and established harmonization regarding the determination of orthodontic treatment need by general practice dentist or dental doctors of other specialties and orthodontists, as well as the level of knowledge of general dentists and non-orthodontic specialties in dentistry and their stance concerning orthodontic therapy.

The criterion used by dentists to recognize the need for orthodontic therapy is not completely clear [10]. The tendency exists that orthodontists are more critical towards dental health protection due to their greater knowledge of occlusion and experience with possible treatment outcome. In comparative research conducted by Kuroda et al. among dentistry students, dentists at specialist training and orthodontists, perceived needs for orthodontic treatment being changed with increased experience and skills in dentistry and orthodontics. Finally, certain variations in the perception of the need for treatment may be found among orthodontists and dentists worldwide and should be taken into account when interpreting the results [11]. Although dentists are so educated that they should well know the bases of diagnostics, etiology and character of individual orthodontic irregularities, some surveys have not yielded results consistent with this. For example, the analyses were performed on patients' diagnoses who referred to one orthodontic outpatient department. From these analyses, it followed that of the total of 400 referral letters that were processed by free choice method, only 65 referral letters were with correct diagnosis. The other diagnoses were partial, incorrect or undefined, and the largest number of referral letters was without any diagnosis [12]. We observe similar data in our research; of the total number of referral letters sent to orthodontist, 96.0% were without diagnosis, while 4.0% of referral letters were with diagnosis.

In the study by Berk et al., it was necessary to establish the rate of agreement among general practice dentists, children's dentists and orthodontists regarding the need for orthodontic therapy. The results showed a high rate of agreement among opinions inside groups of children's dentists, orthodontists and general dentists (Kappa range 0.86-0.95). The rate of agreement compared among groups was lower. The orthodontists, general dentists and children's dentists in this example showed the rate of high agreement regarding the need for orthodontic therapy [13].

The aim of study conducted by Jackson et al. was to examine referral of patients to orthodontist by the general dentists and to examine knowledge of dentists on the Index of Orthodontic Treatment Need (IOTN). The results show that 20% of dentists made correct decisions on referral time for three different malocclusions using tests of photographs. The IOTN is not used routinely by 76% of dentists when referring to the orthodontist. This study offers the evidence that there is a need for postgraduate training or producing instructions for referral in order to help dentists to refer patients for orthodontic treatment to the most appropriate service provider at the most appropriate time. If dentists, among other things, need to act as "doormen" of orthodontic service, it is necessary to provide more support and education for them concerning the use of IOTN [14].

The comparative analysis conducted by Sastri et al. showed significant differences in the results of knowledge and stance towards orthodontics among general dentists and non-orthodontic specialists, and, it was on the side of non-orthodontic specialists. The results of the study were moderately satisfactory and showed the need for increasing clinic-oriented education towards practice and concept of orthodontic therapy. This shows that non-orthodontic specialists, who had 3 more years of education when specializing in dentistry, had more knowledge on orthodontic therapy. Also, results regarding the issue of stance towards orthodontics were on the side of non-orthodontic specialists in comparison with results of general dentists, pointing to a significant statistical difference [4].

Thind et al. concluded in their study that it is necessary to draw attention to general dentists in relation to their recommendation and referral letters that do not contain even basic necessary information. The research suggests that dentists who refer patients to orthodontists should follow instructions and recommendations of British Orthodontic Society [15]. In research by O'Brien et al., it was necessary to determine whether unnecessary referral of new patients to orthodontic consultations was a significant problem. The first part of study included

evaluation of referral letters to orthodontists from general dentists. In the second part, the information was gathered on patients referred by general dentists. The study concluded that significant variations appeared in relation to rates of referral among dentists and many patients were referred unnecessarily. It seems that guidelines for referral to orthodontic therapy are needed and should be directed to all general dentists [16].

Aldrees et al. conducted a study aimed at assessing the orthodontic diagnostic skills, reasons for referral to specialist and the perceptions of orthodontics benefits of pediatric dentists and general dentists in comparison to orthodontists. The selected treatment plans for three cases of early malocclusion showed huge contradictions between results of orthodontists and remaining two groups. Contrary to the orthodontists, pediatric dentists most commonly proposed treatment in relation to dentition periods: primary dentition and early-mixed, and then late-mixed and permanent dentition. Regardless of similarities in diagnosis, among dental practitioners inside three mentioned groups, noticeable differences also existed with regards to proposed treatment approaches, perceived treatment need and timing of intervention [3].

The study by Richmond et al. investigated variations in the dentists' perception of the orthodontic treatment need. The results of this research showed that the group of subjects was divided on the basis of the opinion "what the orthodontic treatment need represents at all", within the very dentistry. It is proposed that the method, achieving a more balanced assessment when defining the need for orthodontic therapy, should be one using occlusal index [10]. O'Brien et al. assessed the effectiveness of recommendations for orthodontic patients' referral to orthodontists. The results showed that the instructions for referral of orthodontic patients did not influence the behavior of general dentists. It is necessary to research more the optimal methods and application of guidelines for referral of patients to orthodontist in general dental service [18].

Contrary to the above-mentioned studies, our research showed that there is no statistically significant difference in determination of need for orthodontic treatment by the general practice dentist or non-orthodontic specialists and orthodontists. The comparative analysis did not show significant differences in results regarding determination of need for orthodontic treatment by the general practice dentist and non-orthodontic specialists.

However, similar to other authors' researches, we established that the representation of referral letters without diagnosis was statistically significantly higher in relation to the representation of referral letters with diagnosis. Still, it is necessary to take into consideration the limitation of this research regarding the size of the very sample, and it would be necessary to conduct the same on significantly greater number of subjects.

Conclusion

The research showed that there is no statistically significant difference in determining the need for orthodontic treatment by general dental practitioners or non-orthodontic specialties and orthodontists. The representation of referral letters without diagnosis was statistically significantly greater in relation to the representation of referral letters with diagnosis.

It is necessary to provide guidelines that would facilitate recognition of individual malocclusions, complexity of case, and timely referral of patients to orthodontist, and therefore issuance of correct referral letters.

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REGENERATIVE THERAPY IN ORTHODONTICS

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ABSTRACT

Regenerative dentistry, as a subdivision of regenerative medicine, is a new field of research uses tissues' self-healing and regenerative potentials. The use of bone and bone substitutes, membranes, growth factors, stem cells, platelet concentrates and a combination of the mentioned cells and tissues, enables more successful dental treatment.

The aim of this review is to inform the wider orthodontic public about the possibilities of regenerative therapy in orthodontics.

Methods and materials: the research was done using search engines PubMed and Google Scholar. The keywords were: regenerative therapy, stem cells, orthodontics, PRF. Selected articles are written in the period of 2004-2018.

Conclusion: combined orthodontic and regenerative therapy can resolve complex clinical problems and enhance bone formation.

New technologies in dentistry, as well as more demanding orthodontic patients, have brought the application of regenerative methods in orthodontics. This article is a short review of the use of regenerative methods, mostly in the form of PRF and stem cells, in orthodontic treatment.

Keywords: regenerative therapy, stem cells, orthodontics, PRF

Introduction

The terms regenerative medicine, reparative medicine or tissue engineering are equally used in describing the use of cells, proteins, cell padding, signal molecules in reparation and regeneration of tissue [1]. The application of regenerative methods in treatment is a challenge for contemporary dentistry. These methods offer regeneration of certain tissues, self-regeneration and self-treatment, during which the body uses own products to regenerate.

The concept of tissue regeneration is taken from regenerative processes which occur in vivo. Regeneration of tissue, although a complex process, can be divided into three steps: inflammation, proliferation and remodeling [1]. During this process signal molecules increase the number of cells of damaged area, while morphogenetic signals induce differentiation of tissue. These signal molecules are mostly polypeptide factors of growth being produced by local cells or are delivered from circular blood and extracellular matrix. During that time the extracellular matrix has a role of padding for the migration of cells and their arrangement in the form of desired tissue. In *in vitro* conditions, there is a presence of triad including non-differentiated cells, signal molecules and instead of extracellular matrix, natural or synthetic tridimensional padding is used. Angiogenesis and vascularity take an important role in reparation of tissue considering that blood supply is necessary for the survival and cell development. It is also a source of undifferentiated perivascular cells which are required for the process of reparation [2].

Due to success in the field of regenerative medicine, it is possible to choose different treatments. Usage of bones and bone equivalent materials, membrane, growth factors, stem cells, platelet-rich fibrin (PRF) and a combination of the above mentioned, provides a possibility of rescuing and maintaining teeth, which would be extracted, ten years ago, due to a volume of loss of supporting structures. Regenerative medicine is new branch in the science started in the 21st century producing the development of regenerative dentistry.

Development of technology in dentistry contributed to bigger expectations in treatment results. New technologies in dentistry and more significant demands of patients lead to the fact that regenerative techniques are more and more used in orthodontics.

Orthodontic treatment, in general, especially at adult and children patients with cleft lip and palate demand interdisciplinary approach, so the application of regenerative methods in other disciplines (oral surgery, maxi facial surgery, implantology, periodontology, and endodontics) improves the orthodontist's performance.

The most commonly used regenerative products are stem cells and various blood products of which the PRF mostly.

Methods and Materials

Articles published in two databases (PubMed and Google Scholar) are searched and analyzed. Different keywords are used during the search: regenerative therapy, stem cells, orthodontics and PRF.

Inclusive criteria were: access to the paper in whole, articles published in English and papers published in the period from 2004 to 2018. Also, papers need to include one of the keywords in their title.

Results

High number of papers were found by searching, but only 20 of them satisfied the criterion. Eight of them were analyzed finally.

Discussion

Application of Stem Cells in Orthodontics

Stem cells are particular type of cells which can regenerate themselves and differentiate to other kinds of a cell [3].

In 2006 Yamanin discovered the way of "reprogramming in stadium similar to embryonic stem cells" in the adult mouse. The success of this method is related to the ability to manifest factors of pluripotent adult stem cells which reprogrammed them and returned to the stage of pluripotent stem cells.

Stem cells are part of multicellular organisms, and they are featured by regeneration by mitotic division of cells while they are in non-differentiate stage [4].

Stem cells are classified concerning their function (normal and cancer stem cells) or by the source of isolation (embryonic, fetal, stem cells from the blood of umbilicus and adult non-stem cells). The existence of human stem cells is proved to be in bone marrow, peripheral blood, hair follicles, epithelium of digestive system, skeletal and heart muscle, lungs, brain, liver, pancreas, fat tissue, synovium, periosteum, and teeth. Although they are in a relative state of sleep mode, these cells can react strongly to non-tissue damage [5].

Stem cells of the tooth can be isolated from:

1. epithelium
2. pulp
3. periodontal ligament
4. applied papillon [5]

In dentistry, the application of stem cells includes regeneration of dentine, support structures of tooth and reconstruction of craniofacial structures.

Application of stem cells in orthodontics is still experimental, and it is far from everyday usage.

Results obtained in this study are promising, in terms that stem cells and regenerative therapy will ease an orthodontist's work generally.

Stem cells in orthodontic therapy are mainly related to the regeneration of periodontium which is responsible for all procedures participating in teeth movement. Therefore, dental cement, periodontal ligament and alveolar bone are tissues in which specific changes occur, during the orthodontic therapy, under the influence of allied force causes teeth movement. There are several papers in which this revolutionary therapy method in experimental conditions is applied. A common application of orthodontics in adult patients demands the help of regenerative methods to ease teeth movement through sclerotic bone.

Xiaoyan Chen et all conducted research in which they applied mesenchyme stem cells to improve osteogenesis in orthodontic teeth movement. They started with the fact forces in orthodontics cause bone resorption on one side and apposition bone on the other side.

The results of the study confirmed that isolated mesenchyme steam cells (hJBMMSCs) taken from healthy donors ageing between18-35 are applied on the bone by *in vitro* conditions, stimulate the development of osteoblast and osteogenesis respectively and therefore, they make orthodontic therapy easier [6].

The other field of orthodontics tending to be improved by regenerative medicine is the splitting of an inter-maxillary suture with an expanding palate. Turkish scientists led by Abdullah Ekizerom conducted an experimental study. They did an experiment in which 19 rats were divided into two groups. In the control group they expanded a palate by splitting intra-pre-maxillary suture and in the tested group, they added mesenchyme stem cells when splitting the suture. Immune-histochemical analysis was conducted after the treatment applied on the samples.

Microscopic analysis showed a presence of excessive formation of the new bone, an increased number of osteoblast and more significant blood supply of intra-premaxillary suture of rats in the test group where mesenchyme stem cells are applied [8].

The problem which appears during teeth movement is a root resorption of the moved tooth. Application of stem cells is a way of preventing these complications.

This study is conducted on rats and it aims to explore and compare results of stem cells and gens of osteoprotegerin (OPG) applied to prevent or inhibit, under the influence of orthodontic forces, resorption of root already appeared.

An orthodontic force of 100 g on the upper first molar of rats and rats test group was injected with mesenchyme stem cells. Control orthopantomography was conducted on the first, sixth and eleventh day out of the total 14 days during which force application lasted.

The conclusion of the paper after application of described methods of regenerative therapy is that the number of osteoclasts, resorption lacunas and area of resorption of the bone is significantly smaller in the test group than in the control group [9].

Regenerative medicine is used in the study which researched orthodontic treatment of patients who had bone defects. Attia MS, Shoreibah EA, Ibrahim SA, Nassar HA in their paper "Regenerative therapy of osseous defects combined with orthodontic tooth movement" applied regenerative therapy on 15 patients, with at least three inter-bone defects and malocclusion. After they tested control group and

two ways of treatment: only orthodontic and combined regenerative-orthodontic therapy were successful.

Results showed that measured parameters (bone thickness, attached gingiva, bone density) were statistically and significantly improved in the test than in the control group [7].

Stem cells offer the potential of regeneration of defect of craniofacial bones, but this hasn't been clinically tested yet. This opens a possibility of using regenerative therapy in treating cleft lip and palate. A regenerative technique, used for reconstruction of cleft palate and lip included appliance of cell therapy and appliance of growth factor. Lack of proof, in controlled clinical studies, efficiency of treatment by compensating tissue in defect of cleft lip and palate cannot be defined [18].

The PRF in Orthodontics

PRF-platelet rich fibrin, which was first described by French scientist **Choukroun in 2000** presents the second generation of platelet concentrate which is gained by centrifuging the blood of patient with no anticoagulant and other biochemical modifications. PRF has a dense fibrin network with leukocytes, cytokines, structural glycoproteins and growth factors [10].

Due to its complex architecture and composition, biomaterial is presented with its unique mechanic features differentiating from other plates concentrates, such as PRP (platel rich plasma). Many studies show that healing with the help of PRF is faster with higher quality. [11,12]. PRF is considered to be more superior in relation to other platel concentrates, such as PRP, due to its simplicity and economic justifed (with no use of beef thrombin and other chemical modifiers), and also in relation to other surgical techniques (in which autotransplants are used) since it avoids the secondary operational field (donor area). Due to its advantages, PRF is a regenerative material which has taken a leading role in periodontology, oral surgery, implantology. Recently, it is used in combination with orthodontic treatment [13]. Each orthodontic intervention has periodontal dimension: orthodontic biomechanics and therapy plan are determined by periodontal factors such as length and shape of a tooth root, length and width of alveolar bone and gingiva structure [14]. Therefore, almost everyday application of PRF in periodontology has an important influence on orthodontics therapy, especially at adult patients.

Apart from PRF in periodontal surgery and therefore in orthodontics, collagen membrane can be used. They can be resorbing and non-resorbing. In practice, the former is used more. It is not necessary to pull out resorbing membranes after they are put in, which eases discomfort, eliminates unnecessary surgical complications and lowers costs for patients. Due to membrane features, their decomposition cannot be thoroughly monitored. Decomposing starts immediately after it is placed in tissue. The speed of decomposing can vary, especially if the membranes used are decomposing by enzymes such as collagen. Desirable period of membrane persistence in vivo ranges from 4 weeks to several months [19]. Resorbing membranes are divided into biological and synthetic.

Apart from collagen membranes, factors of growth and cell mediators regulating cell activities such as proliferation and migration, can be used. They perform locally and in low concentration. They are connected to membrane receptors of high affinity and they activate cell mechanisms in that way. Bone morphogenetic proteins are a group of proteins belonging to a group of transforming factors of growth. Mentioned factors can stimulate bones, cartilage, and cementogenesis as well. It is considered that they stimulate cells not only in the remaining periodontal ligament but also in the rest tissues, lobes for example [20].

Contemporary lifestyle demands faster orthodontic treatment; therefore a time of orthodontic therapy should be shortened. Since the main obstacle in faster teeth movement is cortical bone, the way of overcoming this obstacle is by surgical-orthodontic treatment and cortectomy, respectively.

Brothers Wilcko (periodontist and orthodontist) presented (in 2001) new technique surgically supported tooth movement. Their method combines classical cortectomy/osteotomy of alveolar bone with usage of bone transplant to maintain or increase the thickness of cortical plaque, in which teeth movement occurs.

Their method is called “Periodontally Accelerated Osteogenic Orthodontic or PAOO." Advantages which

this method brought are numerous: fast teeth movement, a short period of therapy, less resorption of root increased booming, accelerated traction of impacted teeth, the robustness of periodontal tissue and post-orthodontic stability [17].

Francisco Munoz et all made an interesting study in which he applied Leukocyte-Platelet Rich Fibrin (L-PRF) (with the previously described method of orthodontic therapy (PAOO)), after which he monitored clinical effects on swelling and pain of the patients.

This study concluded that application of L-PRF with PAOO method of orthodontic teeth movement has multiple advantages. Those are: reduce of postoperative inflammation, pain, and risk of infection and no adverse influence on teeth movement. This is very significant since the usage of common analgesic and non-steroid anti-inflammatory medicines influence negatively teeth movement [17]. Therefore, L-PRF is used as an alternative for these drugs, which inhibit orthodontic teeth movement.

The peak of regenerative therapy application in dentistry is teeth transplant, either from a donor or from artificially produced tooth in biomedical conditions. The progress of medicine is present in dentistry as well.

Japanese scientists demonstrated successful transplantation of biomedical raised tooth in a region of missing lower molar in *vivo* conditions in 4 weeks old mice. The tooth was implanted together with periodontal ligament and alveolar bone and was put into function [18].

This is the first study presented evidence of regeneration of the whole organ through transplantation of biomedical produced tooth. In this comprehensive study conducted by Masamitsu Oshima et all(2011.god) orthodontic force on transplanted tooth was applied, testing its periodontal ligament and their response is mechanic stress. Results of this study showed that applied force caused bone remodeling and concentration of osteoclast and osteoblast and during experimental teeth movement is increased also. Authors, in this way, proved the function of periodontal ligament of a new transplanted tooth [18].

Conclusion

We can conclude that regenerative therapy in orthodontics has the following performances**:** stimulates creation of osteoblast and osteogenesis thus easing the orthodontic treatment, increasing production of new bone, increasing number of osteoblasts and the blood supply of inter-premaxillary suture in widening palate, decreasing root resorption of moved tooth, shortening the time of adverse effects of orthodontic therapy and giving the possibility of transplant of biomedically produced tooth and adequate response to applied force of transplanted tooth.

Significant progress in this area, however, opens ethical issues, considering numerous experiments, which in the hands of immoral scientists, can be extreme.

Combination of orthodontic and regenerative therapy can solve complex clinical problems and significantly improve bone formatting.

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TITLE: **INTRODUCTION TO DENTISTRY WITH HISTORY OF DENTISTRY AND ETHICS**

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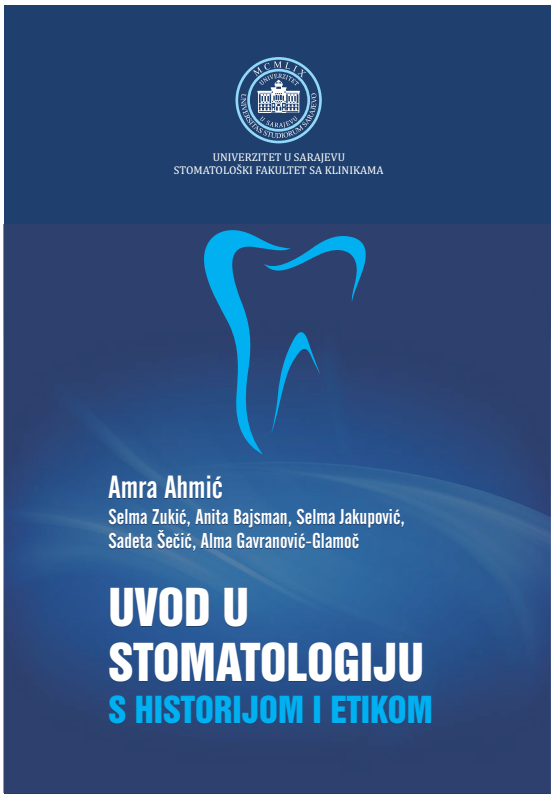

The book "Introduction to Dentistry with History of Dentistry and Ethics" is written in clear way through three parts, each of which represents a separate entity for itself.

The first part representing an introduction to dentistry, provides the information on dentistry as a science and profession, as well as the oral health in the context of general health including the tasks and duties of the dental doctor in accordance to contemporary world and the European doctrine. The book describes the organization of dental medicine study, motivation for this study with methods of learning. It explains the opportunities for professional development upon graduation with a description of specializations in dentistry. Dental team importance as well as the workplace of the dentist are following. An important part of this chapter is dedicated to the risks in dentistry, their prevention and ways of dealing with the consequences, with special emphasis on professional dental diseases.

The second chapter is dedicated to development of dentistry as a branch of medicine. Chronologically, through certain periods and cultures, it describes developmental path of dentistry from prehistory to modern times. A special sub-chapter emphasizes the development of medicine and dentistry in Bosnia and Herzegovina from ancient times, through the monastic medicine and the Ottoman period to the independent and sovereign Bosnia and Herzegovina. The specifics of this textbook, among others, is the subsection representing interesting facts regarding the development of dentistry.

The third part of this book is dedicated to ethics in medicine and dentistry. In addition to the definitions of general concepts in medical ethics, bioethics and deontology, ethical principles and the duties of dentists for the community, colleagues and patients are described. Part of the chapter is dedicated to the Hippocratic Oath, declarations and resolutions on which modern medical ethics lies. Very important are parts of this chapter dealing with the informed consent of the patient, professional confidentiality, medical error and ethical dilemmas in dental practice.

Therefore, this textbook can be recommended to students of dentistry as well as young doctors of dental medicine who want to enrich and expand their knowledge in the history of dentistry and ethics.

6th DENTAL CONGRESS OF BOSNIA AND HERZEGOVINA WITH INTERNATIONAL PARTICIPATION

MOSTAR, BOSNIA AND HERZEGOVINA - 7th AND 8th JUNE 2019

ORAL PRESENTATIONS

TEETH WHITENING

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Introduction: Teeth whitening is one of the most popular procedures in cosmetic dentistry today, and its popularity is rising. The materials used for teeth whitening remove stains and discolorations from the teeth surface. Bleaching can be achieved in practice by a professional person or at home.

Elaboration: Teeth are whitened to remove the effects of coffee, cigarettes and other substance that permanently stain or discolor teeth. Medications such as antibiotics like tetracycline may discolor teeth. Furthermore, aging also causes teeth to loose their bright color. The natural shade of teeth is best considered as such an off-white, bone-color rather than pure white. Public opinion of what is normal teeth shade tends to be distorted. Portrayals of cosmetically enhanced teeth are common in the media. In one report, the most common tooth shade in the general population ranged from A1 to A3 on the VITA classical shade guide.

Whitening methods include: in-office bleaching (applied by a dental professional), treatments which the individual carries out at home (but supplied and guided by a dental professional), and at home methods (without dental professional guidance).

Conclusion: Teeth whitening is a method of restoring the natural tooth color, or whitening of an existing tooth color. Substance mostly used for teeth whitening is carbamide- peroxide or hydrogen-peroxide. There are theories that carbamide-peroxide is less effective than hydrogen- peroxide, but it also has fewer side effects. Common side effects of teeth whitening are increased tooth sensitivity and irritation of gums.

Keywords: teeth whitening; hydrogen peroxide; postoperative tooth sensitivity

EFFECTS OF LED LIGHT QUALITY ON HARDNESS AND DEPTH OF POLYMERISATION OF COMPOSITE RESINS

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Purpose: The aim of this study was to evaluate the effect of light intensity, exposure time and distance of curing tip, on mechanical properties of composites.

Materials and methods: Specimens made of one composite material (Tetric Evo Ceram-Ivoclar Vivadent AG, Schaan, Lichtenstein/shade A2) are polymerized with 12 polymerization protocols, made of three different light intensities (Quartz–tungsten-halogen (QTH 300 mW/cm^2; LED 650 mW/cm^2; LED 1100 mW/cm^2), two exposure times (20 and 40 seconds) and two distances of curing tip (0 and 8 mm). Vickers microhardness of top (VMH-T) and bottom (VMH-B) surface and depth of cure (DC) were measured.

Results: Extending of exposure time produced a significant rise of VMH-B (P<0,004; P<0,051) and DC (P<0,009). Light-intensity did not have significant influence on VMH-B and DC. Distance of 8 mm had a significant influence on reduction of VMH-B (P<0,024), DC (P<0,01, P<0,014). At distance of 0 mm the best polymerization effect was registered with ligh-intensity 650 mW/cm^2, at duration of 40 seconds. At distance of 8 mm, higher intensity produced better mechanical properties, but the differences were not significant.

Conclusion: Exposure time and distance are more important factors of light polymerization than light-intensity. Light with high intesity at distance 0 mm, can generate huge amount of heat that can damage a pulp.

Keywords: dental composites, polymerisation light, microhardness, depth of cure

DIFFERENCES IN PRESENCE OF ORAL CANDIDA ALBICANS BETWEEN HEALTHY CHILDREN AND CHILDREN AFFECTED BY DIABETES MELLITUS TYPE 1

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Goal of the research was to determine the differences of frequently Candida albicans has occurred in oral cavity of children affected by diabetes mellitus type 1 and healthy children.

Material and method: 90 examinees were introduced into research, schoolchildren aging 12-18 living in area of the Sarajevo Canton. Experimental group consisted of 60 examinees who were diagnosed with DMT1.This group was divided into two subgroups: 1A with 30 participants who have controlled HbA1c and B1 with 30 participants who have increased value of HbA1c.Boundary value of HbA1c was 6.8% for participants of the subgroup 1A, and for participants of the subgroup 1B was higher than 6.8%. In controlled group, healthy examinees were involved. Sample for microbiological analysis was taken from labial and buccal mucosa by energetic moves and sterile smear, which were transported into the laboratory within two hours. Homogenization was done in Vortex mixer in the duration of 30 seconds and semination on Sabouraud agar. Examination of the presence of porcelain white colonies of Candida albicans was done after aerobic incubation, which lasted 48 hours.

Results: In the group consisted of diagnosed participants higher percentage of Candida albicans presence was determined (60.0%). In the group of healthy participants 43.3% of the same was determined. Rate of Candida albicans among examinees with well metabolic control of HbA1c is 46.7%, while the percentage among examinees with poor metabolic control is higher, 73.3%.

Conclusion: Difference in the presence of Candida albicans between healthy participants and those with well metabolic control is insignificant, while the difference among participants with poor metabolic control is much greater.

Keywords: Diabetes mellitus, metabolic control, Candida albicans

WASHING AND BRUSHING YOUR TEETH – A HABIT OR A COMMITMENT

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Introduction: Oral hygiene/washing and brushing teeth/ is one of the preconditions for clean and healthy oral cavity. Without oral health there is no healthy population.With preventive programs we need to try and raise the awareness of our litttle ones about the importance of oral hygiene.

Materials and methods: Children from 5th – 9th grades of "Rešad Kadić" Elementary School from Tešanj were included into the analysis. With the questionnaire, we wanted to get answers on some questions which would help us to make certain conclusions regarding brushing and washing of teeth and to help parents regarding this.

Working results: The survey covered all children from the 5th – 9th grades of the School mentioned above. In total of 197, 103 were boys and 94 girls.The survey showed that all children have own toothbrushes, that they most commonly brush their teeth in the morning and in the evening, that they like candy and chocolate most of all the sweets, that most of them wash their teeth without the presence of parents, that almost all of them visited a dentist at least once and that they dedicate time to the hygiene of the mouth and teeth even more, as their mouth and teeth mirror their health.

Conclusion: Attending educative lectures, socializing with children and pointing out the flaws

that children have related to hygiene of the mouth and teeth, as more as possible.

Keywords: Children, brushing and washing teeth, survey.

MULTIDISCIPLINARY CO-OPERATION IN ORTHODONTHICS

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Introduction: Orthodontics is a field of dental medicine dealing with rectification of the wrong position of the tooth and the relationship between the jaw during growth and development, and later during life. It implies the co-operation of several doctors, specialists and subspecialists in various fields, as today, only team work can provide superior service to the patient. Contemporary dentistry, precisely through multidisciplinary approaches to each patient, adequately responds to the patient's demands for the ideal aesthetics. Based this, the aim of the paper was to determine whether there is a need for multidisciplinary co-operation in orthodontics and whether the intensity of need for co-operation is the same in all areas of dental surgery due to the patient's demands for ideal aesthetics.

Material and Method: The survey method is used for the research, and 29 private practices were surveyed. The collected data were processed using descriptive statistics methods, and hypotheses were tested with a Chi-squared test. The survey consisted from two parts. The first part contains general data, while the second part contains questions on which multidisciplinary co-operation in orthodontics can be determined. The survey contains a total of 21 questions.

Results: Research showed that there is real need for multidisciplinary co-operation in orthodontics. In addition, it has been established that the intensity of need for co-operation is not the same within all areas of dentistry. The most common reasons for visiting the orthodontist are actually aesthetic reasons, and far less functional reasons.

Conclusion: After surveying and processing data from the survey it can be seen that there is a need for multidisciplinary co-operation in orthodontics to meet the patient's demands for a better aesthetic and functional appearance.

Keywords: Multidisciplinary co-operation, orthodontics, prosthetics, periodontology, oral surgery.

INTERLEUKIN-6 IN SALIVA OF PATIENTS WITH CHRONIC AND AGGRESSIVE PARODONTITIS

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Introduction: IL-6 as a biomarker has a great potential as a diagnostic parameter for diagnosis and monitoring of periodontal disease activity. Goal is to determine the reliability of this method for determining the value of IL-6 in saliva of patients with periodontal disease.

Materials and methods: Study involved 20 patients diagnosed with chronic parodontitis and 20 patients diagnosed with aggressive periodontitis. Diagnosis of the disease was based on: anamnesis, clinical examination and rtg of orthopantomographic analysis of the image (OPG). Inclusion criteria included subjects aging 18-50 not been periodontologically treated before. Excluding criteria were the existence of systemic illnesses, the use of antiseptics and antimicrobics. All saliva samples were analyzed using Salimetrics 1-3602-Interleukin-6 Salivary Immunoassay Kit by Salimetrics, USA.

Results: The mean value of interleukin-6 in patients with chronic parodontitis is 16.17 ± 2.9565 pg / ml and in patients with aggressive periodontitis 33.2725 ± 18.6037 pg / ml. There is a statistically significant difference in IL-6 values of the two groups ($p = 0.04098$, $p < 0.05$).

Conclusion: Level of IL-6 in saliva can give us significant data on the presence, form and severity of the periodontal disease.

Key words: interleukin-6, salivary, periodontitis, biomarker.

RELATIONSHIP BETWEEN DENTAL AND SKELETAL MATURATION OF CHILDREN IN BOSNIA AND HERZEGOVINA

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Introduction: The objective of this study is to determine the relationship between dental calcification stages, skeletal maturation and chronological age of children in Bosnia and Herzegovina.

Material and methods: Panoramic and cephalometric radiographs of 102 patients (49 male and 53 female) between 7 and 14 years old were evaluated using Demirijan method for dental age assessment and Baccetti method for skeletal age assessment. Stages of tooth calcification were evaluated for incisives, canine, premolars, first and second molar in left mandibular quadrant. Cervical vertebrae calcification was evaluated for the Baccetti method. The relationship between the stages were assessed using Spearman's correlation coefficient.

Results: Dental calcification stages showed positive and statistically significant correlations with vertebrae maturation stages (r = 0,316). The highest correlation was between the mandibular left canine with vertebrae maturation stages (r = 0,529) and the lowest correlation was between the mandibular left first molar with vertebrae maturation stages (r = 0,002).

Conclusion: Positive relationship between dental calcification stages in manibular left quadrant and skeletal maturation stages by cervical vertebrae methods in the sample studied.

Keywords: Dental calcification, Skeletal maturation

LOCAL APPLICATIONS OF CORTICOSTEROIDS IN THE TREATMENT OF EROSIVE-ULCEROUS LICHEN PLANUS

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Introduction: Lichen planus is a mucocutaneous disease, which cause is still not clearly defined. Often, the cause of LP is inherited, some immunopatolgical reactions which result is damage to the plate-layered epithelium. In connection with the formation at LP some infections are involved as the reaction to amalgam fillings and unwanted effect of drugs. Clinically, several different forms of LP can be observed in the oral cavity: reticulons papulose, erosive-ulcerous, atrophic, bullous, and plaque-shaped and lichenoidal changes on the gingival within desquamative gingivitis.

Materials and methods: Patient(42) systemically healthy, denies taking a medication, food allergy non-essential appeared for an checkup of the onset of "wounds" on the mucosae membranes of the cheek and the tongue sometimes scratching and occasionally hurting. She noticed the changes more than a year ago and she was treated in another institution on several occasions, which did not lead to significant bacterial improvement. The review of the membrane mucous of the lips, the symmetrical changes in the mucous membranes of the cheek and tongue corresponding to the erosive ulcerous form of LP are noticed. In therapy we used local application of corticosteroids.

Results: The work will show the appearance of oral mucosa membranes at the beginning, after 15-30 days, as well as 6 months after the performed therapy.

Conclusion: Local application of corticosteroids some-times in a short time period leads to transition of erosive ulcerous form LP to asymptomatis reticular form.

Keywords: Erosive-ulcerous LP, therapy

IN VITRO EVALUATION OF MINERAL TRIOXIDE AGGREGATE SEALING ABILITY AS ROOT-END FILLING MATERIAL

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Introduction: Selecting the most efficient material and proper retrograde cavity preparation are the key elements in successful endodontic surgery. The aim of this study was to evaluate apical micro leakage of mineral trioxide aggregate (MTA) as root-end filling material after ultrasonic retro-preparation technique.

Materials and methods: Twenty extracted single-rooted human teeth with one canal and fully developed apices were included in this study. The teeth were sectioned at a cementoenamel junction in order to standardize the length of the samples. The root canals were instrumented with Mtwo rotary system (VDW, Germany) and obdurated with gutta-percha and Endoplus sealer (President Dental, Germany) using the lateral condensation technique. Root-end resection was performed apically at 90° angle axis to the long axis of the root, removing 3 mm of the apex. Retro-cavities were prepared by piezo-tips and filled with Rootdent MTA (TehnoDent, Russia). Samples were then immersed in an Indian ink for seven days, decalcified and rendered clear using methyl-salicylate. The dye penetration was assessed using stereomicroscope at 10x magnifications.

Results and conclusions: The results showed a minimal degree of apical micro leakage after sealing of retro-cavities with mineral trioxide aggregate. Considering sealing ability, mineral trioxide aggregate was estimated as desirable root-end filling material.

Keywords: Root end filling, MTA, micro leakage, ultrasonic retropreparation

USE OF DENTAL IMPLANTS IN CREATING CONDITIONS FOR EPITHESIS

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The challenges in maxillofacial surgery are increasing in the area of reconstruction of post-traumatic defects. Defects create aesthetic and functional disorders and in that way affect the quality of life of patients. One way to overcome this is to create epithesis covering defects in order to compensate the missing tissue. In the fixation of the epithesis, one of the newer methods is the use of dental implants that have a wider application in reconstructive surgery and thus successfully respond to the functional and aesthetic requirements of patients.

The aim of this study was to evaluate the use of dental implants on the orbital floor in the zygomatic bone, as well as in the frontal sinus zone with the elevation of the frontal sinus floor and the synoptic cavity augmentation, which allows the application of an epithesis in orbit.

Keywords: dental implants, epithesis, orbital defects.

PREVENTION AND TREATMENT OF PERIIMPLANTITIS USING LOW WAVELENGTH LASERS

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The success of osteointegration to dental implants may be impaired by peri-implantative diseases, peri-implant mucositis as reversible and peri-implantitis as an irreversible change. Periimplantitis is an overwhelming problem causes a loss of connective tissue-related implant that leads to the loss of the dental implant. It is presented as inflammation of the supporting tissue around the implant.

Photodynamic therapy is a method of eliminating bacterial, viral and fungal infections. The method is based on the principle of activation of photoactive substance (photosensitizer), a low-wavelength laser (630 nm-700 nm) in the presence of oxygen. Laser light leads to the formation of free radicals and free oxygen, causing photochemical damage and death of the cell. The aim of this study was to reduce the possi-

bility of the presence of pathogenic microorganisms using low wavelength lasers, as well as treatment after the first signs of periiplantantis appeared.

Keywords: periimplantitis, photodynamic therapy, low wavelength laser

FREQUENCY AND TREATMENT OF LOWER JAW COLLUM FRACTURE

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The lower jaw is the most stressed and only mobile bone of the skeleton of the face, thus being mostly exposed to injuries. After the nasal bones, the bone of the maxillofacial region is most often injured, and it is among the ten most common bone fragments of the human organism. (1.2.) The lower jaw and other bone fractures and facial bones are more and more common, more difficult and more complicated. They are often associated with CNS injuriesor appear within a politrauma.We have formulated the aims of the research on the basis of clinical observations that we have aknowledged in many years of practice, as follows: determine the incidence of injuries in relation to gender, determine the most common ethiological factors of the occurrence of a fracture of the lower jaw collum, determine the therapeutic options for neck fracture (conservative or surgical).

Keywords: lower jaw collum fracture, incidence of injuries, treatment

RICHMOND CROWN ON TWO ROOTS OF THE TOOTH

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Dental office "Dental Implant"

Introduction: Some methods and materials have been suppressed because they have functional or aesthetic flaws. By developing material, we have been enabled to return some methods to practice again. Richmond crown has many stages of development from the beginning to the present. The latest achievements in the field of materials made it possible for the Richmond crown to be whole of the zircon.

Case Report: Patient S.P. at the age of 48. He appeared on the recommendation of a colleague from another office as the tooth 47 was extracted. After a detailed examination of the RA x-ray picture and the clinical examination of the patient, we suggested endodontic therapy and Richmond crown. The patient agrees with the proposed therapy. At single-visit, endodontic treatment was performed. During the next visit, the roots of the tooth were prepared as for the cast upgrade, placed a soaked thread with a retraction solution into the gingival sulcus and a single-phase impression with addition silicones. Tooth was sealed with temporary filling. In the following visit, temporary filling was removed. Richmond crown was placed and a tooth and a crown prepared for cementing. It was cemented with glass-ionomer cement.

Conclusion: Indications and contra-indications should be well understood and from each case it should be made the maximum.

Keywords: zircon Richmond crown

IMMEDIATE IMPLANT PLACEMENT

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Immediate implant placement accounts for the procedure of placing implants into the extraction sockets immediately after tooth extraction. With this procedure we successfully manage the time between tooth loss and make of dental prostheses. This solution is more acceptable for the patients for aesthetic and functional reasons. The advantages of this procedure include fewer surgical interventions

and reduction in overall treatment time. Moreover, the procedure includes both tooth extraction and immediate implant placement; therefore, dental implant offers the most long-term solution for replacement of missing teeth with high average life expectancy, providing the patient with the best sense of security and well-being. Consequently, it prevents bone resorption as well as its loss (40% - 60%). Additionally, there are some indications for immediate implant placement such as tooth extraction due to trauma, internal and external tooth resorption, advanced periodontal disease, or endodontic treatment failure. Nevertheless, immediate implant placement has its own disadvantages illustrated in preparation of extraction sockets, necessary bone augmentation, and soft tissue coverage. Finally, according to previous studies, immediate implant placement has a success rate of over 95%. Therefore this study is to describe the procedure of immediate implant placement with immediate loading of implants by immediate restorations.

Keywords: immediate implant placement, immediate restoration

POSTER PRESENTATIONS

PROBIOTICS AS AN ADJUNCTIVE TO NON-SURGICAL PERIODONTAL THERAPY OF CHRONIC PERIODONTITIS

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Background & Aim: Probiotics are living microorganisms, principally bacteria, which provide beneficial effects for the host when administered in proper quantities. Possible mechanisms of probiotics' action in periodontal disease are based on modifications of the pathogenic potential of bacterial biofilm. The aim of this study was to assess the clinical effect of the administration of Bifidobacterium and Lactobacillus probiotic lozenges, as an adjuvant to scaling and root planning (SRP) in the treatment of initial to moderate chronic periodontitis.

Materials and Methods: Twenty patients with initial to moderate chronic periodontitis were recruited and monitored clinically at baseline (before SRP) and 30 days following SRP. All patients were randomly assigned to group I (experimental group): SRP + probiotic (n=10) and group II (control group): SRP only (n=10). The probiotic lozenges were used once a day for 30 days. Clinical parameters, the probing pocket depth and clinical attachment level were measured on baseline and 30th day following SRP. The data were statistically analyzed.

Results: The results show that there is no difference in the values of probing pocket depth and a clinical attachment gain between experimental and control group.

Conclusion: Based on the results of this work, the effectiveness of probiotics on the treatment of periodontal diseases is questionable. There is currently insufficient evidence demonstrating the benefits of systematic use of probiotics in patients with periodontal diseases.

Keywords: periodontitis, scaling and root planning, probiotics

INTERLEUKIN-6 AS A MEDIATOR OF INFLAMMATION IN SALIVA OF PATIENTS WITH WITH CHRONIC PERIODONTITIS

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Introduction: Goal is to make a correlation of IL-6 values in saliva of patients with chronic periodontitis and control group and determine the reliability of IL-6 value determination in saliva as an inflammatory mediator in patients with chronic periodontitis.

Materials and Methods: Study included 20 patients diagnosed with chronic periodontitis and 20 healthy

persons in control group. Inclusion criteria included subjects aging 18-50 years that have not been periodontologically treated before. Excluding criteria were the existence of systemic illnesses, the use of antiseptics and antimicrobics. Samples were analyzed using Salimetrics 1-3602-Interleukin-6 Salivary Immunoassay Kit by Salimetrics, USA.

Results: The mean value of interleukin-6 in patients with chronic periodontitis was 16.17 ± 2.9565 pg / ml. In the control group, the mean value of interleukin-6 was 2.376 ± 2.8167pg / ml. We have shown that in patients with chronic periodontitis there is a statistically significant correlation of interleukin-6 values in saliva and papilla bleeding index (PBI) samples.

Conclusion: Although the average IL-6 value in patients with chronic periodontitis was higher than in the control group, new studies are needed to establish accurate IL-6 potential as a biomarker for easier periodontal disease monitoring.

Keywords: interleukin, saliva, periodontitis, inflammation.

MULTIDISCIPLINARY SURGICAL TREATMENT OF COMPLICATED PERIODONTAL - PERIAPICAL LESIONS

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Introduction: In patients with complicated periodontal-periapical lesions, multidisciplinary surgical approach is necessary in treatment. Surgical therapy is the ultimate method of treating periapical lesions which appear after pulpal necrosis. In the case of advanced periodontitis with deep intrabony defects, surgical therapy is the most effective treatment method. The application of bone graft and collagen membrane provides good treatment results in order to compensate for lost alveolar bone.

The aim of this case report is to present a modern multidisciplinary approach to the treatment of complicated periodontal - periapical lesion.

Materials and methods: In this case report we will present a treatment of complicated periodontal - periapical lesion: anamnestic - diagnostic procedure, surgical procedure with the use of bone graft and collagen membrane, and postoperative treatment outcome one and three months later.

Discussion: Numerous literature data report the success of alveolar bone's regeneration by the use of bone grafts and membrane in patients with periodontitis. We did not find available literature data regarding surgical treatment of complicated periodontal-periapical lesions with the use of bone regeneration materials. Our case report provides insight into the new therapeutic method of treating such cases.

Conclusion: The results of this case confirm the knowledge of the efficacy of using bone grafts and membrane in order to improve alveolar bone healing and reduce postoperative discomfort. This method is a successful in regenerative treatment of complex periodontal-periapical lesions.

Keywords: periodontal-periapical lesion, surgical treatment, bone graft and collagen membrane

SIGNIFICANCE OF SOFT TISSUE MANAGEMENT IN PROSTHETIC REHABILITATION

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Introduction: Prosthetic rehabilitation means the preservation and re-establishment of orofacial system functions, appropriate occlusal and articular relationships and optimal aesthetic results. Aesthetic outcome of prosthetic restauration depends on the interaction between soft tissues and teeth crowns,

regardless to what a natural tooth is, bridge or implant.

In order to correct or eliminate anatomical, developmental, traumatic defects or defects of gingiva, oral mucosa and alveolar bone caused by diseases, required treatments are part of mucogingival surgery, today also known as periodontal plastic surgery. One of those treatments is the clinical extension of dental crown (engl. Clinical crown lengthening - CCL). Clinical crown lengthening is one of the therapeutic procedures that ensures the extension of the dental crown and healthy periodontal tissue and biological width in the same time. This could be achieved by gingivectomy with gingivoplasty, reconstructing the alveolar bone by osteoplasty or apically retiring flap with reconstructing of the bone.

Aim: In this case report we will present a patient who came to the Department of Prosthodontics to replace dental crowns in the area of the upper incisors. We will present a periodontal surgical treatment-clinical crown lengthening and prosthetic treatment with the aim of finally functional and aesthetic rehabilitation of the patient.

Conclusion: Soft tissue management, before making prosthetic dental substitution in oral cavity, sometimes is imperative in achieving optimal aesthetic and functional results, whereby the cooperation of multiple different specialists is necessary.

Keywords: functional-aesthetic prosthetic rehabilitation, clinical extension of tooth crown

GINGIVITIS AND GINGIVAL HYPERPLASIA IN PATIENTS DURING FIXED ORTHODONTIC TREATMENT, A CASE-CONTROL STUDY

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Introduction: Periodontal diseases affect one or more periodontal tissues. Although there are many different diseases affecting the aforementioned tissues, the most common ones are plaque-induced inflammatory conditions such as gingivitis and periodontitis. Bacteria-induced gingiva inflammation is the most common form of gingivitis. It is known that maintaining good oral hygiene during fixed orthodontic treatment is more difficult and requires additional effort. Structural elements of the fixed orthodontic appliances present a predilection site for dental plaque retention.

Aim: To indicate that oral hygiene maintenance, made more difficult during fixed orthodontic treatment, results in inflammatory modifications of the gingiva.

Material and methods: Sixty students of the fourth, fifth and sixth year of the Faculty of Dentistry in Sarajevo will participate in the study. The students will be divided into two groups: 30 students currently undergoing fixed orthodontic treatment and 30 students who are not orthodontic patients. All subjects are healthy and non-smokers. The subjects will be scheduled for one appointment and will get periodontal

Results: The obtained results will be statistically analyzed and discussed to the results obtained by other authors.

Keywords: fixed orthodontic treatment, gingivitis, gingival hyperplasia

THE EFFECTIVENESS OF LASER THERAPY IN A TREATMENT OF DENTINAL HYPERSENSITIVITY: A SYSTEMATIC REVIEW

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Introduction: Dentine hypersensitivity is a common clinical symptom in dental practice.

It is defined as a specific acute, sharp pain arising from the exposed dentine, most commonly in response to thermal, tactile, chemical and osmotic stimuli which cannot be qualified as any other type of dental pathology. The therapy uses various impregnating agents, toothpaste, gels, solution, and laser therapy.

The Aim of this review was to compare the effectiveness of laser application in resolving dentin hypersensitivity among different desensitizing treatments.

Materials and methods: the research was done using search engines PubMed and Google Scholar. The keywords were: laser therapy and dentinal hypersensitivity. Selected articles are written in the period 2009-2019. The articles were divided into three groups: dentinal hypersensitivity after bleaching, after periodontology treatment and unknown etiology. Inclusive criteria were: in all three categories we have works that show results of dentine sensitivity treatment using lasers.

New technologies in dentistry, as well as more demanding patients, have brought about to an application of new treatment in order to improve the quality of our patient's life.

The results will give a brief overview of the effectiveness of the treatment of dentine sensitivity with a laser in relation to various impregnating agents.

Keywords: laser therapy, dentinal hypersensitivity.

CORONALLY ADVANCED FLAP FOR MENAGMENT OF GINGIVAL RECESSION DEFECTS - CASE REPORT

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Introduction: Gingival recession is defined as exposure of root surfaces due to apical migration of the marginal gingival. Causes of gingival recession are: alveolar bone morphology, aberrant frenal pull, anatomical factors include abnormal tooth position in the arch, improper tooth brushing, minimal attached gingiva, poor prosthetic and orthodontic treatment. If untreated, gingival recession may progress to the point that it can compromise the prognosis of the tooth in question. Treatment of recession can be conservative and surgical. Surgical therapy as part of muco-gingival plastic surgery implies completely covering of defect. There have been a number of treatment modalities for managing gingival recession such as coronary or laterally advanced flap, double papilla flap, and free epithelial or sub-epithelial graft procedures.

Material and methodes: In this case report we will present a patient who came to the Department of Periodontology and oral medicine with diagnosis of chronic gingivitis and gingival recession in relation to 23 (Miller`s class I). Oral hygiene instructions were given. Routine periodontal therapy, including scaling and root planning, medical therapy and surgical therapy were done. Root coverage was done with coronary advanced flap without guided tissue regeneration.

Results: After a month, clinical parameters showed successful coverage of gingival recession.

Conclusion: Successful treatment of gingival recession depends on several factors: patient`s corporation and motivation, correct indication, choosing the appropriate operating technique and correctly performed surgical procedure.

Keywords: gingival recession, mucogingival surgery, coronally advanced flap

SUCCESSFUL TREATMENT OF A COMBINED PERIODONTAL AND ENDODONTIC LESION WITH EXCESSIVE ROOT CANAL PERFORATION

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To achieve the best treatment outcome for a combined endo-perio lesion, the elimination of both disease processes should be obtained. Inappropriate cavity preparation can lead to cervical, lateral or furcation pulp chamber perforation, which can generate dissemination of inflammation on periodontium and developing consecutive endo-perio lesion.

The aim of this case report was to present the case of the successful interdisciplinary treatment of endo-perio lesion with an excessive cervical root perforation of lower right second premolar.

In this case report 35-year-old patient reported to the Clinic of Oral Medicine and Periodontology Faculty of Dentistry with a main complain of periodic discharge of pus from the periodontal pocket in lower second right premolar.

Radiographs displayed a localized vertical bone loss involving tooth 45 displaying unsuccessful root canal treatment with coronal root perforation.

The therapy included endodontic retreatment, root perforation sealing, initial periodontal therapy, and periodontal flap surgery with the use of bone graft.

Conclusion: A combined periodontal and endodontic lesion represents a certain clinical challenge. Successful treatment outcomes for any periodontal and/or endodontic lesion depends on correct diagnosis and timely implementation of appropriate therapies.

Keywords: Endo-Perio Lesion, Iatrogenic Root Perforation, Chronic Periodontitis, Fausse Route, Endodontic Retreatment

THE ROLE OF RADIOMORPHOMETRIC AND QUALITATIVE BONE INDICES IN THE DIAGNOSIS OF OSTEOPOROSIS

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Introduction: For evaluation of mandibular bone quality it could be used radio-morphometric and qualitative bone indices, which are assessed on dental panoramic radiographs. These indices are: mandibular cortical index MCI, the inferior mandibular cortex width (Mental Index, Antegonion Index and Gonion Index) and panoramic mandibular index PMI. These indices can be relatively easy observed on radiographs and they require no specialized facilities.

The aim of this study was to evaluate the role of radio-morphometric and qualitative indices in the diagnosis of osteoporosis and to familiarize the dentist about the significance of these indices.

Materials and methods: Available literature, which includes studies about the relationship between low bone mineral density and indices that can be detected on panoramic radiographs, has been analyzed.

Conclusion: Based on collected research results, we can conclude that certain values of radio-morphometric and qualitative indices may indicate the need to refer the patient to DXA (Dual Energy X-ray Absorption) to measure bone mineral density.

Keywords: radio-morphometric indices, qualitative bone indices, osteoporosis

ANTIPARKINSONIAN AND ANTICONVULSANT DRUGS AS POSSIBLE ETIOLOGICAL FACTOR IN THE EMERGENCE OF ORAL CANDIDIASIS

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Introduction: Oral candidiasis is an opportunistic infection caused by fungus from the genus Candida. Candida albicans is the most pathogenic species selectively pathologically adhering to the oral mucosa causing oral disease. Candida albicans can be isolated from healthy persons' oral mucosa. Its pathogenicity is a prerequisite for predisposing factors: immunity, endocrine disorders, bacterial infections, long-term systemic medication application.

Material and methods: The patient came to the Clinic of Oral Medicine and Periodontology due to subjective symptoms: dryness, tingling and burning in the oral cavity. She has been treated at the Clinic of Neurology for seventeen years and has been using antiparkinsonian and anticonvulsant drugs. She reported other symptoms related to her problems with ears and eyes for which the diagnoses were

made: Otomycosis billateralis and sy sicca. We will present a complete anamnestic, diagnostic and therapeutic protocol.

Result: By taking smears from the oral mucosa and making the native preparation using a trinocular light microscope, we confirmed the growth of candida albicans.

Conclusion: Long-term use of antiparkinsonian and anticonvulsant drugs is a possible etiological factor in the emergence of oral candidiasis.

Keywords: oral candidiasis, antiparkinsonian drugs, anticonvulsant drugs, native smear

DIASTEMA CLOSURE WITH DIRECT COMPOSITE AND PRECONTURED MATRICES IN PRIMARY HEALTH CARE – CASE REPORT

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Introduction: Diastema in frontal region can present big esthetic problem for our patients. Diastema closure, dental material choice, matrix system choice, rebuilding interproximal surfaces of the tooth, can be a challenge for primary healthcare dentist. Case report represents diastema closure with minimally invasive dentistry using direct dental composite.

Case report: A female patient, 35 years old, presented with 2 mm diastema between upper lateral incisor and canine bothering her since childhood. After intraoral examination and material considerations, freehand esthetic restauration was performed on 22.

Materials and methods: Composite reconstruction was performed using pre-contoured matrix system and Gradia anterior (GC). Tooth preparation was not required. Attention was given to place composite increments for tooth color selection prior stratification.

Conclusion: Freehand sculpting of anterior tooth anatomy using direct composite is challenging for dentists in primary health care. Rebuilding the interproximal surface is extremely difficult to reproduce using traditional direct composite placement techniques.

Most matrices are flat strips that are simply incapable of reproducing such complex anatomic contours. Also, the limited access to the interproximal area with composite finishing burs, abrasive discs, and contouring strips represent extremely difficult to create natural free-flowing anatomic emergence profiles. Satisfied anatomical and esthetical results as alternative to more expensive, complex and demanding prosthetic.

Keywords: diastema closure, direct composite, freehand

ENDOPROSTHETIC REHABILITATION OF COMPLICATED DENTAL TRAUMA - CASE REPORT

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Introduction: Oral trauma involves an injury to the stomatogenic system as a result of the action of different traumatic agents types.
The incidence of oral injury in the world population varies with the geographical area and accounts for about 17% in children and is more common in males. The frequency of dental trauma is from 1% to 3% and decreases with the age of the patient.

Materials and methods: The patient (33) appeared in the Dental Clinic dr. Pinjić, 3 days after motorcycle crash. Clinical examination and RTG analysis revealed tooth extrusion 22, complicated tooth fracture 21, and inadequately endoprosthetically rehabilitated teeth 12 and 11, with periapical processes. The tooth 22 was extracted, and on the teeth 12, 11 and 21, endoprosthetic rehabilitation was initiated. After removing the dental post from teeth 12 and 21, the endo revision was started, and endodontic therapy 11 (tooth with a fistula). The definitive charging was completed 40 days after the first visit, in the fourth visit (MTA, Gutta-percha and AH +). Intercanal dressing was administered twice by "Calcipast + I". Three fiberglass sticks were placed and four zircon-ceramic crowns were made (in the block).

Results: The control shot was done after a definite filling of the channel where there is a reduction of periapical lesions, and the fistula has completely disappeared.

Conclusion: Dental traumas are usually unexpected accidents that, if not treated appropriately, can have serious consequences for the patient's health. Such cases fall into the highest level of urgency in the provision of dental services.

Keywords: dental, trauma, endoprosthetic, rehabilitation

A CASE OF ALOPECIA AREATA ASSOCIATED WITH ENDODONTIC TREATMENT FAILURE

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Introduction: Alopecia areata is an autoimmune disease characterized by a small area of hair loss due to inflammatory reaction directed against hair follicles. The aim of this case report is to present the role of successful endodontic treatment in the therapy of alopecia areata.

Case report: The patient is a 27-year-old male referred from the dermatologist for diagnostic procedures of possible dental infection associated with localized hair loss. According to the patient, the root canal treatment of tooth 24 was performed six months ago by a general dentist. The extra-oral examination revealed an alopecic area of an irregular shape, about 3 cm in diameter, located on the left occipital area. The suspected tooth 24 was slightly sensitive on palpation and percussion. The radiography confirmed the presence of inadequate root canal filling with apical periodontitis. The previous roots filling was removed and intra-canal medication over two weeks period was made. The obturation was performed by the lateral condensation technique, using AH Plus sealer (Dentsply DeTrey, Germany) and gutta-percha points.

Results and conclusions: Six weeks after endodontic retreatment, first signs of clinical improvement have been observed. Close inspection revealed the appearance of new hair follicles at the site of alopecia areata. Bacterial infection related to poorly cleaned and obturated root canals may cause an inflammatory reaction of the host defense cells and consequently induce disease in distanced tissues. In this case, the endodontic retreatment and elimination of root canal infection gave positive results in the therapy of alopecia areata.

Keywords: alopecia areata, root canal treatment, endodontics

TESTING THE LEVEL OF STRESS IN DOCTORS OF DENTAL MEDICINE

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Introduction: Each workplace has potential risk for stress. One of the stressful professions is the profession of doctors of dental medicine. Many stressors lead to dentist's exposure to stress.

The aim of this study is to examine the level of stress in doctors of dental medicine, aging between 25 and 45 years, and to establish whether there are differences in the experience of stress between women and men.

Materials and methods: A total of 105 doctors of dental medicine participated in this investigation, all from the territory of Bosnia and Herzegovina. They all completed the stress questionnaire according to Perceived Stress Scale- PSS 10.

Results: Of the total number of participants (105), the sample consisted of 66 females (63%), and 39 males (37%). The respondents responded to all questions without a significant statistical difference between men and women. The program IBM Statistics SPSS v.21. and descriptive statistics were used for the statistical analysis.

Conclusion: There was no statistically significant difference in the level of stress in men and women doctors of dental medicine.

Keywords: stress, doctors of dental medicine

KNOWLEDGE, ATTITUDES AND PRACTICES OF STUDENTS REGARDING ORAL HEALTH

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Introduction: Monitoring about knowledge, attitude and practices related to oral health are performed with a goal of gathering information about population's oral health habits. This is important for making adequate programmes to promote oral health and for prevention of oral diseases.

Goals of this research were testing the knowledge, attitude and practices of the 1st year students at Faculty of Dentistry and other faculties and finding out if there were any significant differences between their knowledge, opinions and practices and finding out were there any differences between questioned men and women.

Materials and methods: Sample was made of 182 students aging 19-20, out of which 91 were students at Faculty of Dentistry and the other 91 were students of other faculties. Of the total number of examinees, 120 were female and 62 were male. Program package Excel 2010 was used for data processing.

Results show there are statistically significant differences in some aspects of knowledge, opinions and praxes between the students at Faculty of Dentistry and the students at other faculties. This refers to knowledge about fluoride, toothbrush characteristics, whether dental services are expensive, as well as opinions whether the tooth that hurts needs to be extracted or not.

Conclusion: because of a developed awareness of the importance of oral health and better knowledge about prevention, students at Faculty of Dentistry can, in their environment, contribute to promotion of knowledge, opinions and practices related to oral health.

Keywords: oral health, oral hygiene, fluoride.

INGESTION OF ORTHODONTIC APPARATUS - CASE REPORT

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Introduction: Ingestion of a foreign body in dentistry is one of the urgent conditions. The most commonly ingested body in dentistry are endodontic needles, implants, prosthetics, drills and matrices. In the literature it is stated that about 90% of ingested foreign bodies can pass through the gastrointestinal tract, 10% require endoscopic removal, and 1% surgical removal.

Materials and Methods: Patient (15) March 1, 2019 appears in the Dental Clinic Dr. Pinjić, after four months of palate expansion therapy, for "as he implies swallowing the orthodontics appliances". The patient was urgently transferred to the Cantonal hospital "Dr.Safet Mujić", where the native RTG abdomen was made confirming the foreign body ingestion. The patient did not show signs of pneumoperitonum and there were no signs of acute surgical disease. The control shot was performed after 24 h, which found that the foreign body was in the large intestine, after 48 hours, a control footage was re-made to determine that the foreign body moves with normal peristaltic movements without complications.

Results: Due to the multidisciplinary approach, it was decided to supervise the foreign body and did not undertake surgical treatment or esophago gastroduodenoscopy. The foreign body passed through the gastrointestinal tract five days after ingestion as a result of peristaltic movements without complications.

Conclusion: Ingestion of a foreign body during dental treatment is one of the emergency conditions, and urgent and multidisciplinary approach is needed for the treatment.

Keywords: ingestion, orthodontic apparatus, therapy

USE OF PRF (PLATELET-RICH FIBRIN) IN ORAL SURGERY/IMPLANTOLOGY

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Introduction: Prf is an abbreviation for the term platelet rich fibrin which shows a high regenerative potential in the healing of bone and soft tissue. The main ingredient of the product is platelets and leucocytes, platelets with regenerative ability performed by numerous cytokines and growth factors released by cytoplasmic granules by platelet activation. Leukocytes, their main role is immune-regulatory. Bone resorption after tooth extraction is the biggest problem in implantology. In the first year after extraction in the upper jaw about 3mm is resorbed, and in the lower about 5 mm, the most affected is vestibular lamella.

Methods: The study is a clinical, prospective, comparative, randomized and blind study of therapeutic analytical and clinical application, designed as a split-mouth observational study

Results: The study showed a statistically significant reduction of post-operative sequelae (pain, edema, trismus) in the experimental group of patients in which PRF was administered, as compared to the control group of patients for which it was not applied.

Conclusion: The study shows the exceptional results in the treatment of post-extrusion of the wound by the preservation of the alveola. However, the only disadvantage is that besides expensive equipment for doctors during their education they have been trained to take blood from a vein, therefore there are a large number of doctors who avoid this for this simple reason.

THE EXPERIENCES OF VON WILLEBRAND PATIENTS WITH DENTAL INTERVENTIONS

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Introduction: Von Willebrand's disease as an inborn bleeding disorder caused due to lack of, decreased values or dysfunction of von Willebrand's coagulation factor. As a consequence, blood clotting ability is reduced, which is clinically manifested as mucus bleeding, epistaxis, abundant menstrual bleeding and intra-articular and muscles bleeding.

This category of patients faces a problem when they need a dental treatment.

The aim of this paper is to present the experiences of Von Willenbrand patients with dental interventions.

Material and Methods: A questionnaire was conducted among patients with von Willebrand's disease to collect information on the basic characteristics of the disease, as well as the experience of previous dental interventions, and the knowledge of dentists, according to evaluation of the patients. The recent literature on PubMed databases on Von Willebrand disease and the methods of dental care has also been consulted.

The results: Based on the results and guidelines from the literature, a protocol of the dental care for patients with von Willebrand's disease was presented.

Conclusion: Understanding the nature of von Willebrand's disease is the obligation of any dentist who plans to extract the tooth or perform another dental bleeding intervention.

Keywords: von Willebrand, tooth extraction, protocol

ORAL – SURGICAL PROCEDURE, MULTIPLE EXTRACTION IN PATIENTS ON LONG TERM BISPHOSPHONATE THERAPY: A CASE REPORT

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Introduction: Bisphosphonates belong to a group of anti-resorbtive drugs, whose mechanism of action is based on theory of inhibition of osteoclast activities. These drugs are most commonly prescribed in oncological patients with metastatic changes, and in

patients with osteoporosis. Potency of bisphosphonates depends on their route of administration (oral, intravenous). The main adverse effect and complication caused by bisphosphonates is osteonecrosis of the jaw (BIONJ). Biggest risk for emergence of this kind of osteonecrosis are oral-surgical procedures.

Aim: The aim of this report is to present protocol of work and preventive measures taken in patients on long-term bisphosphonate therapy indicated for oral or surgical intervention.

Materials and methods: The paper demonstrates a case of a 76-year-old female patient who is on a long term oral therapy of Fosamax due to osteoporosis. Clinical intraoral examination and analysis of X-rays showed indication for extraction of three teeth (31; 32; 41) with visible periapical lesions. After a single-session extraction following defined protocol antibiotic prophylaxis was administered, autologous transplant (PRF) was applied in bone defect towards achieving quality bone regeneration and epithelialization of tissue.

Result: Oral surgical procedure which included extraction of three teeth and removal of periapical lesion went orderly with minimum postoperative difficulties. Postoperative recovery was monitored through regular clinical and roentgenological examinations.

Conclusion: Oral surgical procedures are considered the riskiest ones for emergence of osteonecrosis of the jaw induced by bisphosphonates. Each patient should be approached with caution with mandatory preventive measures in order to avoid the possibility of this serious complication.

Keywords: bisphosphonates, osteonecrosis of the jaw, PRF, protocol, tooth extraction

USE OF PRF IN ORAL-SURGERY TREATMENT OF SUPERNUMERARY TEETH

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The presence of supernumerary teeth is not frequent, especially if it is not associated with cleidocranial dysplasia, cleft lip palate or syndromes, such as Gardner syndrome. By definition, a supernumerary tooth is one that is additional to the normal series and can be found in any region of the dental arch. This clinical condition is also known as hyperdontia. The supernumerary teeth can be diagnosed by routine clinical or radiologic examination. They are more frequently seen in permanent dentition (0,8-3,6%), than in deciduous dentition (0,3-0,8%). The aethiology of the supernumerary teeth is supported by different theories.

We presented a case of female patient, with a multiple supernumerary teeth in the mandibular praemolar region, that is not associated with syndrome, and its oral-surgical treatment.

In our case the diagnosis of supernumeraries was after they caused problems: pain, resorpion of adjacent teeth, paresthesia and cystic formation. After the consultation with orthodontist, we came to conclusion that the treatment of choice is surgical therapy, using PRF membrane and cylinder in order to achieve socket preservation, and to improve postoperative period.

We decided to use PRF because we expected a huge bone deffect after surgical extractions of supernumerary teeth. Reviewing the literature we didn´t manage to find any similar examples. PRF is used in oral surgery for socket preservation, after lower third molar extraction, in sinus lift procedures, in cases of severe maxillary atrophy, bone regeneration after cystectomy, etc.

In our case we presented many advantages of PRF: fast and easy to procure, financially acceptable and the most favourable biological characteristics that accelerate both soft tissue and bone healing.

Keywords: supernumerary, teeth, prf, oral-surgical treatment.

DENTAL AGE ESTIMATION USING ROOT DENTINE TRANSLUCENCY

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Introduction: The aim of the study was to examine dental age estimation based on the translucency of root dentine with modified Bang and Ramm method

for dental cross sections using photogrammetric measurements

Materials and methods: A sample of the research consisted of 60 teeth sections made by the "half tooth" technique by Solheim. All sections were encrypted, and from available data there were information related to age and sex of the patients. On all cross sections the measuring of the root dentine translucency was performed using digital sliding gauge/caliper. Then, photography and translucency was measured with the ImageJ program. All data were recorded in the chart created for this research, included in dental formula for Bang and Ramm method and the dental age was calculated for both methods of measurement.

Results: Standard estimation error of the Bang – Ramm method is ±10.38 years which fits the results of this research. Results show that dentine translucency is higher with males regardless the measuring method. Highest average values of translucency measured by caliper are within the age below 65, growing with age. Highest average values measured by ImageJ program are within the age group between 25 and 45 years. Comparison of parameters of these two methods show that all average values of translucency measured by caliper are lower compared to those measured by ImageJ program.

Conclusion: Determination of dental age based on root dentine translucency can be done by the use of conventional and digital methods and is one of the most reliable parameters for age determination. Bang – Ramm method is reliable for dental age estimation. Photogrammetric measuring of dentine translucency demands new regression coefficients in order to get more accurate dental age estimation.

Keywords: odontometry, dental anthropology, dentin translucency, Bang Ramm, dental age

REPRESENTATION OF IRREGULARITY OF CROSS-BITE IN SCHOOL AGE CHILDREN PATIENT OF THE PUBLIC INSTITUTION HEALTH CENTRE OF THE SARAJEVO CANTON

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Introduction: Cross bite is irregularity of tooth ratio in bucco-oral plane, or we can say it is a transversal irregularity. It occurs in primary, mixed and permanent dentition. There are different variations and degrees of expression. From the most gentle shape, where the relationship between the lateral teeth is that cusp of upper teeth is in contact with cusp of lower teeth, buccal cusp of upper teeth is in contact with central fissure of lower teeth buccal cusp of upper teeth is in contact with lingual cusp of lower teeth or completely missed bite of upper and lower lateral teeth. The cross bite may engage one or both sides, it may include one tooth or the entire lateral segment. Causes can be: dental inclination, irregular transverse development of maxilla and mandible, TMD, congenital deformation of the face, heredity.

Aim: The aim of the study was to examine the frequency of cross bite in school children in the Sarajevo Canton.

Material and Method: The study was conducted at The Public Institution Health Centre of the Sarajevo Canton, Department of Orthodontics. We used the existing documentation (orthodontic carnets and models) and received the required data represented by the number of patients with this irregularities. There are 377 models and carnets available, of which 217 are girls and 106 boys.

Results: The results show that 44 children out of 377 had cross bite, which is 11, 6%, 29 girls (7,6%) and 15 boys (4%).

Conclusion: The high incidence of cross bite in children can be corrected by early orthodontic therapy.

Keywords: cross bite, in lateral teeth, incidence.

THE INFLUENCE OF A FIXED ORTHODONTIC RETAINER ON DENTO-ALVEOLAR COMPLEX

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Introduction: One of the major challenges of orthodontists is the long-term stability of the

orthodontic treatments. Recent research has shown insufficient high-quality evidence to make recommendations on retention procedures.

The aim of this study was to determine whether dental medicine doctors in their practice had noticed the harmful effects of the fixed orthodontics retainer and which are the most common.

Materials and methods: For this research, a questionnaire with 11 questions was made. The questionnaires were distributed to dental medicine doctors on the territory of the Federation of BiH. A total of 70 dental medicine doctors participated in this investigation, of which 41 were general dentists and 29 specialists.

Results: Out of the total number of respondents, 90% answered that they had patients with a fixed orthodontic retainer. More than 90% of respondents answered that in patients with a fixed retainer they observed plaque accumulation, 77% presence of calculus, 73% occurrence of gingivitis. The smaller percentage was those who noticed the presence of a gingival recession (15, 8%), periodontitis (15, 8%), caries (33, 3%) and teeth rotation (28,6%). The program Spss 23.0 Chicago was used for the statistic analysis.

Conclusion: Respondents had noticed the harmful effects of a fixed orthodontic retainer on the dentoalveolar complex. The most common adverse effects are increased plaque accumulation, dental calculus and gingivitis.

Keywords: retention, orthodontics therapy, fixed retainer

COMPARISON OF CHRONOLOGICAL AND DENTAL AGE ESTIMATED ON THE BASIS OF DEMIRJIAN, WILLEMS AND CAMERIERE METHODS

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Introduction: For pediatric dentistry and orthodontists it is extremely important to estimate age in treatment planning. Basis of treatment planning of skeletal disharmonies is optimal treatment time. The most favorable time for the treatment of skeletal disharmonies is before or during pubertal growth spurt. As there are individual variation in the beginning and duration of pubertal growth acceleration we need an assessment of individual development stages.

Aim: The aim of this study was to examine the relationship between chronological and dental age estimated on the basis of the method according to Demirjian, according to Willems and to Cameriere respectively.

Materials and Methods: Retrospective study was performed on a sample of 560 orthodontics patients aging from 7.83 – 15.08, mean age being 11.62 (255 boys mean age 11.57 and 305 girls mean age 11.66). Dental age from panoramic radiographs was assessed using Demirjian method (mean age 12,64), Willems method (mean age 12,07) and Camerieri method (mean age 11.47).

Results: By establishing the connection between those three methods of dental age assessment and chronological age of the respondents it is confirmed a statistically significant correlation with the achieved high coefficients of determination (r 2). Correlation of chronological age, common variation (determinative coefficient), achieved with Demirjian dental age was r2 = 0.867, followed by Cameriere dental age r2 = 0.863 and with Willems dental age r2 = 0.854. Correlation refers analyzed variables are presented in diagram.

Conclusion: The greatest correlation of chronological age was achieved with Demirjian dental age (r2 = 0.867).

Keywords: Chronological age, dental age, Demirjian, Willems, Cameriere.

BJÖRK'S PARAMETERS FOR DETERMINING ANTERIOR AND POSTERIOR ROTATION OF FACE

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Introduction: The two most commonly used terms expressing disproportions in vertical development

are open bite and deep bite. Morphological parameters on the basis of which patients with anterior or posterior rotation can be distinguished, according to Björk, are the following: 1- inclination of the head of the condyle (ICH), 2- curvature of the mandibular canal (CMC), 3- the shape of the lower border of mandible and in particular the depth of the antegonal notch (AN), 4 – inclination of the smphysis (ISY), 5 – interiincisal angle (IIA), 6 – intermolar angle (IMA), 7 – lower anterior face height (LAFH).

Aim: The aim of the research was to determine which parameters, mentioned here out of morphological parameters by Björk, are most commonly used in the cases of anterior or posterior facial rotation.

Material and methods: The research was based on the analysis of 50 lataral cephalograms from the archives of the Faculty of Dentistry in Sarajevo, which were randomly selected. All subjects were 13 to 18 years of age.

Results: Out of the total number of respondents, 66% were female and 34% of the male population. The most common parameters for anterior rotation were IMA, CMC and ICH, and in posterior rotation ICH, CMC and AN. For the statistical analysis of the results we used statistical package Statistics IBM SPSS v.21. and Microsoft excel 2010. Descriptive statistics was used in statistical processing.

Conclusion: The parameters used in this study proved credible in order to distinguish the anterior and posterior facial rotation.

Keywords: Björk's parameters, face rotation

PRESENCE OF PRIMARY TEETH CARIES IN SUPPORT ZONE PATIENT OF THE PUBLIC INSTITUTION HEALTH CENTRE KISELJAK

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Introduction: The support zone consists of primary cuspid, first and second primary molars. Except for the first physiological lifting of the bite, the support zone influences the growth of the jaw in the frontal plane, maintains the central line, allows correct replacement of the lateral teeth and influences the proper growth of the jaw length and the proper setting of the first permanent molar and the canine. If there is a loss of tooth of support zone, conditions for the development of malocclusion in permanent dentition are created. Research suggests that reduction of the support zone occurs, almost always, when there is premature extraction of one of the primary molars or canines, except when there are overdeveloped jaw or occlusal relationships in the full class.

Aim: The aim of this study was to establish the presence of the caries of teeth in the support zone, the preservation of the support zone.

Material and Method: The survey was conducted at the Kiseljak Health Center, and the respondents were children, aged between 5, 5 and 7, who are the patients of the dental department. The study included 147 children, both sexes. Dental examinations were performed according to the WHO guidelines.

Results: The study showed that the upper first molars were most commonly affected by caries (99.86%), while caries of first and second molars of lower jaw appears almost in equal numbers (73%).

Conclusion: Preventive measures should prevent the appearance of caries on the primary teeth of the support zone and significantly reduce the possibility of developing malocclusion in permanent dentition.

Keywords: Caries, support zone, malocclusion

SPACE MAINTAINER – A CASE REPORT

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The process of teething in children begins from 5th and 7th month and lasts up to 24-36 months. The period of milk dentition lasts up to 5.5-6 years and when the lower first permanent molar appears, the beginning of the mixed dentition lasts until the age of 12, then permanent dentitions begins. Milk teeth preserve the place for their heirs and should be preserved, but in the event of their premature loss,

the free space in which a permanent tooth should be placed is reduced. The space maintainer is a simple orthodontic device that is used to preserve space for permanent teeth in the tooth array, which was created by the early loss of the milk teeth.

The aim of this study was to show the importance of storing space in the dental array for proper placement of dental teeth in children with prematurely lost teeth.

Clinical case: An 8-year girl came to the Dental Clinic for the pain on the right side of the mandible. The examination revealed two shaken and carious milk molars. Radiographically, it was found that the roots were absorbed at the site of the molar and the growth of teeth began. The extraction was the choice of the therapy for eliminating pain and the patient was considered suitable for making space maintainer.

Conclusion: If there is space loss, the mandible will not have enough space for the teeth to be properly positioned. This is prevented by early diagnosis, intervention and orthodontic solution by placing a space maintainer in order to preserve the space for teeth.

Keywords: premature loss of dairy teeth, space maintainer

DENTAL FUSION- CASE REPORT

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Introduction: Clinical findings of the crown, fused or geminated tooth, can be almost identical. That is the reason why the terms like the double tooth or joined teeth are often used to describe gemination or fusion – which are both developmental abnormalities of the teeth. Two tooth rule can be applied for differentiating between fusion and gemination. Fused tooth are coonsidered as one and the number of teeth in the dental arch is lower contrary to the term fusion is considered. If there was normal number of teeth, the term gemination is considered. Etiology of these anomalies is unclear. Prevalence of the double teeth in primary dentition in different population is between 0, 14 – 5%.

Case report: 6 –years boy was reported to The Department of Pediatric Dentistry for a regular dental check-up. Intraoral examination revealed that mandibular left side deciduous central and lateral incisors were fused together. The periapical radiograph showed that crowns of the central and lateral incisor were fused with the partial fusion of the pulp chamber, while roots and root canals were not fused.

Conclusion: Early diagnosis of the anomaly has a considerable importance. It should be followed by careful clinical and radiographic observations. Thus, it is very important for every dental professional to be familiar with dental developmental anomalies as these abnormal morphology demands prophylactic and early interceptive treatment in order to avoid the complicated pulpal and periodontal treatment related to these teeth.

Keywords: tooth anomaly, fusion, gemination

FRACTURE OF MAXILLARY ALVEOLAR PROCESS – CASE STUDY

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Introduction: Dental injury occurred to the 16-year old girl who came at the Oral Surgery Clinic after the fall in front of her school. She came 30 minutes after the accident; she didn't lose her consciousness and didn't vomit. We saw contusion and laceration of the skin and mucous membrane on the left side of upper lip. Manual examination showed the mobility of bone fragments and palatal movement of teeth 21, 22 and 23. The bite was disordered and the patient was not able to close her mouth. Radiography of teeth showed that teeth 21, 22, 23 were lower, above the roots of teeth in upper jaw and fracture shadow was not radiographically visible. We diagnosed closed fracture of maxillary alveolar ridge. After rinsing the area with H202 and saline solution, we performed the analgesia of the area. We did reposition, we set

fractural bone fragment in its anatomical position and proceeded with the occlusal adjustment to get the teeth in central occlusion. We used wire-composite splint to stabilize teeth. The patient was advised to apply an ice pack on it, blended food, soft toothbrush, and rinsing of mouth with clorhexidine solution twice a day during the first week. We prescribed antibiotics and scheduled the next appointment to the dentist. Splint was removed after 4 weeks, and we noticed that teeth 21, 22 and 23 had weaker vital response. RTG and of teeth vitality will be checked after 6 or 8 weeks, 4 months and one year. In the next 5 years she should do RTG once a year.

Materials and methods: Materials and methods were used in accordance with clinical protocol for threatening surgeon treatment of upper alveolar jaw fracture.

Conclusion: We avoided wrong wound healing, infection and sequestration of bone fragments in the jaw. Function and esthetics of teeth 21, 22 and 23 and local tissues were satisfactory.

TREATMENT OF TEN-YEAR OLD CHILD TOOTH AVULSION – CASE STUDY

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Introduction: Dental injury occurred to a 10-year-old girl that came at the Oral Surgery Clinic after the fall of the roller skates. After the clinical examination followed by bleeding, contusions and lacerations in the area of the upper lip was visible empty alveolar socket and tooth 11 was brought by a mother in a non-sterile medium. Furthermore, the mother stated that the tooth ended on a concrete base and that the child was regularly vaccinated. One hour after the injury occurred, alveolus and tooth were rinsed with chlorhexidine solution and sterile saline solution. The tooth was replanted in alveolus, taking into account occlusal relationships and wire-composite splint was applied. After the examination and clinical procedure antibiotics were prescribed. It was also recommended to have a soft food dietary regime and to follow instructions on the oral hygiene. Furthermore our decision was to remove pulp, which was considered a reliable clinical procedure that would provide a safe prognostic outcome. After 14 days we approached from the palatal side to the pulp chamber, removed the necrotic pulp, following the mechanical instrumentation and disinfection of root canal using the standard protocol. In addition, the canal was filled with Ca (OH) 2 by exploiting its longevity and bactericidal action for the purpose of a temporary six-month filling and we closed the entry into root canals with zinc phosphate cement. After it was all finished we proceeded with radiological examination which we repeated after 6 months. To conclude, after the final examination there was no sign of roots resorption so a definite filling and final filling was performed.

Materials and methods: Materials and methods were used in accordance with clinical protocol for dental avulsion.

Conclusion: After the therapy related to the function and aesthetics of tooth 11 and condition of the soft tissues, the results were satisfactory. The patient's smile indicated satisfaction with the achieved result.

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Books:

Heger JW, Niemann JT, Criley JM. Cardiology, 5th ed. Philadelphia: Lippincott, Williams & Wilkins; 2003.

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