



20



Volume : 20

Issue : 3

2017

ISSN: 1302-5805 e-ISSN: 2146-2852

Cumhuriyet Üniversitesi  
**Diş Hekimliği Fakültesi**  
**Dergisi**

**Cumhuriyet Dental Journal**



<http://dergipark.gov.tr/cumudj>

<http://dergi.cumhuriyet.edu.tr/cumudj>

ISSN 1302-5805 e-ISSN 2146-2852 Volume/20 – Number/3 2017

**CUMHURİYET ÜNİVERSİTESİ**

**Diş Hekimliği Fakültesi  
Dergisi**



## **Cumhuriyet Dental Journal**

An official publication of the  
Faculty of Dentistry,  
Cumhuriyet University, Issues  
are published 3 times a year.

Our Faculty Journal first went  
into press in 1998.

<http://dergipark.gov.tr/cumudj>

<http://dergi.cumhuriyet.edu.tr/cumudj>

**ISSN 1302-5805**

**e-ISSN 2146-2852**

**Volume/20-Number/3-2017**

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## ASSESSMENT OF THE RELATIONSHIPS BETWEEN DELETERIOUS ORAL HABITS THAT MAY CAUSE ORTHODONTIC ANOMALIES AND PSYCHOLOGICAL AND SOCIO-DEMOGRAPHIC FACTORS

*Ortodontik Anomalilere Sebep Olabilen Kötü Alışkanlıkların Psikolojik ve Sosyodemografik Faktörlerle İlişkisinin Değerlendirilmesi*

Zeynep ÇOBAN BÜYÜKBAYRAKTAR, Cenk DORUK

**Makale Kodu/Article Code** : 341904

**Makale Gönderilme Tarihi** : 05.10.2017

**Kabul Tarihi** : 08.11.2017

### ABSTRACT

**Objectives:** The aim of this study is to identify the relation between the deleterious oral habits (DOH) which can cause orthodontic anomalies such as finger sucking, nail biting, lip chewing, bruxism and psychological and socio-demographic factors.

**Materials and Methods:** 64 males, 71 females, between the ages of 9 and 12, including their parents have been included in our study. In our study, a survey form consisting of Clinic Examination Data Form, Socio-demographic Data Form, Children's Depression Inventory (CDI), Child State Trait Anxiety Inventory (CSTAI) has been applied to patients.

**Results:** DOH have been observed in 62.5 % of the male children and % 52.1 of the female children, but these results are not statistically significant ( $p>0.05$ ). No statistically significant association was found between DOH and CDI ( $p>0.05$ ). No statistically significant association was found between the CSTAI status section score and trait section score and DOH ( $p>0.05$ ). Statistically significant associations were found between family type and DOH ( $p<0.05$ ).

**Conclusions:** While there was no association between anxiety and depression and DOH, there was significant association family type from socio-demographic factors and DOH.

**Key words:** Finger Sucking, Nail Biting, Depression, Anxiety

### ÖZ

**Amaç:** Bu çalışmanın amacı; ortodontik anomalilere sebep olabilen, parmak emme, tırnak yeme, dudak emme, diş sıkma ve gıcırdatma gibi kötü alışkanlıkların psikolojik ve sosyodemografik faktörlerle ilişkisini saptamaktır.

**Gereç ve Yöntem:** Çalışmamıza, yaşları 9 ila 12 arasında değişen 64 erkek, 71 kız olmak üzere toplamda 135 çocuk ve ebeveynleri dahil edilmiştir. Çalışmamızda, Klinik Muayene Veri Formu, Sosyodemografik Veri Formu, Çocuklar İçin Depresyon Ölçeği (ÇDÖ), Çocuklar İçin Durumluk-Sürekli Kaygı Envanteri (ÇDSKE) şeklinde 4 bölümden oluşan anket formu, hastalara uygulanmıştır.

**Bulgular:** Erkek çocukların %62,5'inde, kız çocukların ise %52,1'inde kötü alışkanlık görülmüştür ancak elde edilen bu sonuç istatistiksel olarak anlamlı değildir ( $p>0,05$ ). Kötü alışkanlıklar ile ÇDÖ puanı arasında istatistiksel açıdan anlamlı bir ilişki bulunamamıştır ( $p>0,05$ ). ÇDSKE durumluk bölüm puanı ve sürekli bölüm puanı ile kötü alışkanlıklar arasında istatistiksel olarak anlamlı bir ilişki bulunamamıştır ( $p>0,05$ ). Aile tipi ile kötü alışkanlıklar arasında ise istatistiksel açıdan anlamlı ilişki bulunmuştur ( $p<0,05$ ).

**Sonuç:** Kaygı ve depresyon ile kötü alışkanlıklar arasında anlamlı bir ilişki bulunamazken, sosyodemografik faktörlerden yalnız aile tipi ile kötü alışkanlıklar arasında anlamlı bir ilişki bulunmuştur.

**Anahtar kelimeler:** Parmak Emme, Tırnak Yeme, Depresyon, Kaygı

## **INTRODUCTION**

Repetitive activities that occur automatically are called habits. These repetitive behaviors are often seen in childhood and many begin and end by themselves.<sup>1</sup> Habits such as finger sucking and foreign body stabbing, which are sometimes part of the psychosocial development that breaks the physiological development between the ages of 3 and 6 and leads to pathology in the dentition are described as deleterious oral habits (DOH). DOH could be divided into 2 main groups:

1. Acquired DOH: When a child grows up, they can easily leave this habit and switch to another habit.
2. Compulsive DOH: These habits are constantly seen in children and when emotional pressure becomes unbearable for a child, they feel secure themselves with this habit. He feels uneasy when he tries to get rid of habits.<sup>2</sup>

DOH such as finger sucking, lip chewing, mouth breathing, nail biting, tongue thrusting can be seen in children. It is known that DOH seen in children sometimes cause orthodontic anomalies that are impossible to cure. Orthodontic deformation caused by DOH varies with the severity of habits, frequency of recurrence, duration of residence and tissue strength.<sup>3</sup>

The reasons for these habits are different. Several theories (psychoanalytic theory, learning theory, insufficient sucking theory) have been proposed to explain the etiology of sucking behavior in particular. According to the psychoanalytic theory which is one of these theories, sucking behavior is instinct for the first period of life. Unhindered, it should be saturated in this period. According to those who argue that sucking behaviors that transcend the reflex or instinct dimension originate from various spiritual problems, the problem should be sought especially in child-mother or child-sibling relationships.<sup>4,5</sup> According to some experts; sucking behavior that develops to elder

or older ages is a symptom of abnormal psychological development.<sup>5,6</sup>

Nail biting, which is another of the DOH, emerges as a reaction in response to some psychological disorders and in some children it is seen that sucking habits have changed to nail biting.<sup>1</sup> Depression-style psychological problems have been identified in more than half of the families with children having nail biting. Children with this habit should be assessed emotionally.

The etiology of bruxism is still being debate and in the theories; occlusal, psychological, genetic and stress factors are emphasized. It has been abandoned to think that the phenomenon of bruxism is related to occlusal discomfort alone. Today, there is a common belief that etiology is related to more than one factor and it is thought that there is a central nervous system phenomena associated with more stress and pain behavior.<sup>7</sup>

In our study, DOH such as finger sucking, nail biting, lip chewing and bruxism were evaluated in relation to psychological and socio-demographic factors and comprehensive data on etiology of these DOH were collected.

## **MATERIAL AND METHOD**

Our study was conducted on the children and their parents who applied to the Orthodontics Department of the Dentistry of Cumhuriyet University for examination between the dates of 10.12.2016 and 10.03.2017. In total, 135 children and their parents, 64 of whom are male and 71 of whom are female were included in to our study. The ages of the children are between 9 and 12.

Oral and written consent with ethics committee approval for study were taken from each patient and parents (Ethics committee decision no: 2016-09/05, Date: 27.09.2016).

Patients who have not had any previous orthodontic treatment and who do not have any mental or physical disabilities that would

prevent them from responding to the questionnaire were included in the study.

**Habit group (HG):** From the child patients who have at least one of the DOH such as finger sucking, lip chewing, nail biting and bruxism.

**Habit free group (HFG):** It is made up of children who have not seen any of the DOH mentioned.

The questionnaire consists of 4 sections (Clinical Examination Data Form, Socio-demographic Data Form, Children's Depression Inventory, Child State Trait Anxiety Inventory) in total has been applied to collect information about the underlying causes of DOH that described the negative effects on mouth, teeth and jaw system.

**1. Clinical Examination Data Form:** This section includes intra oral and extra oral examinations made by the observer and questions directed to the patients' parents. The age and gender of the patients were recorded. Whether or not DOH such as finger sucking, nail biting, bruxism and lip chewing are present or not is discussed and evaluated with the patients' parents.

**2. Socio-demographic Data Form:** In this section, age, education, family type, number of children living at home, settlement place and monthly income are questioned. The answers to the questions in this section are taken from the guardians of patients.

**3. Children's Depression Inventory:** In childhood depression, among the self-assessment scales, the most frequently used one and the most frequently researched psychometric features of a scale is the Children's Depression Inventory and it is a self-assessment scale applicable to children aged 6-17 years. It has been based on the views of Kovacs which are 1. There is childhood depression, 2. Observable and measurable, 3. Features similar to adults. The Beck Depression Scale is based on the questionnaire, but also includes questions about the school-specific

situation for childhood depression, friendship, and so on.<sup>8,9</sup> The scale is filled in by reading to the child or by the child. There are three different options for each item on the 27-item scale. The child is asked to choose the most appropriate sentence for the last two weeks. For example; 1. I feel sad sometimes from time to time. 2. I feel sad often. 3. I always feel sorry for myself. Each item takes 0, 1 or 2 points according to the severity of the indication. The maximum score is 54. The higher the score, the more depressed it is. The cut point is recommended as 19.<sup>8,9</sup> Validity and reliability studies in our country were made by ÖY<sup>10</sup> and pathology cut point was determined as 19 points.

#### **4. Children's State Trait Anxiety Inventory:**

This scale, developed by Spielberger<sup>11</sup>, has two subscales with multiple choice of 20 questions for state and trait anxiety. Each item is scored 1, 2 or 3 according to the severity of the indication.

**Trait Anxiety Scale:** It aims to measure persistent individual differences as well as anxiety. The scale consists of 20 items. It usually evaluates how the child feels according to the frequency of occurrence. Expressions such as "My nerves at home" or "My hands are tired" are answered with one of the "almost never", "sometimes" and "often" options. The scores to be taken from the scale are between 20 and 60, the increase of the scores represents the increase in trait anxiety.

**State Anxiety Scale:** The children are asked to evaluate how they feel at that moment and to choose the most appropriate option such as "I feel so angry, I feel angry, I do not feel angry". The total number of items is 20. The lowest score you can get is 20, the highest score is 60. The state anxiety scale is suggested to be given prior to the trait anxiety scale in practice, since it is a scale that is susceptible to emotions/disturbances that may occur in test conditions. The study of validity and reliability of the scale in our country was carried out by Özusta.<sup>12</sup>

Patients in both groups were examined first, the necessary information was recorded by the investigator and then a questionnaire was given to the patients and their parents to answer socio-demographic questions and psychological inventory. Socio-demographic questions were asked to be answered by guardian of patient and psychological inventory of the patients were asked to be answered by the patient.

**Statistical method**

The data obtained from our study were uploaded to the SPSS (Ver: 15.0) program. In the evaluation of the data; the mean, standard deviation and frequency distributions were examined. Subsequently, the significance test between the two means in comparison of the groups, Man Whitney U and Chi Square test have been used. The level of error was taken as 0.05.

**RESULTS**

The gender distribution of the children included in the study is 64 (47.4%) male and 71 (52.6%) female. The average age of the individual is 11.3 for males and 11.4 for females.

62.5% of males and 52.1% of females were seen to have DOH (Table 1). There was no statistically significant association between males and females, although the percentage of malnutrition was higher in males ( $p > 0.05$ ).

**Table.1** Assessment of individuals in terms of DOH and gender

		DOH		Total	Result
		HG	HFG		
Gender	Male	N	40	24	0,22
		%	62,5	37,5	
	Female	N	37	34	
		%	52,1	47,9	
Result	N	77	58	135	
	%	57	43	100	

$\chi^2 = 1.48$   $p = 0.22$

The average score of CDI is higher in individuals with DOH (Table 2), but no statistically significant association was found between DOH and CDI scores ( $p > 0.05$ ).

**Table.2** Assessment of individuals in terms of DOH and CDI score

DOH	N	Average	SD	Minimum	Maximum	Median
HG	77	9,8312	5,46135	1,00	33,00	9,0000
HFG	58	9,0345	6,20686	2,00	37,00	7,0000
Total	135	9,4889	5,78452	1,00	37,00	8,0000

$p = 0.160$

CSTAI state and trait anxiety scale point averages were found higher in individuals with DOH as seen on Table 3 and Table 4. No statistically significant association was found between CSTAI status and trait episode score and DOH ( $p > 0.05$ ).

**Table.31** Assessment of individuals in terms of DOH and CSTAI State Scale score

DOH	N	Average	SD	Minimum	Maximum	Median
HG	77	31,0390	6,51606	23,00	50,00	28,0000
HFG	58	29,5690	5,42933	21,00	40,00	26,0000
Total	135	30,4074	6,09538	20,00	50,00	30,0000

$p = 0.090$

**Table.4** Assessment of individuals in terms of DOH and CSTAI Trait Scale score

DOH	N	Average	SD	Minimum	Maximum	Median
HG	77	34,1299	8,05957	28,00	55,00	30,0000
HFG	58	33,6034	6,44529	24,00	50,00	28,0000
Total	135	33,9037	7,38784	20,00	55,00	33,0000

$p = 0.894$

Among the parameters such as age, educational status, family type, number of children living at home, place of residence and monthly income of parents and siblings questioned in the socio-demographic data form, only “family type” was found to have a significant association with DOH ( $p < 0.05$ ), (Table 5).

**Table.5** Assessment of individuals in terms of DOH and family type

		DOH		Total	Result	
		HG	HFG			
Family Type	Nuclear Family	N	53	50	0,01	
		%	51,5	48,5		
	Other Group*	N	24	8		
		%	75	25		
	Total	N	77	58		135
		%	57	43		100

\* Fragmented or extended family  
 $\chi^2 = 5.523$   $p = 0.01$

**DISCUSSION**

135 individuals and their parents, aged 9-12 years, were included in the study. The reason we choose age range 9-12 is that the Children State-



Trait Anxiety Inventory we use in our study is applicable to this age range.

In our study, the rate of DOH in males was found higher than females. In the study done by Leme *et al.*, the rate of DOH was found higher in girls than in boys<sup>8</sup>, but in some other studies there was no significant relationship between males and females in terms of DOH.<sup>9,10</sup> Until now, there is no consensus in the literature as to whether there is a relationship between gender and DOH. This can be explained by the psychological character difference seen in the individuals participating in the study.

Two theories have been proposed to describe the etiology of DOH. One of them is the psychoanalytic theory, which is defended by Freud, and the other is the theory of learning.<sup>11</sup> The link between psychoanalytic theory and DOH remains unclear in the literature. The work done in this subject is limited.<sup>12</sup> We need studies which are about psychosocial variables such as depression and anxiety, which are frequently seen in children and adolescents with DOH. Thus, in our study, Children's Depression Inventory which is used frequently and Children's State Trait Anxiety Inventory which is used for determining anxiety levels have been used.

There was no statistically significant relationship between anxiety and DOH in our study; but CSTAI scores were found higher in individuals with DOH. Similarly, in a study by Dellazzana *et al.*, it is found that anxiety scores were higher in children with oral habits, especially with mouth / tongue biting.<sup>13</sup> Unlike our study, Leme *et al.* and Tanaka *et al.* found a significant relationship between DOH and anxiety in their work.<sup>12</sup>

Although there was no statistically significant relationship between depression and oral habits in our study the average score of depression in individuals with oral habits was found to be higher. Similarly, in the study done by Leme *et al.* there have been found more depressive symptoms in children and

adolescents with oral habits when compared to those not seen.<sup>8</sup>

Mothers and fathers are the individuals having a basic role in child development. A child modeling his or her parents can develop positive or negative personality traits. The increase in the socioeconomic level also causes the individual to feel more comfortable and stronger in the society, to trust himself and his family, and to be accepted around his friends. Otherwise, adjustment problems and behavioral disorders may develop in children.<sup>14</sup> Therefore, the relationship between DOH and socio-demographic factors was evaluated and there was no statistically significant relationship between DOH and mother's age, father's age, mother's educational status, father's educational status, number of children living at home, place of residence and monthly income.

In a study similar to our study in 2009 when we look at their compliance problems according to their habitual disorders of the students of the schools at different socioeconomic levels, statistically significant difference couldn't be found when lower, middle, upper socioeconomic levels are compared according to variables of night wetting, finger sucking, nail biting.<sup>15</sup> Unlike our study, in a study of the relationship between socioeconomic factors and oral habits, it was found that there are more oral habits in the children of the parents having low socioeconomic conditions. This is due to the high likelihood that parents with low socioeconomic conditions may not have adequate information about oral health and problems that may arise in the presence of oral habits.<sup>9</sup>

There are many reasons why children experience adjustment and behavior disorders. One of these reasons is the divorce of parents or the fragmentation of family. Family type has a significant effect on the development of children. There was a statistically significant relationship between family type and DOH in

our study.<sup>16</sup> In a similar research on primary school students with different socioeconomic conditions in Malatya province center, when those with compliance problems and those with no compliance problems are compared, it has been determined that there is differences from the aspects of tic, nail biting, finger sucking, night wetting and school achievement. These problems were more frequently observed in those with adjustment problems, and school performance was found to be lower in these children.<sup>17</sup> This data overlaps with the data obtained with our work.

## CONCLUSION

There was no statistically significant relationship between anxiety and DOH; however, the scores of CSTAI were found higher in individuals with DOH. Despite the fact that there is no statistically significant relationship between depression and DOH, the average score of depression in individuals with oral habits is higher. There was a statistically significant relationship between family type and DOH.

It seems beneficial for us that there must be done more comprehensive studies including consultation with psychiatric departments in larger patient groups about the relationship between DOH and psychological and socio-demographic factors.

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## THE EFFECT OF DIODE LASER AS AN ADJUNCT TO PERIODONTAL TREATMENT ON CLINICAL PERIODONTAL PARAMETERS AND HALITOSIS: A RANDOMIZED CONTROLLED CLINICAL TRIAL

*Periodontal Tedaviye Destek Olarak Kullanılan Diyot Lazerin Periodontal Klinik Parametrelere Ve Halitozis Üzerine Etkileri: Randomize Kontrollü Klinik Çalışma*

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**Makale Kodu/Article Code** : 148016

**Makale Gönderilme Tarihi** : 20.10.2015

**Kabul Tarihi** : 24.02.2017

### ABSTRACT

**Aim:** The aim of this study is to examine the clinical efficiency of diode laser periodontal pocket irradiation as an adjunct to conventional scaling and root planning (SRP) on periodontal parameters and halitosis.

**Material and Methods:** In our randomized, controlled clinical trial, 40 patients with untreated chronic periodontitis were randomly separated into two group to receive SRP with laser (laser group n=20) or SRP solely (control group n=20). Plaque index (PI), gingival index (GI), probing pocket depth (PD), clinic attachment loss (CAL), bleeding on probing (BOP) and halitosis were recorded at baseline and 1st ,3rd and6th months after treatment by a periodontist.

**Results:** Both treatment methods showed significant reductions in clinical parameters and halitosis levels compared to baseline.

**Conclusion:** The present study indicates that compared to SRP solely, adjunctive applications of a 940-nm diode laser with SRP showed lower bleeding on probing and halitosis levels.

**Key Words:** Periodontitis, Diode Laser, Halitosis.

### ÖZ

**Amaç:** Bu çalışmanın amacı geleneksel diş yüzeyi temizliği ve kök yüzeyi düzleştirmesine (SRP) ek olarak periodontal cep içerisine diyot lazer uygulamasının periodontal parametreler ve ağız kokusu üzerine klinik etkinliğini incelemektir.

**Materyal Metot:** Randomize kontrollü klinik çalışmamızda, tedavi edilmemiş kronik periodontitisli 40 hasta rastgele SRP ve lazer uygulananlar (lazer grubu n = 20) veya sadece SRP uygulananlar (kontrol grubu n = 20) olmak üzere iki gruba ayrıldı. Başlangıçta ve 1. 3. ve 6. aylarda plak indeksi (PI), gingival indeks (GI), cep derinliği (PD), klinik ataşman kaybı (CAL), sondalamada kanama (BOP) ve halitozis kaydedildi.

**Bulgular:** Her iki tedavi metodunda da klinik parametreler ve halitozis seviyeleri başlangıca göre anlamlı derecede azalma gösterdi.

**Sonuç:** Bu çalışma, yalnızca SRP'ye kıyasla SRP'ye ek olarak 940 nm diyot lazer uygulamasında sondalamada kanama ve halitozis seviyelerinin daha düşük olduğunu göstermiştir.

**Anahtar Kelimeler:** Periodontitis, Diyot Lazer, Halitozis

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## INTRODUCTION

Chronic periodontitis is an inflammatory disease which develops against the microbial plaque on tooth surface and ends in loss of periodontal tissues.<sup>1</sup> The prime target in periodontal treatment is the elimination of all factors which cause formation and cumulation of the plaque.<sup>2</sup>

In nonsurgical periodontal treatment, infection is aimed to be controlled by mechanically removing supragingival and subgingival calculus.<sup>3</sup> The success of periodontal treatment depends on totally removing subgingival and supragingival pathogens and enabling oral hygiene by the patient after the treatment.<sup>4,5</sup>

Tooth surface (SRP) is the most important procedure in the treatment of periodontitis and its clinical benefits were proved by many studies.<sup>4, 6, 7</sup> However, microbial component may not be removed totally by mechanical treatment in the presence of deep pockets.<sup>8</sup> Therefore, many methods such as antibiotics, antiseptics and lasers have been used in addition to periodontal treatment.<sup>9-12</sup>

Dental laser usage has been commonly used recently. Different laser types are used for dental purposes such as Er:YAG laser, Er,Cr:YSGG laser, Nd:YAG laser, CO2 laser and diode laser.<sup>13, 14</sup>

Diode laser is a semiconductor laser, which uses combinations of elements such as gallium (Ga), arsenide (Ar), aluminum (Al) and indium (In) for the transformation of electric energy into luminous energy.<sup>15,16</sup> Diode laser, which can be used in soft tissue implementations successfully, do not penetrate into hard tissues.<sup>13</sup> Many studies showed that diode laser has an antibacterial activity when it is used to support periodontal treatment.<sup>17-19</sup>

Moritz *et al.* suggest that diode laser as an adjunct to SRP will decrease bacteria amount and inflammation.<sup>17</sup> They achieved positive results in clinical parameters but irradiation

procedure caused morphological changes on root surface.<sup>17, 19</sup>

The term 'halitosis' means bad breath which can have local or systemic origins.<sup>20, 21</sup> 10 per cent of halitosis cases develop because of extra-oral reasons.<sup>22</sup> Halitosis can be observed in people of different ages and negatively affect social interaction of the person.<sup>23</sup> Findings which belong to epidemiological studies in different countries cannot be compared because there are not standart protocols for treatment and diagnosis of halitosis.<sup>24</sup>

Most of extra oral factors which cause halitosis are generated from respiratory tract or otorhinolaryngologic diseases such as tonsillitis, sinusitis and post-nasal drip. Bad breath can occur rarely because of renal, hepatic, endocrinological or gastrointestinal reasons.<sup>22, 24-27</sup> The cumulated materials can be smelt by the breath within some certain systemic diseases such as acetone smell within diabetic patients or ammonia smell within urea or cirrhotic patients.<sup>28</sup> Periodontal diseases, caries, bacteria plaque on the tongue, insufficient salivation, stomatitis, in-mouth neoplasm, extraction socket which is being treated and smelly food consumption are amongst in-mouth reasons of halitosis.<sup>22, 24, 29</sup>

Volatile sulphur compounds (VSC) are formed as oral microorganisms which exist in saliva, periodontal pockets, tongue and other parts of the mouth proteolysate free amino aside substrates, such as cysteine, sistine and methionine which include sulphur.<sup>30</sup> VSC is mainly composed of hydrogen sulfide, methyl mercaptan and dimethyl sulfide components which are the main reasons of bad breath.<sup>31, 32</sup>

Two methods are implemented in the evaluation of halitosis; the first one is organoleptic method which is subjective. In this method, breath of the patient is graded through smelling by an educated and experienced person. The method can give variable values because it is a sense method

besides it is not a good experience both for the patient and the implementer.<sup>38, 39</sup> The second method is measuring VSC amount by gas chromatography or halimeter which is an objective method.<sup>40</sup> When halitosis is measured by a halimeter, nano VSC amount can be defined.<sup>41-45</sup> VSC amount within the people with periodontal diseases are more than healthy people because of the high rate of bacteria plaque covering the tongue. Therefore, there is a positive relation between the severity of periodontal disease and VSC content.<sup>31</sup>

The main principle in the treatment of halitosis is eliminating oral pathogens and restraining bacterial bio film. Many methods are adopted in order to treat halitosis such as using mouthwash solutions with CHX, hydrogen peroxide and essential oil, tongue scraper or tongue brush. 70 per cent of oral sulfides will be eliminated by tongue cleaning.<sup>46</sup> Chewing gum with mint and mouth sprays is also used in order to cover the smell.<sup>21, 24, 47-51</sup>

Our study aims at evaluating the effectiveness of diode laser usage as an adjunct to SPR both on periodontal parameters and halitosis.

## **MATERIAL AND METHOD**

### *Selection of the Participators and Design of the Study*

This study is a randomized controlled clinical study. 40 adults (20 females, 20 males), who were selected from the patients without periodontal treatment in the last 6 months, who consulted to Akdeniz University Faculty of Dentistry Periodontology clinic between September 2014 and March 2015 for periodontal complaints or controls, were included in the study. All patient provided written permissions. The protocol of the study was approved by Antalya Training Research Hospital Non-pharmaceutical Clinic Researches Ethical Commission (2014 decision no:46/10).

The people who have systemic diseases, require regular medicine, are pregnant, smoke and people with fixed partial denture were not included in the study. The people have minimum 14 teeth and at least 2 teeth that have 5mm pocket in each quadrant. The people were only divided into 2 random groups as the ones who have SRP treatment (control group KG n=20) and who are implemented diode laser as an adjunct to SRP (Laser group LG n=20)

### *Halitosis measurement*

In our study halitosis measurements are done by Halimeter (InterscanCorp., Chatsworth, Ca, USA). People were asked not to consume onion, garlic and spicy food and use mouthwash before the implementation day. People were also asked to breathe through the nose without opening their mouths for a minute then halimeter was placed into the mouth as not to touch the patient's tongue and palate.

### *Clinical Procedure*

Plaque index (PI), gingival index (GI), clinical attachment level (CAL), probing pocket depth (PD), bleeding on probing (BOP) and halitosis measurements were carried out in 6 sections for each tooth after treatment prior to treatment of the patients.

SRP was implemented via hand pieces (Gracey Curettes, Hu-Friedy, Chicago, IL, USA) and ultrasonic equipment (EMS SA CH 1260 Nyon, SWITZERLAND). 940 nm indium-gallium-aluminum-phosphate diode lasers (Epic, Biolase, Irvine, CA, USA) were implemented in the same session under local anesthesia. Total 15 J/cm<sup>2</sup> power of laser in 1.5 W power with 20 ms frequency during 20 ms shots was implemented to periodontal pocket. Laser irradiation was realized with fiber optic ends which are of 300 µm diameter. Fiber is implemented by parallelly locating on root surface level inside the periodontal pocket. Fiber laser is directed from apical to coronal during light emission. It was implemented in total 20 seconds as 10 second

lingual to 10 seconds to each tooth in mesio-distal direction in buccal angle.<sup>12</sup>

The patients were provided with detailed oral hygiene training at the end of the session. The training includes the usage of materials such as dental floss and interdental brush which are used for interdental cleaning and how to clean dorsum and lateral of tongue with brush and tongue cleaner.

Clinical index scores and halitosis levels were measured after 1, 3 and 6 months after the treatment. The patients were not informed about their categories in the groups during the treatment.

Whether they correlate normal distribution or not is decided via Shapiro-Wilks test for statistical assessment of datum. Variance analysis, Tukey multiple comparison tests and independent sample t-test were carried out via an appropriate software for the assessment of datum which are defined to present normal distribution. (SPSS v20.0, IBM, Chicago, IL, USA).

**RESULTS**

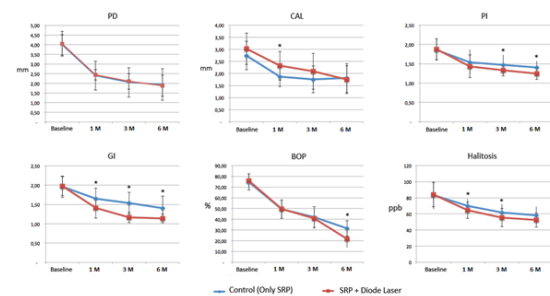
Average and standard deviation values for datum of control group of clinical assessment criteria, the group which was implemented SRP solely and Diode laser group with combined SRP are presented in Table 1.

**Table 1:** Average and standard deviation results of datum of clinical evaluation criteria

	SRP (Control)				SRP + Diode Laser			
	Beginning	1 <sup>st</sup> month	3 <sup>rd</sup> month	6 <sup>th</sup> month	Beginning	1 <sup>st</sup> month	3 <sup>rd</sup> month	6 <sup>th</sup> month
PD (mm)	4,00±0,53	2,40±0,75	2,05±0,76	1,95±0,81	4,05±0,64	2,44±0,27	2,11±0,41	1,88±0,55
CAL (mm)	2,74±0,59	1,87±0,41	1,76±0,55	1,81±0,60	3,03±0,65	2,32±0,59	2,09±0,74	1,75±0,58
PI	1,86±0,28	1,54±0,33	1,47±0,26	1,41±0,16	1,88±0,27	1,44±0,29	1,33±0,15	1,25±0,15
GI	1,96±0,28	1,65±0,27	1,54±0,28	1,41±0,31	1,98±0,25	1,42±0,27	1,17±0,13	1,14±0,11
BOP (%)	74,8±7,59	49,4±8,56	42,1±9,73	31,5±7,23	75,9±6,79	49,6±8,93	40,1±9,80	21,7±8,16
Halitosis	83,4±17,2	70,1±8,56	61,8±10,2	58,2±10,8	83,9±14,9	64,5±10,1	55,4±11,4	52,4±8,69

It was found out that both groups decreased pocket depth in time in the pocket depth (PD) measurement in clinical probing. However, in the statistical assessments a significant difference was not found between groups (p>0.05). There was a decrease in both

groups in the comparison of clinical attachment levels in 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> months. The difference between groups was found statistically significant especially in the 1<sup>st</sup> month's measurement. It was shown in plaque index scores that both methods are effective related to time and plaque index values were decreased via the measurements in the beginning. It was found that the difference between SRP solely and diode laser combined with diode laser implementation were statistically significant in plaque index data in 3<sup>rd</sup> and 6<sup>th</sup> month periods. Both treatment methods were found effective in gingival index scores and statistically significant difference was found in the date which were held in the measurements in 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> months periods (p<0.05). As a result of data held with bleeding on probing, it was found that significant decrease was held especially at the end of 6<sup>th</sup> month and the difference between groups in the data of these periods were significant. In halitosis measurements, it was discovered that both treatment methods decreased bad smell and there is a significant difference between treatment methods in 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> month's periods.



**Figure 1:** Datum of clinical evaluation criteria and statistical differences between groups. (\*:p<0.05)

**DISCUSSION**

There is much evidence on the benefits of non-surgical treatment in the treatment of periodontal diseases.<sup>53 54</sup> It is argued that laser can be used as a support for non-surgical periodontal treatment.<sup>55</sup> However, on the contrary, some authors decided that diode laser implementation combined with SRP has no

supremacy over SRP implementation solely in terms of microbial parameters and gingival inflammation.<sup>56, 57</sup> In our study, it was presented that both treatment procedures caused significant recovery in clinical parameters.

Dukic and colleagues expressed that statistically significant recovery was held in clinical parameters in the group which they implemented SRP solely and the group implemented with diode laser combined with SRP in 6th and 18th weeks in a study, which was carried out on people with chronic periodontitis.<sup>2</sup>

Aykol and colleagues achieved progress in periodontal pocket depth and bleeding on probing per cent in the group they implemented gallium-aluminum-arsenide after periodontal treatment in 1st, 2nd and 7th day through a similar study which they carried out with chronic periodontitis patients.<sup>58</sup>

Kreisler and colleagues implemented diode laser of 810 nm wave length to 2 random quadrants of the patients after they treated 22 patients with chronic periodontitis via routine SRP during their study. They presented that more statistically significant decrease was held in teeth mobility, pocket depth and clinical attachment loss in the tooth which were implemented laser when compared to control group.<sup>59</sup>

In our study CAL, BOP and PI datum were compared and decrease was found in both groups in 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> months. However, a statistically significant recovery was achieved in LG when compared to CG in the 1<sup>st</sup> month's measurements. A statistically significant decrease was held in BOP measurements in LG when compared to CG in 6<sup>th</sup> month.

Whilst probing pocket depth decreased in time in both groups in PD measurements a statistically significant difference cannot be found between groups.

Qadri and colleagues had better results in periodontal pocket depth, plaque index and

gingival index in the areas where they implemented laser when they carried out a similar study design.<sup>60</sup>

Ustun and colleagues implemented diode laser of 810 nm wave length to 2 random quadrants of the patients after they treated 21 patients with chronic periodontitis via routine SRP during their study. CAL, BOP and PI datum were compared and decrease was found in both groups in 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> months. More decrease was achieved in LG when compared to CG in terms of PD levels in 1st, 3rd and 6th months. Better results were found in LG when compared to CG in terms of CAL and GI levels in 3<sup>rd</sup> and 6<sup>th</sup> months. They could not have found a statistically significant difference between two groups in terms of PI.<sup>61</sup>

PI and GI datum were compared and a decrease in both groups were found in our study. However, in all of 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> months' measurements in GI levels of LG had a statistically significantly decrease when compared to CG. Whilst decrease was observed in both groups within PI measurements, a statistically significant decrease was achieved in LG when compared to CG in 3<sup>rd</sup> and 6<sup>th</sup> months.

Many authors reported that periodontal disease is a significant reason of halitosis.<sup>62-65</sup> Periodontal pathogens generate endotoxine, proteinase and VSC. Persson and colleagues stated that *Bacteroides melaninogenicus*, *Treponema denticola*, *Porphyromonas gingivalis* and *Prevotella intermedia* types produce VSC.<sup>66</sup> VSC molecules, which are produced by gram negative bacteria on tongue and periodontal pocket, cause smell formation.<sup>67</sup>

A number of studies showed the positive relation between progression of periodontal disease and VSC amount.<sup>35, 36</sup> Morita and Wang<sup>68</sup> found a significant relation between the severity of periodontal disease and VSC amount in breath. They discovered that VSC value was measured lower within people who



are provided with periodontal treatment than the ones who are not treated. They also asserted that there is a correlation between VSC level and bleeding on probing and periodontal pocket depth. Coil and Tonzetich<sup>69</sup> also found higher VSC levels in the people with deep pockets which bleed during probing than the people with shallow pockets with low bleeding rate during probing.

A similar relation between periodontitis and halitosis was also determined in our study. VSC level in 1<sup>st</sup>, 3<sup>rd</sup> and 6<sup>th</sup> months were found to be lower than the first measured level in both groups which have periodontal treatment. Dissimilarly, VSC level which is measured in LG is found to be statistically significantly lower than CG in the 1<sup>st</sup> and 3<sup>rd</sup> months.

In the light of this information, we can state that laser treatment which is implemented as an adjunct to SRP has a statistically significant positive effect on clinical parameters and halitosis. In addition to that there is a need for new studies to discover in which mechanisms does laser effect these parameters.

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## EFFECT OF TWO ACTIVATED BLEACHING TECHNIQUES ON SURFACE ROUGHNESS OF DIFFERENT ESTHETIC RESTORATIVE MATERIALS

*İki Aktive Olan Beyazlatma Tekniğinin Farklı Estetik Restoratif  
Materyallerin Yüzey Pürüzlülüğü Üzerine Etkisi*

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**Makale Kodu/Article Code** : 192786

**Makale Gönderilme Tarihi** : 16.06.2016

**Kabul Tarihi** : 28.03.2017

### ABSTRACT

**Objectives:** The aim of this in vitro study was to evaluate surface roughness of six different restorative materials during office bleaching procedures with blue light emitted diode (LED) and diode laser photo activation.

**Materials and Methods:** Filtek TM supreme, Tetric Evo Ceram, Tescera ATL, Clearfill Majesty Esthetic, Durafill VS and IPS Empress 2 materials were evaluated in this study. Twenty specimens, 10 mm in diameter and 2 mm thick, were fabricated from each material using a teflon mold. All specimens were randomly assigned to two groups (n=10). Group 1 received two topical applications of 35% hydrogen peroxide for 20 s. And was photoactivated using LED. Group 2 received topical application of 46% hydrogen peroxide using diode laser. Surface roughness values were measured prior to and following bleaching procedures by using a profilometer. Data were analyzed statistically, by one-way-analysis of variance (ANOVA), post-hoc Tamhane's T2 and independent t tests.

**Results:** Surface roughness values for all restorative materials tested increased after both bleaching procedures (p<0.05). Tescera ATL bleached with diode laser photo activation showed higher surface roughness value than LED activation (p<0.05). However, there were no significant differences in two bleaching methods for other restorative materials (p>0.05).

**Conclusions:** Although clinical effects depend on *in-vivo* conditions, the effects of office bleaching agents should be known and applied cautiously when a colored restoration is bleached or a restoration is neighbored with the tooth bleached.

**Keywords:** Esthetic restorative materials, Dental porcelain, Teeth bleaching, Surface roughness, Semiconductor lasers

### ÖZ

**Amaçlar:** Bu in vitro çalışmanın amacı, mavi ışık yayan diyet (LED) ve diyet lazer ile foto aktive olan ofis tipi beyazlatma prosedürleri esnasında altı farklı restoratif materyalin yüzey pürüzlülüğünü değerlendirmektir.

**Materyal ve Metotlar:** Bu çalışmada Filtek TM supreme, Tetric Evo Ceram, Tescera ATL, Clearfill Majesty Esthetic, Durafill VS ve IPS Empress 2 materyalleri kullanıldı. Yirmi örnek; her biri 10 mm çapında 2 mm kalınlığında olacak şekilde teflon kalıp kullanılarak oluşturuldu. Bütün örnekler rastgele iki gruba ayrıldı (n=10). Grup 1' de topikal uygulanan %35'lik hidrojen peroksit LED kullanılarak 20 saniye süreyle foto aktive edildi. Grup 2' de %46'lık hidrojen peroksit diode lazer kullanılarak topikal olarak uygulandı. Yüzey pürüzlülüğü değerleri başlangıç ve beyazlatma işlemleri sonrasında olmak üzere profilometre yardımıyla ölçüldü. Veriler tek-yönlü varyans analizi (ANOVA), Tamhane's T2 ve bağımsız t testleri yapılarak istatistiksel olarak analiz edildi.

**Sonuçlar:** Yüzey pürüzlülüğü değerleri test edilen tüm restoratif materyallerde her iki beyazlatma prosedüründe de artmıştır (p<0,05). Diode lazer foto aktivasyonu ile beyazlatılan Tescera ATL, LED ile aktive edilenden daha yüksek yüzey pürüzlülüğü değeri gösterdi (p<0,05). Fakat diğer restoratif materyaller için iki beyazlatma prosedüründe de önemli farklılıklar ortaya çıkmadı (p>0,05).

**Çıkarımlar:** Klinik etkiler *in-vivo* şartlara bağlı olmasına rağmen ofis tipi beyazlatma ajanlarının etkileri bilinmeli ve renklenmiş bir restorasyon beyazlatıldığında veya beyazlatılmış diş ile komşu restorasyon varlığında dikkatle kullanılmalıdır.

**Anahtar kelimeler:** Estetik restoratif materyaller, Dental porselen, Diş beyazlatma, Yüzey pürüzlülüğü, Yarı iletken lazerler

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## INTRODUCTION

Dental bleaching is the best conservative treatment to whitening the natural teeth in order to improve aesthetic reasons.<sup>1,2</sup> There are two techniques for bleaching vital teeth: in-office under supervision of a dentist, or at-home, with the use of lower concentration of whitening agents in special trays. In-office bleaching systems produced more rapid results, professional controls the contact of whitening agents with soft tissues and avoidance of the material ingestion. On the other hand, at-home bleaching is being a lower cost procedure in comparison with in-office treatment, being easy to use by patients. Nevertheless, common problems for this technique are sensitivity of the tooth and soft tissue, incorrect use of by patients and overexposure to the over-the-counter products without professional control.<sup>3-7</sup>

Hydrogen peroxide, sodium perborate and carbamide peroxide are the agents used for dental bleaching procedures.<sup>6-8</sup> To enhance or accelerate the whitening process, heat activation of bleaching agent by light, heat or laser is described in the literature.<sup>9</sup> Light-activated bleaching is a method of tooth whitening that can be achieved by utilizing highly concentrated bleaching gel (35 to 50% hydrogen peroxide). Halogen light, derived from relatively low-cost technology, produces high heat generation and loss of pulpal vitality. LEDs (light emitting diodes) are also able to produce light in a specific wavelength and have low amounts of wasted energy and minimum heat generation.<sup>10, 11</sup> Laser technology has rapidly developed during last two decades. Its applications have been successfully implemented in the medical professions.<sup>12</sup> Laser tooth bleaching officially started 1996, with the approval of the argon laser (480 nm) and the CO<sub>2</sub> laser (10.6  $\mu$ m).<sup>13,14</sup> Today three types lasers; argon (488/514 nm), CO<sub>2</sub> (10.6  $\mu$ m), and diode (790-980 nm) lasers are approved for tooth whitening according to US Food and Drug Administration.<sup>10</sup>

In literature several reports exist regarding the influence of bleaching agents on surface morphology of composite<sup>15-20</sup> and ceramic materials<sup>15, 21, 22</sup> and these studies present controversial findings. Beside this there is no information published regarding the potential effects of activated bleaching techniques on the surface roughness of the composites, ceramic and ormocer. Therefore, the purpose of this study was to evaluate the effect of two in-office bleaching techniques (blue light-emitted diode (LED) activated 35% HP and diode laser activated 46% HP) on the surface roughness of composite materials, ormocer and ceramic. Two null hypothesis were purposed: 1) that the surface roughness of restorative materials would not affected by bleaching techniques. 2) that there was no significant difference between two bleaching techniques.

## MATERIALS AND METHODS

The effect of two commercial in-office bleaching techniques on the surface roughness of 6 restorative materials was evaluated. The materials, product names, and manufacturers are listed in Table 1.

**Table 1.** Materials used

Materials	Abbreviation	Manufacturer	Type	Lot Numbers
Filtek™ Supreme XT	FS	3M ESPE Seefeld, Germany	Nanofilled	20090220
Clearfill Majesty™ Esthetic	CME	Kuraray Medical Inc, Okayama, Japan	Nanofilled	0029AB
Tetric® EvoCeram	TEC	Ivoclar Vivadent AG, Schaan, Liechtenstein	Nanohybrid	K29326
Durafill® VS	Df	Heraeus Kulzer GmbH, Hanau, Germany	Microfilled	010214
Tescera™ ATL	TATL	Bisco Inc. Schaumburg, U.S.A	Ormocer	0700004069
IPS Empress 2®	IPS2	Ivoclar Vivadent AG, Schaan, Liechtenstein	Ceramic	M22932

Twenty discs were fabricated by using Teflon molds (10-mm diameter, 2 mm thickness) from each of the restorative materials. Teflon molds were positioned on a transparent plastic matrix strip (Universal strips; Extra Dental, Istanbul, Turkey) lying on a glass plate and then filled with the restorative composite materials. After having inserted the materials into the teflon mold, a transparent plastic matrix strip was put over them and a

glass slide was placed in order to flatten the surface. A glass slide was then placed over and pressure was applied to extrude excess materials. Filtek™ Supreme (FS), Clearfil Majesty™ Esthetic (CME), Tetric®EvoCeram (TEC) and Durafill (Df) composite materials were then light polymerized for 40 s in two steps through the glass slide with a blue light-emitted diode (Bluephase Ivoclar Vivadent Schaan, Liechtenstein) with irradiance of 470 mW/cm<sup>2</sup>, constantly monitored by a radiometer (Curing Radiometer Model 100, Demetron Corp., Danbury, CT, USA). A total of 80 composite specimens were made for this study. Tescera ATL (TATL) specimens were polymerized using the same light unit for 180 s in accordance with the manufacturer's directions. As for the polymerization unit (BISCO, Inc, Schaumburg, IL, USA) provided for TATL specimens, it comprised two specialized cups (one for pressure/light and one for water/pressure/light/heat). TATL specimens were placed in one increment and polymerized with light polymerization cup for 5 minutes. The specimens were then removed from first cup and ormocer specimens were postcured in the heat cup submerged in water at a temperature of 120°C and under a pressure of 6 bar for 13 minutes. A total of 20 ceromer specimens were made. Composite and ormocer specimens were regularized with a sequence of 600-, 1,000-, 1,200-grit aluminum oxide abrasive papers under running water using the Metaserve2000 polishing machine (Buehler UK Ltd. Coventry, West Midlands, England) with hand pressure to obtain a well-plane-shaped surface that allowed positioning of specimens for the roughness measurements. And then specimens were polished with a felt disc by same machine and a single investigator.

A leucite based all-ceramic (IPS Empress2, IPS2) specimens (10 mm diameter and 2 mm thickness) were waxed (S-U-Ceramo-Carving-Wax, Schuler-Dental, Ulm, Germany) with using a metal mold. The wax specimens were sprued, and then pressed after investment. All

procedures were performed with IPS2 materials following the manufacturer's recommendations. Ceramic specimens were then polished with 220-, 400-, 600-, 1000-grit aluminum oxide abrasive papers under water and glazed according to the manufacturer's instructions. A total of 20 ceramic specimens were made.

Finished specimens were cleaned in distilled water with an ultrasonic cleaner (Biosonic UC 50, ColteneWhaledent, Cuyahoga Falls, OH, USA) for 5 minutes. Then, they were dried and stored in distilled water at room temperature for 24 hours before the test procedure.

A total of 120 specimens, 20 of each of the composite materials, ormocer and ceramic were fabricated and randomly divided into two groups (n=10) according to bleaching procedure. The first group specimens were bleached with Whiteness HP (WHP) (Dentscare LTDA, Joinville, Brazil) which is contain 35% hydrogen peroxide (HP), as the bleaching agent. The red activator was mixed the colorless bleaching gel at the moment of use according to the manufacturer's instructions. The mixture was applied on the surface of specimens with approximately 1 mm thick layer for 10 minutes and specimens were photoactivated with LED for 20 s. Following this, the bleaching agents were washed off. This procedure was repeated 4 times with a 2-min interval between them.

The second experimental group specimens were bleached with Laserwhite 20 (LW) (MT Promedt GmbH St. Ingbert, Germany) which is contain 46% HP. The caps were removed from both the activator and base gel syringes. The two syringes were connected by twisting one syringe onto other until fully tightened. To mix, pushed one syringe into other and reversed action for 25 times and it was applied approximately 1 mm thick layer on the specimen's surface for 5 minutes and then photoactivated with a diode laser (Ezlase™ Laser, wavelength 980 nm, average power 7 watt, energy setting 200 J, continuous mode) for 30 s. The bleaching agents remained on the

specimens surfaces for another 5 minutes and irradiated again for 30 s. Following this, the bleaching agents were washed off. This procedure was repeated 2 times with a 5-min interval between them. After all application surfaces were washed with distilled water and dried with oil-free compressed air.

The average surface roughness ( $R_a$ ,  $\mu\text{m}$ ) of the treated specimens were measured with the Mitutoyo SurfTest-402 Surface Roughness Tester (SurfTest 402 Analyzer Mitutoyo Corporation, Tokyo, Japan). Three traces were recorded for each specimen at three different locations (parallel, perpendicular, and oblique). The mean surface roughness value was calculated by averaged of the three measurements. All readings were performed by a single investigator. Roughness values were recorded at baseline and after exposure to the bleaching agents for each specimen. For surface characterization, one representative specimen from each group with  $R_a$  values close to the mean values were selected. The specimen was coated with gold and examined under a scanning electron microscope (SEM), (LEO 440, Electron Microscopy Ltd, Cambridge, USA).

### Data Analysis:

Statistical analyses were performed with SPSS 15.0 (Windows; SPSS Inc, Chicago, IL, USA) for WINDOWS. Sapiro-Wilk test was used for the measurement of normalization of data and parametrical tests were used for statistical analysis. The baseline measurements of roughness of the materials were accepted co-variant values and Univariant analysis was used to evaluate differences between materials and study groups. If there were significantly differences between 6 different materials, then data were analyzed by using one-way ANOVA test. The homogeneity of variances was measured by using Levene's test. Because the values of the roughness were not homogen distribution, post hoc Tamhane's T2 test was used for the statistical analysis. If statistically significant differences were found between two

bleaching procedures, independent t-test was used for the statistical analysis. P values less than 0.05 were considered to be statistically significant in all tests ( $p < 0.05$ ).

## RESULTS

The mean values and standard deviations of roughness measurements of each study group are presented in Table 2, respectively. The percentage values of the discrepancies of roughness (Table 2) measurements were also recorded in WHP and LW groups.

**Table 2.** Surface roughness measurements of the study groups and materials before and after bleaching procedures (Mean  $\pm$  SD)

Materials	Bleaching Procedures	Before Bleaching	After Bleaching	Differences in Percentage Values of Surface Roughness
Filtek™ Supreme (FS) (n=20)	WHP (n=10)	0.15 $\pm$ 0.04	0.18 $\pm$ 0.04 <sup>a</sup>	31.37 $\pm$ 40.01
	LW (n=10)	0.17 $\pm$ 0.08	0.21 $\pm$ 0.08 <sup>a</sup>	21.70 $\pm$ 19.54
Clearfil Majesty™ Esthetic (CME) (n=20)	WHP (n=10)	0.21 $\pm$ 0.11	0.28 $\pm$ 0.12 <sup>a</sup>	46.72 $\pm$ 44.02
	LW (n=10)	0.30 $\pm$ 0.09	0.40 $\pm$ 0.07 <sup>a</sup>	39.72 $\pm$ 34.94
Tetric® EvoCeram (TEC) (n=20)	WHP (n=10)	0.23 $\pm$ 0.10	0.36 $\pm$ 0.13 <sup>a</sup>	59.03 $\pm$ 28.62
	LW (n=10)	0.21 $\pm$ 0.10	0.37 $\pm$ 0.12 <sup>a</sup>	115.86 $\pm$ 177.02
Durafill (Df) (n=20)	WHP (n=10)	0.19 $\pm$ 0.07	0.38 $\pm$ 0.08 <sup>a</sup>	35.46 $\pm$ 26.38
	LW (n=10)	0.25 $\pm$ 0.05	-13.89 $\pm$ 12.41 <sup>a</sup>	61.05 $\pm$ 55.19
Tescera ATL (TATL) (n=20)	WHP (n=10)	0.15 $\pm$ 0.02	0.18 $\pm$ 0.05 <sup>a</sup>	21.10 $\pm$ 19.18 <sup>a*</sup>
	LW (n=10)	0.19 $\pm$ 0.07	0.32 $\pm$ 0.16 <sup>a</sup>	71.59 $\pm$ 54.01
IPS Empress 2 (IPS2) (n=20)	WHP (n=10)	0.60 $\pm$ 0.05	0.65 $\pm$ 0.07 <sup>a</sup>	8.12 $\pm$ 7.17 <sup>a</sup>
	LW (n=10)	0.53 $\pm$ 0.09	0.61 $\pm$ 0.08 <sup>a</sup>	16.93 $\pm$ 12.20

<sup>a</sup>: All restorative materials showed increased surface roughness values after bleaching procedures ( $p < 0.05$ ).

<sup>†</sup>: Differences in percentage values of surface roughness of TATL and IPS2 were lower than TEC in WHP group,  $p < 0.05$

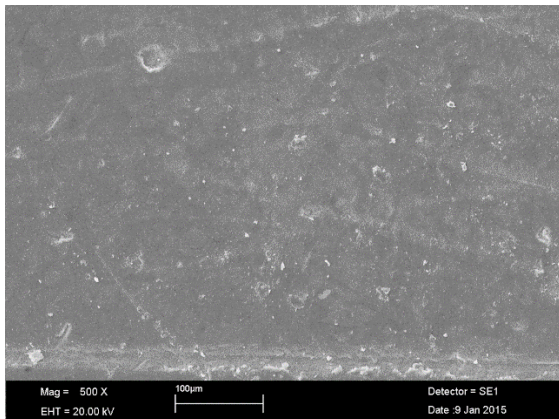
<sup>\*</sup>: Differences in percentage values of surface roughness of TATL bleached with LW were significantly higher than bleached with WHP,  $p < 0.05$

All restorative materials showed an increased surface roughness value after bleaching procedures ( $p < 0.05$ ). Univariant analysis revealed that there were significant differences among the changes of surface roughness values for the tested materials ( $F = 4.97$ ,  $p < 0.05$ ) and among bleaching methods ( $F = 11.37$ ,  $p < 0.05$ ). In WHP group, the surface roughness values of the TEC were higher levels than TATL and IPS2 (ANOVA,  $p < 0.05$ ). There were no statistically significant differences in changes of the surface roughness among tested materials for LW group. Independent t test demonstrated that the differences in percentage values of the surface roughness of TATL bleached with LW were higher levels than bleached with WHP ( $p < 0.05$ ). On the other hand, the changes of the surface roughness of the other

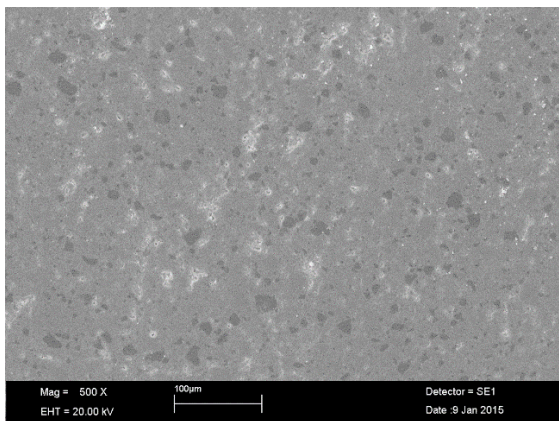


restorative materials bleached with LW were similar levels in WHP applications ( $p>0.05$ ).

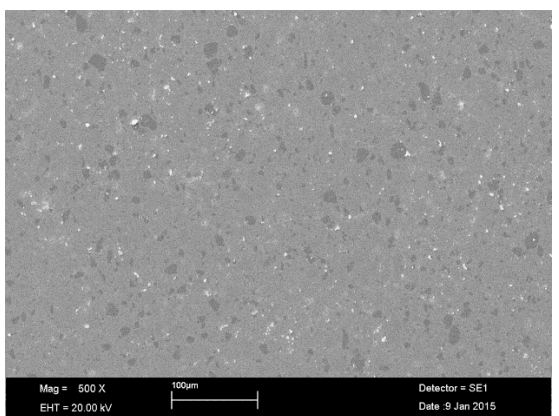
Figs 1, 2, 3 presents scanning electron microscope images of the bleached restorative materials surface. Different specimens from groups bleached with LW and WHP had different topographies.



**Figure 1:** Representative SEM micrograph of TEC specimen bleached with WHP with the highest mean surface roughness value.



**Figure 2:** Representative SEM micrograph of TATL Hard specimen bleached with LW with the highest mean surface roughness value.



**Figure 3:** Representative SEM micrograph of TATL specimen bleached with WHP with the highest mean surface roughness value.

## DISCUSSION

In this *in vitro* study surface roughness values of restorative materials tested changed after exposed with two bleaching systems so the null hypothesis that the two in-office bleaching techniques would not alter the values of surface roughness was rejected. In comparison of the two bleaching techniques, both of the bleaching techniques demonstrated similar effects on surface roughness of restorative materials. After activated bleaching the surface roughness of restorative materials increased, so the second hypothesis of this study that there were no significant difference between two bleaching techniques was accepted.

With respect to the surface roughness of different esthetic materials after two bleaching system, this *in vitro* study showed that WHP and LW bleaching technique causes the changes in the surface of the materials tested. Some investigations have been published analyzing the efficacy of different concentrations of the carbamide peroxide or hydrogen peroxide regarding the bleaching procedures.<sup>19-23</sup> The studies demonstrated that 35% carbamide peroxide or 35% hydrogen peroxide regarding in-office bleaching procedures were not detrimental effects on the surface roughness of the microfilled and hybrid composite resins<sup>19</sup>, compomers, giomers, resin-modified glass ionomer cements<sup>23</sup> and ceramic restorations.<sup>21</sup> On the other hand, Dogan *et al.*<sup>24</sup> found that surface roughness of microfilled, nanohybrid and ormocer-based resin composites were decreased upon bleaching with 37% carbamide peroxide, 35% hydrogen peroxide and 16% carbamide peroxide. However, Hafez *et al.*<sup>18</sup> reported that 35% or 38% hydrogen peroxide office bleaching agents significantly increased the surface roughness of the microfilled and microhybrid composites. Again Rosentritt *et al.*<sup>25</sup> found that the surface roughness of the tooth colored restorative materials, hybrid composites, microfilled composite, compomer, and ormocer, increased after bleaching. The

results of the present study are in agreement with the findings of these previous studies.<sup>24,25</sup> In current study, nanofilled, nanohybrid, microhybrid, ormocer and ceramic specimens were used for the bleaching of the restoration surface. All restorative materials were polished and 35% hydrogen peroxide, as in-office bleaching agent was applied for 10 minutes and photoactivated for 20 s. The results of present study cannot be affirmed that tested composites, ormocer and ceramic were resistant under bleaching systems. The changes in surface roughness of different restorative materials after bleaching are material's composition and time dependent.

The use of laser energy has some advantages in-office bleaching products. Studies demonstrated that the laser-activated bleaching has no any ultra structural effects within enamel.<sup>26</sup> Gurgan *et al.*<sup>27</sup> recommended that bleaching with laser resulted less tooth and gingival sensitivity than plasma arc lamp or LED system. In present study, for the bleaching of the different composition of the restorative materials, 46% HP was applied approximately 1 mm thickness on the specimen's surface for 5 min and then photoactivated with diode laser system (wavelength 980 nm, average power 7 watt, energy setting 200 J, continuous mode) for 30 s. Diode laser activated 46% hydrogen peroxide caused an increasing in surface roughness of nanofilled, nanohybrid, microfilled, microhybrid, ormocer and ceramic materials.

In this study, as Univariate analysis revealed that both light activated bleaching techniques significantly increased the surface roughness of restorative materials. One reason for this is that there might be an increase in release of free radicals from bleaching agents when the temperature rises, thus inducing greater effects on dental materials.<sup>28</sup> Also a previous study<sup>29</sup> presented that surface roughness of a ceramic material increased with increasing HP concentration. In this study the bleaching agents used are at high concentrations

(35% and 46%). Another result of this study was that two bleaching procedures were not significantly different in the changing of the surface roughness of the restorative materials, except the TATL. For ormocer (TATL) material, LW causes higher the degradation of the surface properties than WHP technique. Ormocer-based composite resins consisted of organic polymers, inorganic unit and inorganic-organic unit (polysiloxanes).<sup>30</sup> Dogan *et al.*<sup>24</sup> suggested that bleaching agents might cause degradation in the organic polymers of ormocers.

It has been found that surface roughness of the microfilled composite resins (Durafil) was the lowest values compared with themicrohybrid (GradiaDiect) and an Ormocer-based (Admira) resin composite upon HP bleaching.<sup>24</sup> On the contrary, microhybrid composites (TPH3) showed higher surface roughness than microfilled resins (Durafil) bleaching with 35% hydrogen peroxide and 38% hydrogen peroxide. In present study, for nanohybrid composite (TEC), a significant increase in surface roughness was observed in WHP group and these changes were higher levels than ormocer (TATL) and ceramic (IPS2). The lower changes of the surface roughness of the ceramics might be depend on the brittle, hard, strong in compression properties. This study also showed that the changes of the surface roughness among tested materials were similar levels in LW group.

When evaluating the change on surface roughness values, it is important to indicate that the specimens were stored in distilled water instead of saliva. Further *in vivo* research is needed to determine the surface roughness of restorative materials after bleaching treatment. The effects of office bleaching agents should be known and applied cautiously when a colored restoration is bleached or a restoration is neighbored with the tooth bleached.

## CONCLUSIONS

It has been concluded that there was a significant surface roughness in all restorative materials after office bleaching procedures with blue light-emitted diode (LED) and diode laser (DL) photoactivation. After WHP bleaching technique, the surfaces of the nanohybrid TEC material showed significantly higher roughness values than ormocer (TATL) and ceramic (IPS2). However, surface roughness in all tested materials for LW bleaching was minimal, when measured with surface roughness tester. The evidence from this study, would suggest that bleaching may adversely affected the surface texture of the restorative materials, therefore patients who have restorative materials should be informed of its possible effects.

## ACKNOWLEDGMENTS

The authors do not have any financial interest in the companies whose materials are included in this article.

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## NONSURGICAL CLOSURE OF OROANTRAL COMMUNICATIONS USING OCCLUSAL SPLINTS

*Oroantral Açıklıkların Okluzal Splintler ile Cerrahisiz Kapatılması*

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**Makale Kodu/Article Code** : 201578

**Makale Gönderilme Tarihi** : 19.09.2016

**Kabul Tarihi** : 04.03.2017

### ABSTRACT

**Purpose:** Oroantral communications (OACs) may close spontaneously, especially when the defect has a size smaller than 2-3 mm, whereas larger openings require surgical closure. The aim of this retrospective study was to present our experience with non surgical closure of small and large OACs with occlusal splints.

**Materials and Methods:** Clinical and radiographic data of twenty patients who had used occlusal splints after the occurrence of an acute OAC were included in this study. Two groups were created according to the size of the defects: Group A: defects smaller (<) than 5 mm; and Group B: 5 mm and wider (≥). In all patients, a well fitted soft occlusal splint was placed for hermetic closure of the opening. All patients were followed up weekly and the splint use was stopped when complete epithelization of the OAC was observed clinically. The relationship between the size of OACs, treatment outcome, and healing time was compared statistically.

**Results:** OAC was healed spontaneously in all patients, except one. The healing time was found to be significantly higher in group B than in group A. No significant difference was found between the groups with respect to the success of the treatment.

**Conclusion:** The use of occlusal splints seems to improve the spontaneous healing of the OACs.

**Key words:** Oroantral communication, occlusal splint, nonsurgical closure

### ÖZ

**Amaç:** Defekt boyutu 2-3 mm olan oroantral açıklıklar spontan olarak iyileşebilirken büyük açıklıklarda cerrahi müdahale gereklidir. Bu çalışmanın amacı, küçük ve büyük oroantral açıklıkların, okluzal splintler ile cerrahisiz tedavisi hakkında bilgi sunmaktır.

**Gereç ve Yöntem:** Bu çalışmaya akut oroantral açıklık gelişen 12 hasta dahil edildi. Defektin boyutuna göre 2 grup oluşturuldu. Grup A: defektin 5 mm'den küçük olduğu; Grup B: defektin 5 mm ve daha fazla olduğu hastalardan oluşmaktaydı. Bütün hastalara açıklığın kapatılması için yumuşak okluzal plak yapıldı. Hastalar haftalık olarak takip edildi ve klinik olarak tam epitelizasyon sağlandığında splint kullanımı bırakıldı. Açıklıkların boyutu ile iyileşme süresi ve tedavi sonuçları arasındaki ilişki istatistiksel olarak karşılaştırıldı.

**Sonuçlar:** Bir hasta dışında, tüm hastalarda oroantral açıklıklar spontan olarak iyileşti. Grup B'nin iyileşme süresinin Grup A'dan belirgin olarak fazla olduğu görüldü. Tedavinin başarısı ile ilgili gruplar arasında herhangi bir fark bulunamadı.

**Sonuç:** Okluzal splintlerin kullanımı, oroantral açıklıkların spontan olarak iyileşmesinde faydalı olabilir.

**Anahtar Kelimeler:** Oroantral açıklık, okluzal splint, cerrahisiz kapama

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## INTRODUCTION

Oroantral communication (OAC) is an opening between the maxillary sinus and the oral cavity. The close relationship between the root apices of the teeth and the maxillary antrum may cause this common complication after dental extractions in the posterior maxilla.<sup>1</sup> To prevent chronic sinusitis and the development of fistulas, it has generally been accepted that all such defects should be surgically closed within 24 to 48 hours.<sup>2</sup> Various techniques for the closure of OACs have been proposed for the closure of oroantral fistulas, including buccal or palatal alveolar flaps and their modifications, the use of bone grafts and biomaterials. The preferred technique may vary from one clinic to another, depending on past experience.<sup>3</sup> Although spontaneous healing may occur, especially when the size of the defect is 3 mm or less<sup>4,5</sup> and sinus disease is absent or eliminated, this is not guaranteed in all cases.

The purpose of the present study was to assess the closure of acute OACs using an alternative non-surgical treatment protocol.

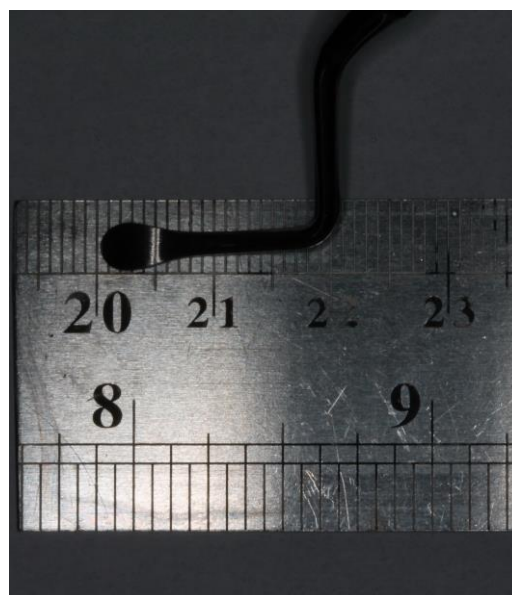
## MATERIALS AND METHODS

This study followed the Declaration of Helsinki on medical protocol and ethics and the regional Ethical Review Board of Erciyes University approved the study. The clinical and radiographic data of the twenty acute OAC patients, treated with occlusal splint at the Department of Oral and Maxillofacial Surgery, Erciyes University Faculty of Dentistry, between 2011 and 2012, were included in this study. They were all healthy and nonsmokers. The orthopantomogram radiographs demonstrated the close proximity of the roots of the involved teeth in all cases. (Figure 1) The diagnosis of OACs were made by an experienced oral and maxillofacial surgeon with both inspection of the tooth socket and valsalva maneuver, in all patients. The size of the perforations were determined by measuring the opening with a dental curette of approximately 5 mm in diameter (Figure 2 and 3), and two groups were created. Group A was consisted of defects

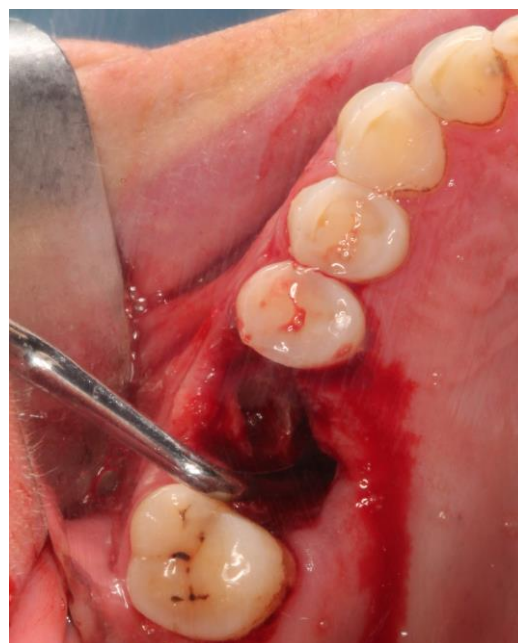
smaller ( $<$ ) than 5mm and group B was consisted of, defects of 5mm and wider ( $\geq$ ).



**Figure 1:** (Pt. 6) Close relationship between the right upper first molar and maxillary sinus



**Figure 2:** The dental curette of ~5 mm in diameter



**Figure 3:** (Pt. 4) Measurement of an acute OAC with the dental curette

In all patients, OACs were debrided and irrigated with saline as first line of the treatment. An oxidized cellulose hemostatic agent (SkyTeks Reoxcel®, İstanbul, Turkey) was then placed into the extraction socket and a well fitted soft occlusal splint was immediately prepared and placed to the upper jaw for hermetic closure of the opening with in 24 hours (Figure 4).



**Figure 4:** A soft occlusal splint in place for hermetic closure of the OAC

The fitting surface of the splint was coated with chlorhexidine gel prior to insertion. All patients were strictly instructed to wear the splint continually, removing it only after the meals at what time they rinse their mouth and the splint with clorhexidine solution. They were also advised to avoid activities which increase the intraoral or intranasal pressure such as smoking, drinking with straws, and blowing their nose. A standard postoperative medication, including amoxicillin-clavulanic acid 1 g, twice a day, for ten days to prevent antral infection, flurbiprofen 100 mg for pain when necessary, and clorhexidine mouth wash as long as the treatment takes, was prescribed to all patients. All patients were advised to visit our clinic for controls and irrigation of the sinus with saline solution weekly throughout the treatment time. The splint use was stopped after the epithelization completed and the healing of the OAC was observed clinically.

Data were statistically analysed with R2.14.0 programme. Mann- Whitney U test

was used to evaluate the relationship between the size of OACs and healing time.

## RESULTS

Of the 20 patients 11 were female (55%) and 9 were male (45%). The mean age of the patients were 27,05 (min: 14; max: 50). An overview of the descriptive data and treatment results were represented in Table-1. Acute OACs were occurred as a complication of tooth extractions in 19 patients and, of a cyst enucleation with tooth extraction in one patient. The location of OACs was the first molar tooth in 14 patients (70%), while it was the second molar in 4 (20%), and the third molar in 2 (10%) patients.

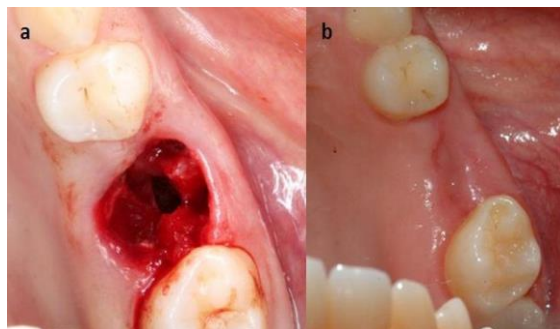
**Table 1.** Overview of the descriptive patient data and treatment results

Pt. No	Gender	Age	OAC size(mm)	OAC Location	Indication for Extraction	Healing Time (day)
1	male	45	>7mm(10 mm)	LFM	apical lesion	14
2	male	17	>5 mm	RFM	carious	No healing(14 days splint used)
3	female	25	>7 mm	RFM	carious	21
4	female	50	5 mm	LFM	carious	14
5	female	18	3-4 mm	RFM	carious	10
6	female	32	5 mm	RFM	carious	21
7	female	15	7 mm	LFM	carious	35
8	female	27	5 mm	LTM	nonfunctional	10
9	female	20	3-4 mm	LSM	carious	10
10	male	24	3-4 mm	RFM	carious	10
11	male	45	2 mm	LSM	carious	7
12	female	24	2 mm	LFM	carious	10
13	male	17	2 mm	RFM	carious	10
14	male	20	2 mm	RSM	carious	10
15	male	45	7 mm	RSM	endodontic	21
16	male	30	3 mm	RTM	carious	14
17	male	26	3 mm	RFM	carious	7
18	female	14	8 mm	RFM	carious	21
19	female	31	5 mm	LFM	carious	14
20	female	16	10 mm	RFM	carious	21

**Abbreviations:** RFM: Right first molar; RSM: Right second molar; RTM: Right third molar LFM: Left first molar; LSM: Left second molar; LTM: Left third molar

All patients, except one, healed completely, and the OACs closed spontaneously (Figure 5-a, b; 6-a, b). Surgical closure of the OAC was performed in this patient after 35 days, and no complications were observed in the healing period. The mean healing time for the OACs was 14.7 days, ranging from 7 to 35 days. A significant difference was found between OAC size and healing time (Table 2). No complications such as sinusitis, recurrence of

OAC, or infection occurred during seven to nine months of follow-up period.



**Figure 5-a:** (Pt. 6) Acute OAC of ~5 mm in diameter **Figure 5-b:** (Pt. 6) Two months after the extraction



**Figure 6-a:** (Pt. 7) Acute OAC of 7 mm in diameter **Figure 6-b:** (Pt. 7) 2 months after the extraction

**Table 2.** The relation between OAC size and healing time

	OAC size		P
	<5 mm	≥ 5 mm	
Patients (n)	9	10	
Healing time (median±Sd)	10.00±2.048	21.00±6.92	0.01

Mann Whitney U Test, p<0.05

## DISCUSSION

OACs are pathological entities those are often occurred during or after dental treatments such as surgical extractions, removing cysts, implant surgery, trauma, tumors and pathological lesions of the maxillary sinus.<sup>6</sup> If the opening left untreated, an oroantral fistula may develop and patients may experience sinusitis within 48 hours to 2 weeks.<sup>3, 6, 7</sup> To prevent sinus infection and the development of a fistula, it has generally been recommended that these defects should be closed within 24 to 48 hours.<sup>2</sup>

Despite the simplicity and safety of most of the procedures, each surgical technique has its own drawbacks such as partial obliteration of the vestibul depth requiring a secondary

vestibuloplasty when using buccal mucosal flaps<sup>8</sup>; tissue bunching and liquid passage beneath the flap<sup>4</sup> when using palatal rotation flaps, and an increased risk of infection related to buccal fat pad flaps. Donor site morbidity is one disadvantage, which further increases postoperative pain and discomfort, depending on the surgical technique applied. The need for surgical expertise and equipment, postoperative pain and swelling are also among the various disadvantages.<sup>9</sup> In addition, as a clinical observation, surgical options may be avoided by some patients, when they only expect a tooth extraction procedure as their physician describes the extent of a possible surgery.

Various nonsurgical techniques has been proposed in the literature. The most preferred technique is placing a gauze sponge dressing that is supported with an eight suture or acrylic splint for 48 h, to protect the blood clot in the tooth socket.<sup>3</sup> Resorbable hemostatic gauze composed of reconstituted oxidized cellulose was also used to maintain the blood clot in place.<sup>10</sup> Susan et al reported a 80% successful rate with biodegradable polyurethane foam in patients with OACs with diameters up to 7 mm.<sup>11</sup> However, good oral hygen, patient cooperation and close follow up is very important in such cases.

The maximum size of OACs that tend to heal spontaneously is controversial in the literature. Most reports agreed on that small defects of 1 to 2 mm heals spontaneously after the formation of a blood clot.<sup>3, 6, 12, 13, 14, 15</sup> Others contend that defects smaller than 5 mm may close naturally when there is no prior infection.<sup>2, 16</sup> However, it is difficult to determine the size of OACs clinically.<sup>17</sup> In our study, we measured the OACs with a dental curette of approximately 5 mm in diameter, and, classified them into two groups according to the defect sizes which were described either 'less than 5 mm' or '5 mm or greater'. Spontaneous healing was observed at defects either less or larger than 5 mm. No significant difference was found



between the two groups with regard to the treatment success. However, the healing time was significantly higher in the larger defect group. These results suggest that the spontaneous regeneration of oral mucosa may be supported by the use of occlusal splints in the defects either less or larger than 5 mm. Nevertheless, the healing period may be longer for larger defects, as in one of our cases, in which complete epithelization was observed at the 35th day. Because of the reduction of the defect size over time, and no complications associated to the maxillary sinus were observed, the splint use was continued for a long time in this patient. In one patient in group B however, no reduction of the defect size were observed during the 14 days of follow period. Therefore, the OAC was closed surgically with buccal fat pad.

Primary reason of immediate closure of the OAC is to prevent the risk of oral bacteria invading the maxillary sinus and causing maxillary infection, or in long term the development of a fistula.<sup>11</sup> An oroantral fistula is a canal covered with epithelium which may or may not be filled with granulation tissue or polyposis of the sinus membrane. The airflow from the sinus trough the oral cavity facilitates the formation of a fistular canal.<sup>18</sup> Sokler et al. proposed that, by permanent wearing of a palatal plate, with occasional rinsing of the sinus with a physiological solution, enteral application of an antibiotic and rinsing with a solvent antibiotic, it is possible to achive spontaneous closure of the fistula, even in cases which have existed for more than a month.<sup>18</sup> Logan and Coates<sup>19</sup> used this method for OACs in an immunocompromised patient, de-epithelizing the fistula and covering the OAC with an acrylic splint. They achieved complete healing after continuous use of the splint for eight weeks. In the present study, with a similar method, acute OACs healed completely, in a period of 7 to 35 days, with no complications in 6-8 months of follow up period, in healthy patients. We believe, as long as the air current, which may disrupt the blood clot, is prevented to pass through the OAC,

and all the measures for sinus infection are applied, the fistula may close spontaneously.

The presented technique has in fact been used for years to support surgical flaps in oral and maxillofacial surgery. There are several advantages of using occlusal splints to treat OACs when compared to the surgical options. First, this technique is minimal invasive and can be applied immediately after tooth extraction. Second, dental practitioners can also treat OACs immediately using this method. Third, it may be more acceptable for the patients due to the decreased rate of morbidity of this procedure. The drawbacks of this method are the necessity of patient compliance, and the need for follow up appointments once a week until the OAC is completely closed.

In conclusion, immediate diagnosis and adequate treatment of OACs are very important in order to prevent the formation of an oroantral fistula, and subsequent complications. The use of an occlusal splint with systemic antibiotics, and antimicrobial mouth washes seems to be safe and predictable for the closure of OACs as a nonsurgical method in either small or large perforations of the maxillary sinus. Further prospective studies are needed which compares the treatment results of different non surgical procedures in the treatment of acute OACs.

#### **ACKNOWLEDGEMENT**

This report was presented as a poster at the 6th AÇBİD International Oral and Maxillofacial Surgery Society Congress 30th of May – 3rd of June, 2012, Antalya, Türkiye

#### **CONFLICT OF INTEREST**

Authors have no conflict of interest.

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## AWARENESS ABOUT PERIODONTITIS AND PRE-TERM LOW BIRTH WEIGHT INFANTS AMONG GYNECOLOGISTS IN CHENNAI- A QUESTIONNAIRE STUDY

*Chennaideki Jinekologların Periodontitis ve Düşük Doğum Ağırlıklı Prematüre Bebekler Hakkındaki Farkındalığı: Bir Anket Çalışması*

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**Makale Kodu/Article Code** : 201578

**Makale Gönderilme Tarihi** : 25.06.2016

**Kabul Tarihi** : 28.03.2017

### ABSTRACT

**Background:** Periodontal infection has been associated with adverse pregnancy outcomes. Subsequently it is important that gynecologists are educated about hormonal effects on women's oral health. The current study assessed gynecologist's awareness regarding the effect of female sex hormones on periodontal health and preterm delivery.

**Materials and methods:** Sixty-six gynecologists from the city of Chennai completed a questionnaire regarding awareness about female hormonal and periodontal health and its effects on pre-term low birth weight infants. Respondents were divided into three groups: Group A, (doctors who practiced at a medical colleges) Group B (doctors who practiced at private hospitals) and Group C. (doctors who practiced at both medical colleges and private hospitals) Survey responses were collected and data between the groups were statistically compared.

**Results:** Our findings showed that most gynecologists were aware and concerned about female patient's oral health during various hormonal phases. However, gynecologists practicing at medical colleges (Group A) and gynecologists practicing at both medical colleges and private hospitals (Group C) had significantly greater health awareness than doctors practicing at private hospitals. (Group B)

**Conclusion:** The results of the current study imply the fact that there is adequate knowledge about the effects of hormonal changes in the periodontal tissues. However, there is limited incorporation of this knowledge, especially among gynecologists who are exclusively into private practice.

**Keywords:** Periodontitis, preterm low birth weight, scaling, root planing

### ÖZ

**Amaç:** Periodontal enfeksiyon, gebeliğin olumsuz sonuçlarıyla ilişkilendirilmiştir. Bundan dolayı jinekologların kadınların ağız sağlığı üzerindeki hormonal etkileri konusunda eğitim alması önemlidir. Mevcut araştırma kadın seks hormonlarının periodontal sağlık ve erken doğum üzerindeki etkileri konusundaki jinekoloğun farkındalığını değerlendirdi.

**Gereç ve yöntem:** Chennai şehrinde altmış altı jinekolog, kadınlarda hormonal ve periodontal sağlık ile düşük doğum ağırlıklı prematüre bebeklere etkileri konusundaki bir anketi doldurdu. Katılımcılar, A Grubu (tıp fakültesinde çalışan jinekologlar), B Grubu (özel hastanelerde çalışan jinekologlar) ve C Grubu (hem tıp fakültelerinde hem de özel hastanelerde çalışan jinekologlar) olmak üzere üç gruba ayrıldı. Anket yanıtları toplandı ve gruplar arasındaki veriler istatistiksel olarak karşılaştırıldı.

**Bulgular:** Çalışmanın sonuçları, çoğu jinekoloğun, çeşitli hormonal fazlarda kadın hastalarının ağız sağlığı konusunda bilgili olduklarını ve endişe duyduğunu ortaya koymuştur. Bununla birlikte, tıp fakültelerinde çalışan jinekologlar (Grup A) ve hem tıp fakültelerinde hem de özel hastanelerde çalışan jinekologlar (Grup C), özel hastanelerde çalışan doktorlardan (Grup B) istatistiksel olarak anlamlı derecede daha fazla sağlık bilincine sahip bulundu.

**Sonuç:** Bu çalışmanın sonuçları, hormonal değişikliklerin periodontal dokular üzerindeki etkileri hakkında yeterli bilgi bulunduğu sunmaktadır. Bununla birlikte, bu bilginin, özellikle özel hastanelerde çalışan jinekologlar arasında sınırlı bir şekilde göz önünde bulundurulması söz konusudur.

**Anahtar Sözcükler:** Periodontitis, prematüre düşük doğum ağırlığı, diş yüzeyi temizliği, kök yüzeyi düzleştirme

## INTRODUCTION

A high prevalence of periodontitis is noted among adults regardless of sex, race, education, residence or socio economic status. Changes in female sex hormone levels during pregnancy are related to the enhanced susceptibility to gingival inflammation.<sup>1</sup> Female sex hormones have a multifunctional influence on the periodontal condition in different parts of the life cycle in women.<sup>2</sup> These hormones also play an important role in the pathogenesis of pregnancy related gingivitis.<sup>3</sup> Increased sex steroid hormone levels can cause edema in tissues by increasing the vascular permeability and cellular proliferation in blood vessels.<sup>4,5</sup> Elevated estradiol and progesterone concentrations during pregnancy alter the quality of sub-gingival microbiota towards a higher anaerobe-aerobe ratio by favoring the growth of certain gram-negative anaerobes in the oral cavity.<sup>6</sup>

Research clearly demonstrates that puberty, menstrual cycle, pregnancy, oral contraception use and menopause affect gingival tissue. Since gynecologists assess and treat women across their life span and during these hormonal changes, it is important that these doctors understand the influence of hormonal fluctuations on a women's periodontal health. Pre-term low birth weight infants (those infants who are born in less than 37 weeks of gestation and have a birth weight of less than 2500 grams) are prone to various abnormalities like respiratory problems, neuro-developmental problems and congenital problems.<sup>7</sup> There are various causes of such preterm low birth weight deliveries and periodontal infection is said to be one of them.<sup>8</sup> Gestational length can be affected by both generalised infections, including viral respiratory infections, diarrhoea and malaria and more localised infections of the genital and urinary systems.<sup>9-12</sup>

A periodontal infection may influence the pregnancy outcomes by providing a source of

gram-negative anaerobic organisms and bacterial components such as lipopolysaccharides. These can trigger release of immune mediators such as PGE2 and TNF- $\alpha$ , which is normally involved in normal parturition, and in turn, may influence the course of pregnancy.<sup>13, 14</sup> Therefore, this study assesses gynecologists' knowledge regarding the awareness about female hormonal and periodontal health and its effects on pre-term low birth weight infants.

## MATERIALS AND METHODS

A cross sectional survey was conducted among 100 gynecologists in Chennai among which 66 responded to the survey. Survey responders were divided into three groups based upon institutional practice. Group A included doctors practicing at a medical college, Group B included doctors practicing at private hospitals and Group C included doctors practicing at both medical college and private hospitals. The questionnaire (Table 1) was individually distributed and answers were collected.

**Table 1: Questionnaire**

AWARENESS ABOUT PERIODONTITIS AND PRE TERM LOW BIRTH WEIGHT AMONG GYNECOLOGISTS IN CHENNAI	
AGE:	GENDER:
ACADEMICS / PRIVATE PRACTITIONER / BOTH	
NUMBER OF YEARS OF EXPERIENCE:	
1. Do you think tooth and gum problems could affect outcomes of pregnancy?	
a) Yes b)No	
2. Do you think pregnancy increases for the gums to bleed, swell or be red?	
a) Yes b)No	
3. If your answer is 'Yes' for second question, would you advise visiting a dentist?	
a) Yes b)No	
4. Do you think that periodontal disease is a risk factor for preterm low birth?	
a) Yes b)No	
5. Do you think treatment of periodontal disease during pregnancy is feasible and may reduce the risk of preterm birth?	
a) Yes b)No	
6. Are you aware of the term 'pregnancy gingivitis'?	
a) Yes b)No	
7. Do you think that progesterone and estrogen play a major role in causing gingivitis during pregnancy?	
a) Yes b) No	
8. Do you think that periodontal disease can be treated safely during pregnancy?	
a) Yes b)No	
9. Do you think scaling and root planing procedures can be done during pregnancy to eliminate periodontal disease?	
a) Yes b)No	
10. Do you think counseling pregnant patient about periodontal disease and prematurity is important for health?	
a) Yes b)No	

Respondents' data were statistically analyzed. The Chi square test was used to determine statistically significant difference between

groups A, B and C. The collected data was analysed with SPSS 16.0 version. To describe about the data descriptive statistics, frequency analysis, percentage analysis, mean and S.D were used. To find the significance between the variables Pearson's Chi-Square test was used. In the above statistical tool the probability value .05 is considered as significant level.

## RESULTS

About sixty six gynecologists completed the questionnaire. There were sixty-five females and one male gynecologist who participated in the survey. Of the sixty six doctors, 27 doctors belonged to Group A, 20 doctors belonged to Group B and 19 doctors belonged to Group C. The results showed that Group A and group C doctors believed it was more important to refer patients for dental care compared to Group B doctors. In fact, table 2, shows a significant difference in the responses as about 92.5% of Group A gynecologists and 78.9% of Group C doctors would refer cases of gingival tissue changes to a periodontist for further dental health, compared to only 60% of Group B gynaecologists. (p=0.026)

**Table 2:** Survey Responses

		Academics (%)	Private practitioner (%)	Both (%)
1. Do you think tooth and gum problems could affect outcomes of pregnancy?	Yes	27 (100%)	20(100%)	19(100%)
	No	0	0	0
2. Do you think pregnancy increases gums to bleed, swell or be red?	Yes	27(100%)	20(100%)	19(100%)
	No	0	0	0
3. If your answer is 'Yes' for second question, would you advise visiting a dentist?	Yes	25(92.5%)	12(60%)	15(78.9%)
	No	2(7.4%)	8(40%)	4(421%)
4. Do you think periodontal disease is a risk factor for preterm low birth?	Yes	27(100%)	20(100%)	19(100%)
	No	0	0	0
5. Do you think treatment of periodontal disease during pregnancy reduces the risk of preterm birth?	Yes	27(100%)	20(100%)	19(100%)
	No	0	0	0
6. Are you aware of term 'pregnancy gingivitis'?	Yes	27(100%)	20(100%)	19(100%)
	No	0	0	0
7. Do you think progesterone & estrogen play a major role in causing gingivitis during pregnancy?	Yes	27(100%)	20(100%)	19(100%)
	No	0	0	0
8. Do you think periodontal disease can be treated during pregnancy?	Yes	27(100%)	18(100%)	19(100%)
	No	0	2(10%)	0
9. Do you think scaling & root planing can be done during pregnancy to eliminate periodontal disease?	Yes	26(96.2%)	14(70%)	19(100%)
	No	1(3.7%)	6(30%)	0
10. Do you think counseling pregnant patients about periodontal disease & prematurity is important for health?	Yes	27(100%)	11(55%)	19(100%)
	No	0	9(45%)	0

Groups A, B and C expressed similar beliefs on all other survey questions. For example, almost all the doctors are well aware about the relation between periodontal health and female hormones. Hundred percent of the doctors agreed that hormonal fluctuations may change gingival tissue across a woman's reproductive phase. There was no significant differences in response for question number 5 that is all gynecologists agreed that treatment of periodontal disease during pregnancy is feasible and may reduce the risk of preterm birth.

Almost all gynecologists agreed that periodontal disease is a risk factor for 'Preterm Low Birth Weight'. When asked if periodontal disease can be treated during pregnancy almost all gynecologists agreed in the affirmative with a statistically insignificant difference in the responses across the 3 groups. (p=0.093) The results also show that about 96.2% gynecologists from Group A, 70% gynecologists from Group B and 100% gynecologists from Group C agreed that scaling and root planing procedures can be done during pregnancy to eliminate periodontal disease with a statistically significant response between group A and B. (p=0.003) when asked about whether counselling a pregnant patient about periodontal disease and prematurity is important for health shows that only 100% of the respondents in group A and C agreed to that whereas only 55% of the respondents in group B agreed to it implying the deficiency of knowledge or reluctance on the part of the gynecologists in private hospitals to inform and educate patients about the importance of periodontal infection and its relationship to adverse pregnancy outcomes. (p=0.00)

## DISCUSSION

Although several studies have investigated doctors' attitude and awareness of the association between oral health and pregnancy outcomes, the present study is unique because

it assessed gynecologists' awareness of pregnancy outcomes in addition to knowledge about hormonal-induced gingival changes throughout a woman's reproductive phase. We found that most gynecologists were well educated and concerned about a female patient's oral health during different hormonal phases. Our findings contribute to the literature regarding gynecologists' knowledge of oral health, particularly periodontal health, for female patients.<sup>15, 16</sup>

Our data showed that gynecologists from Group A and C demonstrated greater awareness of the need for dental follow-ups compared to gynecologists from Group B. The difference in awareness may be explained by the fact that doctors in medical colleges (Group A and Group C) are continually updated with current knowledge for teaching and research purposes. The present study showed that while all of the gynecologists knew about hormonal influences on the periodontium, a few private practitioners were less aware of the importance of a regular dental check up and the to counsel pregnant patients with regards to periodontal disease. These findings are supported by Wilder et al who concluded that obstetricians were well aware of periodontal disease as a potential risk factor for PLBW but showed limited incorporation of this knowledge into clinical practices.<sup>17</sup> Almost all respondents agreed that hormonal fluctuations might induce gingival tissue changes across the female life cycle.

## CONCLUSION

Preventive, routine and emergency dental care procedures should be provided to pregnant patients. Beyond treatment there is need for pregnancy specific preventive care and oral health education. It is recommended to arrange training both dentists and obstetricians in the oral health needs, screening and care of pregnant patients, as a part of parental care.

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## A CASE REPORT OF TRANSORAL REMOVAL OF SUBMANDIBULAR GLAND SIALOLITH

*Submandibular Tükürük Bezi Taşının Ağız İçinden Uzaklaştırılması: Bir Olgu Sunumu*

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**Makale Kodu/Article Code** : 189565  
**Makale Gönderilme Tarihi** : 17.05.2016  
**Kabul Tarihi** : 20.01.2017

### ABSTRACT

Salivary calculus or sialolithiasis is a disease that affects the salivary glands characterized by the formation of mineralized structures within the glandular substance or excretory ducts of the salivary gland. The formation of these salivary stones is due to the crystallization of minerals in saliva. It causes blockage of salivary ducts and results in painful inflammation or sialadenitis of the salivary gland. Among the salivary glands submandibular gland has highest incidence of sialolithiasis due its anatomic features. The patient commonly experiences pain and/or edema when the ducts are obstructed. The case report presented here is of sialolithiasis of submandibular gland which had caused pain and swelling in the floor of the mouth.

**Keywords:** Salivary calculus, sialolithiasis, salivary stones, submandibular gland, Wharton's duct

### ÖZ

Tükürük bezi taşı veya siyalolitiyaz, tükürük bezini etkileyen, glandüler madde veya tükürük bezinin boşaltma kanallarındaki mineralize yapıların oluşumu ile karakterize olan bir hastalıktır. Bu tükürük taşlarının oluşumu tükürükteki minerallerin kristalleşmesinden kaynaklanmaktadır. Tükürük kanallarının tıkanmasına neden olur ve tükürük bezi ağrılı inflamasyonu veya sialadenit ile sonuçlanır. Tükürük bezleri arasında, submandibular bezin anatomik özellikleri nedeniyle siyalolitiyaz insidansının en yüksek olduğu görülmektedir. Kanallar tıkanmış zaman hasta genellikle ağrı ve / veya ödem görür. Bu olguda, ağız tabanında ağrı ve şişme yaratan submandibular bezin siyalolitiyazisi sunulmaktadır.

**Anahtar Kelimeler:** Tükürük taşı, siyalolitiyazis, tükürük taşları, submandibular bez, Wharton kanalı



## INTRODUCTION

Sialolithiasis is the disease of the salivary glands, predominantly occurring in the submandibular gland, followed by the parotid, the sublingual and infrequently the minor salivary glands.<sup>1</sup> The disease corresponds to about 30% of the salivary gland pathologies and is more commonly seen in adults (0.1–1.0% of population) than among children.<sup>2</sup> It is twice more common among middle aged men than among women.<sup>3, 4</sup> Sialoliths are calcified structures that develop within the ductal system of a major and/or minor salivary gland. The stones are mainly composed of organic calcium and sodium phosphate salts. They are believed to occur due to deposition of these salts around a nidus of debris within the duct lumen. The debris may be composed of inspissated mucus, bacteria, ductal, epithelial cells or foreign bodies.<sup>5</sup> Patients with sialoliths most commonly present with a history of acute, painful and intermediate swelling of the affected major salivary gland. The degree of symptoms is dependent on the extent of salivary duct obstructions and the presence or absence of secondary infection. Eating typically will initiate the swelling salivary gland duct as the stones totally or partially block the flow of saliva causing salivary pooling within the ductal system of the gland. Since the gland is encapsulated and only little space is available for expansion, there is resultant pain and discomfort. When salivary stimulation ceases and/or the output decreases, the swelling subsides.<sup>6, 7</sup> Obstructive sialoliths cause enlargement and tenderness of the salivary glands frequently. Stasis of the saliva may lead to infection, fistulae, sinus tract, ulceration over the stone in chronic cases, fibrosis and gland atrophy.<sup>5</sup> The factors which play a role in the etiopathogenesis of sialolithiasis are stasis of the salivary flow, increased mucous secretion, epithelial inflammation, calcium deterioration, and electrolyte metabolism.<sup>8</sup> We present a case of a patient with submandibular sialolithiasis with

pain, edema and swelling in the floor of the mouth.

## CASE REPORT

A 37 year old male patient reported to the department of Oral Medicine and Radiology with a chief complaint of pain, swelling under the tongue since 5 days. The patient gave history of increase and decrease in size of the swelling before as well as after meals with occasional pus discharge from the floor of the mouth. (Figure 1)



**Figure 1.** Clinical image of the patient showing inflamed, ulcerated left submandibular duct orifice and raised floor of the mouth.

The patient also complained of difficulty in eating and speaking. On extra-oral examination the patients' left submandibular lymph node was palpable which was tender and mobile. On intra-oral examination, there was swelling on left side of floor of the mouth with an overlying ulceration at the site of Wharton's duct opening. The overlying mucosa was erythematous and inflamed. The floor of the mouth appeared to be raised on left side when compared to the right. The floor of the mouth was tender on palpation. Bimanual palpation revealed a hard component within the floor of the mouth. Based on history and clinical features a provisional diagnosis of salivary calculi within the duct of submandibular gland

located in the floor of the mouth was made. A topographic mandibular occlusal projection was advised which revealed an elongated homogenous radio-opacity at the left side of the floor of the mouth extending from the area lingual to the mandibular incisors to 1 cm medial to the line corresponding to mesial aspect of the first molar. (Figure 2)



**Figure 2.** Topographic mandibular occlusal projection showing the radiopaque sialolith in the anterior part of the mandible on the left side.

Based on the radiographic finding a radiographic diagnosis of sialolith of the left submandibular gland duct was made. Following the radiographic diagnosis of sialolith, an attempt for conservative management of the same was done. Milking of the submandibular duct was performed bimanually and the sialolith was expelled. The stone measured approximately 2.2 X 0.5 X 0.4 cm. (Figure 3) Clinically reduction in the swelling of the floor of the mouth was noticed following the expulsion. (Figure 4a) A post-operative topographic mandibular occlusal projection was made to confirm complete expulsion of the stone and the radiograph revealed total absence of any radio-opacity. (Figure 4b) The patient was then prescribed capsule Amoxicillin 500mg thrice daily along with anti-inflammatory tablet Diclofenac sodium 50 mg twice daily for 5 days. The patient was also recommended to follow soft diet regimen for a few days. The follow up of the patient revealed uneventful healing.



**Figure 3.** Sialolith which was expressed from the submandibular gland duct through transoral approach.



**Figure 4a.** Clinical image of the floor of the mouth after the sialolith is milked out of the gland

**Figure 4b.** Topographic mandibular occlusal projection following removal of the sialolith from the submandibular gland duct

## DISCUSSION

The cause of the submandibular sialolithiasis is due to the fact that the Wharton's duct is longer, tortuous, its flow is horizontal as well as against gravity, the mouth of the duct is narrow, and the submandibular saliva is more alkaline and contains more mucous secretions. 80% of the submandibular sialolithiasis occurs in the Wharton's duct and other 20% of it occurs in the gland.<sup>9</sup> Of utmost importance in the diagnosis of sialolithiasis is the detailed analysis of the symptoms and physical examination. The history of pain and swelling in the gland during meals or in response to the stimulus are relevant.<sup>10</sup> This patient presented with all the above features of pain, swelling of the floor of the mouth during meals. The classification of submandibular stones is made according to their transverse direction relationship with the mandibular first molar tooth as anterior and posterior. The anterior stones can be detected with bimanual palpation and are easy to recognize with occlusal radiographs as seen in the case reported here.

These stones could be excised intraorally because the opening of the duct would get distended and they could perforate into the mouth.<sup>8, 11</sup> The anterior stones can also be expressed and manipulated through the orifice of the duct with the aid of dilating lacrimal probes if required to open the duct.<sup>13</sup> Whereas the posterior stones reside in the hilum of the gland or sometimes within the gland, such stones are usually removed surgically through an extraoral excision.<sup>8, 11, 13</sup> Based on the above classification of stones we inferred that this patient had an anterior stone in the duct of the gland which was confirmed by a mandibular occlusal radiograph. In case of complete obstruction of the salivary gland or the duct the patient will present with pain and swelling. Drainage of pus can be observed through the duct along with signs of systemic infection which was similar in this case as the patient had reported fever and fatigue. Bimanual palpation of the floor of mouth, from posterior to anterior, reveals palpable sialoliths in most anterior submandibular duct stones.<sup>10</sup> Our patient had swelling and pain while eating due to complete obstruction of the duct. However, in case of an intraglandular sialolith and those associated with recurring glandular infection, submandibular sialoadenectomy may be required.<sup>14</sup> In case of our patient the sialolith was expressed by milking the Wharton's duct posteriorly to anteriorly. Sialography may be useful where sialadenitis is associated with radiolucent sialolith which is present within deep submandibular gland, but keeping in mind the necessary precautions taken in those patients having acute infections of the gland or those who are allergic to contrast medium.<sup>15, 16.</sup>

## CONCLUSION

Despite the large size of the sialolith of this patient, treatment consisted of the removal of the calcified mass using a conservative intraoral approach. Transoral removal of submandibular sialolithiasis without performing external approaches is a method

that has to be as the first step because it is the simplest and the most inexpensive method. To conclude, conservative treatment option which aims to preserve the submandibular salivary gland with minimal trauma and confers optimum post-surgical function is most sought out treatment plan for favourable prognosis.

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## REMOVAL OF SEPARATED INSTRUMENTS WITH MASSERANN TECHNIQUES: TWO CASE REPORTS

*Masserann Tekniği ile Kırık Aletlerin Uzaklaştırılması: İki Olgu Sunumu*

Hakan GÖKTÜRK, İsmail ÖZKOÇAK

**Makale Kodu/Article Code** : 205221

**Makale Gönderilme Tarihi** : 23.10.2016

**Kabul Tarihi** : 13.01.2017

### ABSTRACT

Instrument fracture is a procedural mishap that prevents efficient cleaning and shaping of the root canal. When bypassing the fracture fails, the fragment must be removed. Many techniques and devices have been described to remove fragments from the root canal. The Masserann Kit is a widely used instrument for the removal of fragments. These clinical cases describe use of the Masserann Kit to remove separated instruments blocking the entire canal in posterior teeth.

**Keywords:** Endodontics, Instrument removal, Masserann Kit, Separated file

### ÖZ

Enstrüman kırığı, kök kanalının etkin şekilde temizlenmesini ve şekillenmesini önleyen bir prosedür hatasıdır. Kırık parçayı atlayarak yanından geçilmesi (bypass) başarısız olduğunda, parça çıkarılmalıdır. Kırık parçanın kök kanalından uzaklaştırılması için birçok teknik ve cihaz geliştirilmiştir. Masserann Kit, kırık parçaların çıkarılması için yaygın olarak kullanılan bir alettir. Bu klinik olgularda, arka bölgedeki dişlerde tüm kanalı tıkayan kırık parçaları uzaklaştırmak için Masserann Kit kullanımını sunulmuştur.

**Anahtar Kelimeler:** Endodonti, Alet uzaklaştırma, Masserann Kiti, Kırık eğe

## INTRODUCTION

Instrument breakage is an undesirable situation that may arise during root canal preparation. Breakage of an instrument jeopardizes the proper preparation and obturation of the entire root canal system.<sup>1</sup> Nowadays, the use of nickel-titanium (NiTi) rotary files for root canal preparation is more common than stainless steel files. For this reason, the incidence of NiTi rotary files separation is more than stainless files.<sup>2, 3</sup> NiTi instruments are exposed to excessive torsional or flexural fatigue (cyclic fatigue) and will fracture without showing visible signs of breakage.<sup>4</sup> The clinician should be prepared for unexpected complications during endodontic treatment.

When instrument breakage occurs, the fragment can be removed or bypassed and sealed within the root canal space or true blockage can be performed.<sup>4, 5</sup> Certainly removal of the fractured instruments is the best treatment option. However the removal of separated instruments from the root canal is impossible or very difficult in many cases and can also be very time consuming. Furthermore, the success rate of instrument removal procedures ranges from 47.6– 95.2%.<sup>1, 6, 7</sup> The removal of an instrument fragment is influenced by the anatomy of the root canal, the length of the separated fragment, and the remaining tooth structure.<sup>1, 5, 7-9</sup> A variety of devices and techniques to remove fractured instruments have been described, including drills, extractors, ultrasonic tips, dental operating microscopes, and electrochemical processes.<sup>5, 8, 10, 11</sup> These techniques have shown encouraging results. However no standard protocol for the removal of separated instrument is currently available.<sup>1</sup>

The Masserann Kit (Micro-Mega, Besancon, France) is a widely used instrument for the removal of separated instruments.<sup>1, 11-13</sup> It consist of a series of color coded trepan burs (diameter ranging from 1.1 to 2.4 mm), two

size extractors (1.2 and 1.5 mm in outer diameter) and other accessories.<sup>14</sup> A staging platform and canal should be prepared at the coronal part of the fragment using Gates Glidden drills. The trepan burs are rotated counter-clockwise to cut the dentin around the coronal end of the fragment and create a suitable space for the extractor tubes. An extractor with a plunger rod (stylet) is used to grip and dislodge the fragment. This technique is used in straight canal portions. The use of this technique in the thin and curvature canal is dangerous.

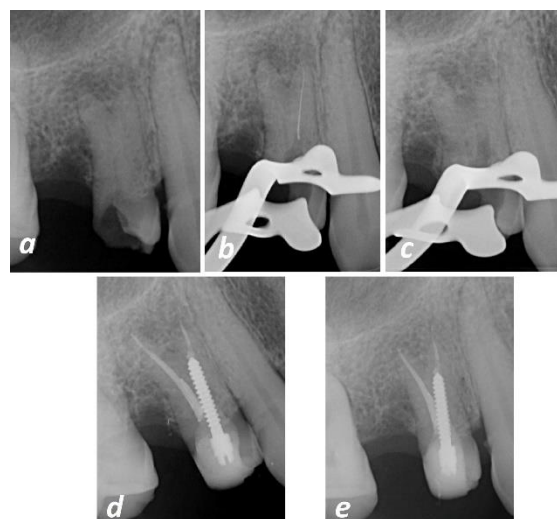
The aim of this presentation is to describe the removal of broken instruments that block the entire root canal using the Masserann Kit.

## CASES PRESENTATION

**Case 1:** 44-year-old male patient was referred to the Department of Endodontics for root canal treatment of tooth number #14 (maxillary right first premolar) by his general dentist. Clinical examination revealed gross and deep occlusal caries in tooth #14. The tooth was asymptomatic upon palpation and percussion. Radiographic examination revealed curved and narrow canals associated with periapical lesion (Figure 1a). The tooth elicited a negative response on thermal and electric pulp tests. A diagnosis of pulp necrosis with chronic apical periodontitis was made and root canal treatment was suggested for tooth #14. After isolation of the tooth with a rubber dam, the access cavity was prepared. During root canal preparation 8 mm of a 15 K-file was separated in the palatal canal. Radiographic examination confirmed that the entire length of the palatal canal was blocked by the separated instrument with a small portion of the file extending beyond the apex (Figure 1b). The patient was informed of this accidental event and about the treatment options to remove the separated part of the instrument. It was decided to use the Masserann technique. A modified 3 Gateds Glidden drill (Dentsply Maillefer, Ballaigues, Switzerland) was used to create direct access



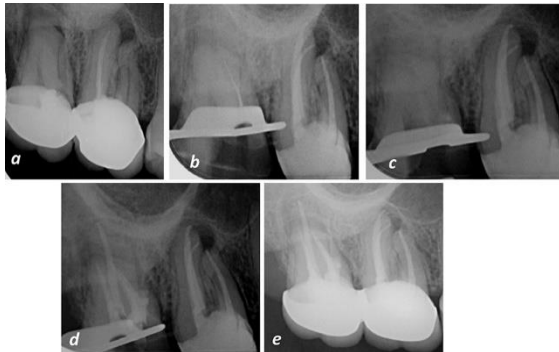
to the fragment and a straight platform. Three trepan burs (1, 2 and 3, respectively) were subsequently used to remove the surrounding dentin using a handpiece at 300 rpm in a counter-clockwise rotation. The fragment was not removed during trephining. A small extractor tube with a diameter of 1.2 mm was used to grip the broken instrument. An extractor tube gripping the fragment was gently rotated in a counter-clockwise direction to retrieve the fragment. A radiograph was taken to confirm instrument removal (Figure 1c). Preparation of all canals was completed using a ProTaper Universal system with full sequence up to F3 (PTU; Dentsply Tulsa Dental, Tulsa, OK). The root canals were copiously irrigated with 2.5% sodium hypochlorite (Whitedentmed, Erhan Kimya, İzmir, Turkey) and 17% ethylenediaminetetraacetic acid (Imicryl Ltd., Konya, Turkey) during the preparation. The root canals were filled with epoxy-amine resin-based sealer (2Seal, VDW, Munich, Germany) and gutta-percha points (Dentsply Maillefer, Tulsa, OK) using the cold lateral condensation technique. The tooth was provisionally sealed with temporary filling material (Cavit G 3M Espe, Seefeld, Germany). Two days later a screw post (Nordin Screw Posts, H. Nordin SA, Swiss) placed in the palatal root canal and the access cavity was restored with composite resin (3M Filtek Z-250, 3M ESPE, St. Paul, MN, USA) (Figure 1d). The patient was then referred to the prosthodontics clinic for a full crown restoration. At the 6 month follow up visit the tooth was asymptomatic without any radiographic changes (Figure 1e). For this reason, it was decided to follow the teeth radiographically at intervals of six months. However the tooth was not restored with a crown and the patient was redirected to the prosthodontics clinic.



**Figure 1.** (a) A pre-operative radiograph of Case 1. (b) Broken instrument (15 K-file) in the entire palatal canal of maxillary right first premolar. (c) A radiograph confirmed the removal of broken instrument. (d) A post-operative radiograph showing the obturation and restoration. (e) Six month follow-up.

**Case 2:** A 44-year-old male patient was referred to our clinic with complaints of pain and swelling in the maxillary right region. Clinically, tooth #16 and #17 had porcelain-fused-to-metal crowns and were tender to percussion. Radiographic examination revealed that tooth #17 had a deep restoration under the prosthesis and a wide radiolucent area in the apical region (Figure 2a). After the removal of prosthesis, an electric pulp test and cold application were applied to tooth #17 and there was no response these vitality tests. The tooth was diagnosed with chronic apical periodontitis. After isolation with a rubber dam, the access cavity was prepared. During root canal preparation a ProTaper Universal S1 (Dentsply, OK) file was fractured in the mesio-buccal canal. Radiographic examination revealed that the fragment was occupying the entire length of the canal (Figure 2b). Clinically, the broken fragment did not extend to the pulp chamber. The fragment could not be grasped coronally and it was decided to use the Masserann technique. Three trepan burs (2, 3, and 4, respectively) were used to create space between the fragment and the root canal wall. The small extractor tube was used to grip the fragment. The tube with the locked fragment was gently rotated in a counter-clockwise direction to retrieve the fragment. A

radiograph was taken to confirm removal of the broken file (Figure 2c). The root canals were obturated as described previously in case 1 without intracanal post placement (Figure 2d). The tooth was restored with porcelain fused to a metal crown. At the six-month follow-up the tooth was asymptomatic and there was reduced periapical radiolucency (Figure 2e).



**Figure 2.** (a) A pre-operative radiograph of Case 2. (b) Broken instrument (ProTaper Universal S1) in the entire mesio-buccal canal of maxillary right second molar. (c) A radiograph confirmed retrieval of the fragment. (d) Final restoration and obturation. (e) Six month follow-up.

## DISCUSSION

Breakage of an endodontic instrument during root canal preparation impedes thorough cleaning and shaping of the root canal and prevents access to the apex. Breakage also reduces the likelihood of endodontic treatment success.<sup>1</sup>

When an instrument is broken in the root canal, clinicians need to make a decision on extraction, surgery, instrument removal or continued endodontic treatment. Clinicians should consider that the type and condition of the tooth (vital or non-vital), accessibility, and position of the fractured instrument in the canal, the type of pulpal pathology, the degree of cleaning and shaping at the time of separation, periapical pathosis and skill and experience of the clinician.<sup>1, 3, 6, 8</sup> Orthograde retrieval is a time consuming and often a difficult procedure. Many orthograde techniques such as grasping with hemostats, a tube and Hedstrom file, wire loops, and

devices such as the Masserann Kit, Instrument Removal System (IRS), Endo Extractor, Endo Safety System, and ultrasonics have been described for fragment retrieval.<sup>1, 3, 5, 7, 11-13</sup>

The Masserann Kit is a useful device for the removal of broken instruments, especially in cases where fragments are in a readily accessible position and tightly wedged. The Masserann Kit is designed for removing metallic objects from straight rooted anterior teeth. However it has limited application in curved rooted posterior teeth. Long and rigid trepan burs and extractors preclude the use of the Masserann Kit within the limited access of the canal. These instruments remove excess dentine, weaken the root, and can predispose to root fracture or perforation.<sup>4, 12</sup>

In present study, the Masserann technique was employed when attempts to grasp the fragment with a hemostat failed. Despite positioning of the teeth in the posterior and the presence of a moderately curved canal, the Masserann technique was used successfully. The level of the fractured instrument allowed for minimal dentin removal around the peripheral dentin surrounding the fragment. The exposed coronal end of the fragment was accessible to locking and gripping by the extractor. The small extractor tube with the locked fragment was rotated in a counter-clockwise direction to remove fragments.

Ultrasonics is considered to be superior to Masserann Kit for fragment removal.<sup>1</sup> However, NiTi instruments usually break under ultrasonic vibration due to heat build-up.<sup>15</sup> In addition, ultrasonic and Masserann techniques result in similar weakening of straight roots.<sup>5</sup> The Masserann Kit was used in these cases due to blockage of the entire length of the canal with coronal access.

The retrieval of broken instruments is sometimes a time consuming and difficult procedure. The literature reports a success rate of 47.6–95.2%.<sup>1, 6, 7</sup>



Previous studies have shown that the success rate of these procedures increases when the fragment is visible using an operating microscope.<sup>6, 8, 10</sup> The probability of fragment retrieval is reduced when the canal curvature angle is increased.<sup>1,7</sup> Excessive dentine removal creates straight-line access within the curved canal. This leads to weakening of the tooth and perforation. Ideally, dentin removal should be reduced as much as possible while creating access to the fragment. In the present cases, the coronal level of the fragment was near the orifice of the canal and minimal dentin removal was created to expose at least 1.5 mm of the fragment in order to be able to grip the fragment with the extractor.

A dilemma exists in fragment removal: there is no clear evidence that retained instrument fragments have any impact on prognosis.<sup>9</sup> Instrument fragment inhibit cleaning and shaping of an infected root canal system. Insufficient mechanical and chemical treatment may have a negative impact on the treatment outcome and reduce the chances of successful treatment.<sup>8</sup> However, fragment removal procedures weaken the teeth.<sup>5</sup> In the present study, instrument fracture occurred in the initial stage of the root canal preparation. In both cases the canal could not be sufficiently cleaned and shaped. The fragment was very long and blocked the entire canal system. It was impossible to bypass the broken instrument. As a result it was decided to remove the fragment using the Masserann Kit.

This report showed that the Masserann Kit was successful in the retrieval of tightly wedged fragments from maxillary premolar and molar teeth. However it should be employed with proper case selection. In the hands of a skilled clinician, the Masserann Kit is effective only in the straight portion of the canal in cases with adequate surrounding dentin and straight line accessibility.

In the present study, both cases were diagnosed with chronic apical periodontitis. In

general, chronic apical periodontitis treated with multiple-visit root canal treatment. However, in the present both cases treated with single-visit root canal treatment because of the use of proper instrumentation and irrigation procedures, aseptic operating procedures. Also during the root canal filing there was no exudate. Waltimo *et al.*<sup>16</sup> report that, when adequate bacterial reduction with NaOCl irrigation was obtained, there was no significance difference between single or multi-visit treatment of chronic apical periodontitis.

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## ORTHOGNATHIC TREATMENT OF A PATIENT WITH CLASS III MALOCCLUSION AND SEVERE FACIAL ASYMMETRY: REPORT OF A CASE

*Sınıf III Malokluzyon ve Şiddetli Fasiyal Asimetriye  
Sahip Hastanın Ortognatik Cerrahi ile Tedavisi: Olgu Sunumu*

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**Makale Kodu/Article Code** : 197202

**Makale Gönderilme Tarihi** : 28.07.2016

**Kabul Tarihi** : 13.01.2017

### ABSTRACT

**Aim:** The aim of this case report was to present the orthognathic treatment of a patient with Class III malocclusion and severe asymmetry.

**Subject and Method:** The chief complaint of the 18-year old male was asymmetry. Clinically, he had maxillary retrognathism and severe facial asymmetry with the chin deviated to the left side. He also had a Class III molar and canine relationship. Cephalometric evaluation showed that the patient had maxillary retrusion and slight mandibular protrusion. The mandibular incisors were lingually and the maxillary incisors were labially inclined. Posteroanterior cephalometric analysis showed 2 mm maxillary and 5 mm mandibular midline deviation to the left side. The chin was deviated to the left side about 13°. After correction of the arch forms by fixed orthodontic treatment over seven months, surgical correction with bimaxillary osteotomy was undertaken.

**Results:** A Class I occlusion with normal overbite and overjet was achieved in 17 months. The maxillary retrusion, mandibular protrusion and asymmetry were corrected.

**Conclusion:** Combined orthodontic and orthognathic treatment resulted in a Class I occlusion and esthetically pleasing results.

**Keywords:** Facial asymmetry, Orthognathic treatment, Class III malocclusion

### ÖZ

**Amaç:** Bu olgu raporunun amacı Sınıf III malokluzyona ve şiddetli asimetriye sahip bir hastanın ortognatik tedavisini sunmaktır.

**Birey ve Yöntem:** 18 yaşında erkek hastanın esas şikayeti yüzündeki asimetrik görüntüdür. Klinik olarak maksiller retruzyonu, çene ucunda sola deviasyonu ve Sınıf III molar kanin ilişkisi bulunmaktadır. Sefalometrik değerlendirmeye göre maksiller retruzyonu ve hafif mandibular protruzyonu bulunmaktadır. Alt keserler dikleşmiştir, üst keserler labiale eğimlidir. Posteroanterior sefalometrik analizde sola doğru 2 mm maksiller, 5 mm mandibular orta hat kayması mevcuttur. Çene ucu 13° sola kaymıştır. 7 ay süreyle uygulanan sabit ortodontik tedavi sonrası bimaxiller osteotomi ile cerrahi düzeltim sağlanmıştır.

**Bulgular:** 17 aylık tedavinin sonunda normal overbite, overjet ve Sınıf I okluzyon sağlanmıştır. Maksiller retruzyon, mandibular protruzyon ve asimetri düzeltilmiştir.

**Sonuç:** Kombine ortodontik ve ortognatik tedavi ile Sınıf I okluzyon elde edilmiş; kayıp estetik ve fonksiyon sağlanmıştır.

**Anahtar kelimeler:** Fasiyal asimetri, ortognatik tedavi, Sınıf III malokluzyon

## INTRODUCTION

Facial asymmetry is a major esthetic problem and usually accompanies various types of malocclusions. Although there is minor asymmetry in every face, which is considered normal,<sup>1</sup> closer facial symmetry is known to be an important factor in facial attractiveness.<sup>2,3</sup>

Facial asymmetry may accompany Class I malocclusion but frequently accompanies Class II or Class III malocclusions.<sup>4,5</sup> Class III malocclusion can be characterized by maxillary retrusion, mandibular protrusion or both, and it has a 0% to 26% prevalence.<sup>6</sup> Although dental asymmetries and minor skeletal asymmetries can be treated with orthodontic treatment alone, in patients with severe skeletal discrepancies, orthognathic surgery is recommended for esthetic and functional correction.<sup>5</sup>

This case report presents the orthognathic treatment of a patient with Class III malocclusion and severe skeletal asymmetry.

## CASE REPORT

An 18-year-old male was referred to Hacettepe University Faculty of Dentistry Department of Orthodontics with a chief complaint of asymmetry. When he was a six-month-old baby, the doctors told his parents that there was a tissue deficiency on one side of his face. When he was 14 years old, he fell down stairs onto the right side of his face. Except for these issues, his medical history was unremarkable.

Clinically, he had maxillary retrognathism and severe facial asymmetry with the chin deviated to the left side. Intraorally, he had Class III molar and canine relationships. The upper and lower dental midlines were deviated to the left side with more deviation in the mandibular midline. (Figure 1)



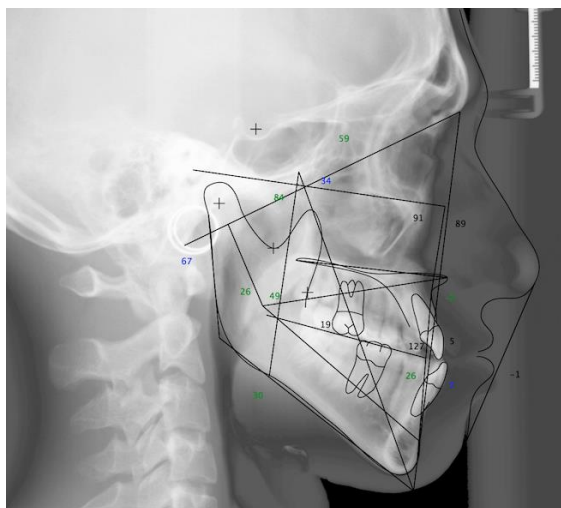
Figure 1. Pretreatment intraoral and extraoral photos

Panoramic x-ray evaluation showed that all permanent teeth were present except the upper left first molar, which had been extracted because of caries. The right mandibular condyle was thinner and longer in the panoramic view (Figure 2).

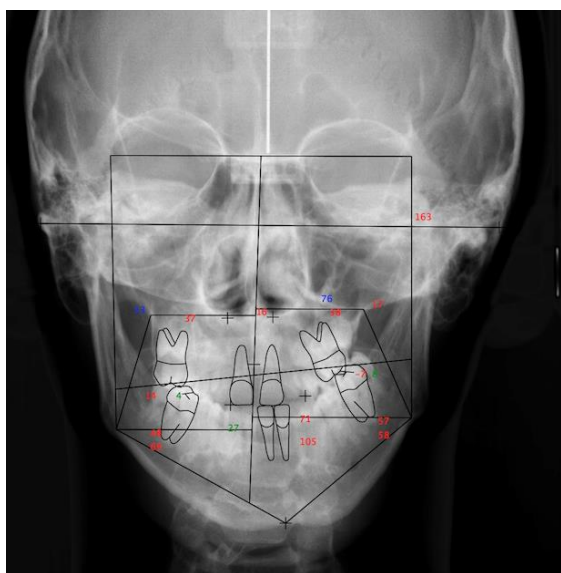


Figure 2. Pretreatment panoramic radiograph

Cephalometric evaluation showed that the patient had maxillary retrusion and slight mandibular protrusion with an ANB angle of  $-2^\circ$ . The mandibular incisors were lingually and the maxillary incisors labially inclined. (Figure 3) Posteroanterior cephalometric analysis showed 2 mm maxillary and 5 mm mandibular midline deviation to the left side. The chin was deviated to the left side about  $13^\circ$ . (Figure 4) There was no crowding in the lower arch, and there was 6 mm excess space in the upper arch.



**Figure 3.** Pretreatment lateral cephalometric tracing



**Figure 4.** Pretreatment anteroposterior tracing

### *Treatment Objectives*

Our goals were to improve the patient's facial esthetics and to provide functional occlusion. There was severe skeletal asymmetry and Class III malocclusion with both maxillary retrusion and mandibular protrusion, so the only treatment choice was bimaxillary orthognathic surgery after decompensation of the dental arches with fixed orthodontic treatment. Although the maxillary incisors were labially inclined, extraction of the upper premolars was not planned, as the slight labial inclination of the incisors was thought to be correctable with the aid of excessive space at the upper arch.

### *Treatment Progress*

The upper and lower arches were bonded and banded with 0.018-inch Roth prescription brackets (Victory Series, 3M Unitek, Monrovia, Calif), and 0.014 nickel titanium (Ni-Ti), 0.016 Ni-Ti, 0.016 stainless steel (SS) and 0.016 x 0.016 SS arch wires were inserted. Upper left canines, premolars and the molar were moved to the anterior one by one, using elastic chains for the space closure. Later, 0.016 x 0.022 SS arch wires were inserted and dental models were taken. As it was seen that the upper and lower dental models were consistent with each other after eight months of fixed orthodontic treatment, a surgical plan was devised.

### *Surgical Procedures*

Two-jaw orthognathic surgery was planned to correct the maxillary retrusion and facial asymmetry. First, dental models of the patient were carried out to the articulator with face-bow transfer, and the model surgery was performed according to the surgical plan. Two pieces of acrylic splint were constructed at the laboratory. With Le Fort 1 osteotomy, the maxilla was moved forward by 1.5 mm at the right side and by 6.5 mm at the left side. The maxilla was fixed at the planned position with the aid of the acrylic splint. Asymmetric mandibular surgery was then performed by bilateral sagittal splint osteotomy with a 12 mm setback on the right side and 5 mm forward movement on the left side. Then the intermaxillary fixation was performed using elastics by using an acrylic splint. Postoperative intermaxillary fixation was maintained for four weeks. After five months of postsurgical orthodontics treatment, debonding was planned.

### *Treatment Results*

Favorable facial changes were obtained. The facial asymmetry and Class III profile features were corrected. The upper left central incisors on the mesial side and the lower dental midline were coincident with the facial midline, and Class I molar and canine relationships were



established. The patient's oral hygiene was poor, and he was referred for descaling and for diastema closure of the upper central incisors. Because both central incisors needed esthetic restoration for a symmetrical appearance, the upper midline became slightly deviated to the right side when the restorations were finished. (Figure 5)



Figure 5. Posttreatment intraoral and extraoral photos

Cephalometrically, the SNA angle increased from 75° to 79°, the SNB angle decreased from 77° to 75°, and a skeletal Class I relationship was obtained with an ANB angle of 4°. The upper incisors were slightly retroclined from 118° to 110° at the upper incisor-Frankfurt horizontal angle, and lower incisor inclinations were not changed with the treatment. FMA angle slightly increased from 31° to 35°, 2.5 mm overjet and 1mm overbite was obtained. (Table 1, Figure 6a, 6b, 6c)

Table 1. Pretreatment and posttreatment cephalometrical values

VARIABLES	INITIAL	FINAL
SNA°	75°	79°
SNB°	77°	75°
ANB°	-2°	4°
MAXILLARY DEPTH°	88°	90°
FMA°	31°	35°
Mx1-FH°	118°	110°
Mx1-NA°	30°	20°
IMPA°	79°	80°
Md1-NB°	21°	24°
OVERJET (mm)	-2 mm	2,5 mm
OVERBITE (mm)	0 mm	1 mm

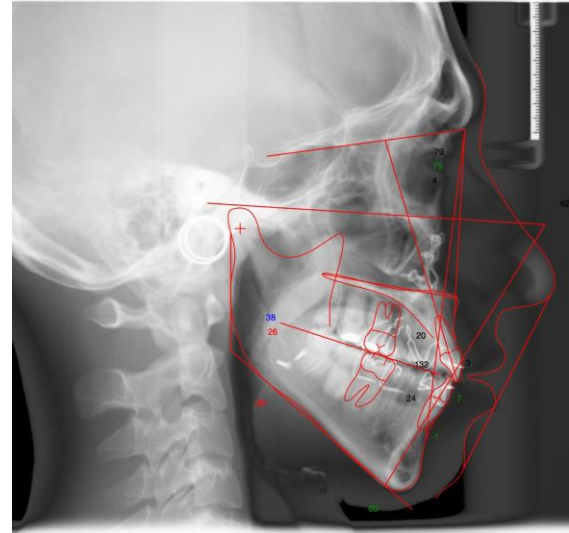


Figure 6a. Posttreatment lateral cephalometric tracing

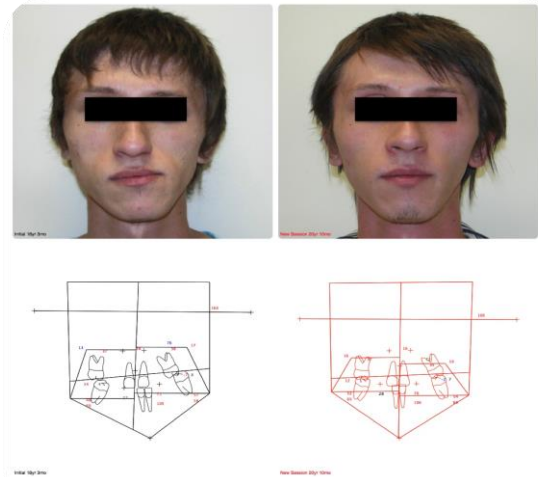
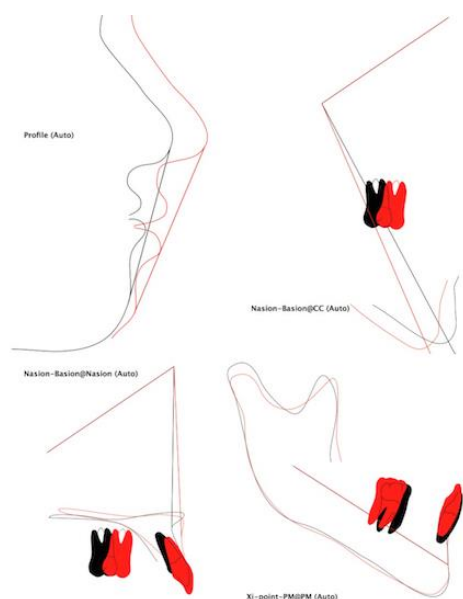


Figure 6b. Pretreatment and posttreatment anteroposterior tracings and photos



Figure 6c. Posttreatment panoramic radiograph

The superimpositions at profile, Nasion-Basion at CC, Nasion Basion at Nasion and Xi point-Pm at Pm are shown in Figure 7. It was seen that the profile improved noticeably, mandible was positioned more posteriorly and rotated clockwise and maxilla was moved anteriorly.



**Figure 7.** Pretreatment and posttreatment lateral cephalometric comparison

## DISCUSSION

When a patient is seeking for a treatment for his dental and skeletal discrepancy, the first step should be the evaluation of the etiology as it mainly determines the treatment plan. The etiology of asymmetry can be divided into 3 main categories; congenital, developmental and acquired.<sup>7</sup> Congenital asymmetries are usually associated with some syndromes but in our case although the patient had no syndrome, when he was a 6-month-old baby the asymmetry of his face was diagnosed as a tissue deficiency. The patient stated that the asymmetry increased gradually after he fell down from stairs so it was thought that the patient had a tissue deficiency from birth, but this severe facial asymmetry could be an acquired condition triggered by trauma. Also the patient's father had a Class III malocclusion, and the etiology of Class III malocclusion was thought as a genetic predisposition.

The panoramic radiograph of the patient revealed asymmetric condyles with right condyle being thinner and longer. In Class III malocclusion with mandibular deviation it was reported that the condylar morphology and the density of the deviated side differs from non-deviated side.<sup>8</sup> But that asymmetric condition should be differentiated from condylar

hyperplasia which is the overdevelopment of the condyle unilaterally or bilaterally and leads to facial asymmetry or mandibular deviation.<sup>9</sup> When the patient was referred to our clinic, he was 15 years old and because of the asymmetric conditions of the condyles and his Class III malocclusion, the patient was followed up till he was 18 years old. As it is known that the orthognathic surgery should be planned after growth period<sup>10</sup>, we began to the treatment when it was observed that the severity of the discrepancy remains the same at one-year interval. The first step at pre-surgical orthodontic treatment was correction of decompensations. The inclinations of upper incisors were corrected and upper spaces were closed, but the inclinations of the mandibular incisors were not corrected as it could lead to reduced vertical alveolar height.<sup>11</sup>

Dentoalveolar compensations are common in patients with Class III malocclusions and should be corrected with orthodontic treatment before orthognathic surgery for adequate surgical correction.<sup>12,13</sup> Capelloza *et al.*<sup>14</sup> suggested that decompensation of the maxillary arch satisfactorily leads to greater surgical correction. In the present case, although the upper incisors were labially inclined, there was also excessive space in the maxillary arch. So, instead of additional teeth extraction from the upper arch, the spaces were used for correction of the upper incisor inclinations.

Although orthognathic surgery is a difficult treatment plan for patients, in severe skeletal discrepancies, the patients seek orthognathic treatment choice for improvement in their esthetic appearance. Especially when the case is facial asymmetry, orthognathic treatment could be the only choice. It was shown that with double jaw orthognathic surgery facial symmetry improves and correlations of soft and hard tissue changes are highly predictable especially in mandibular region.<sup>15</sup> Although the treatment length and surgical risks are major problems for the

patients, the improvement in the appearance by orthognathic surgery usually satisfies the patients<sup>16-18</sup> and results in improvement in psychosocial adjustment.<sup>19</sup> In our case, the patient was unhappy about his facial appearance and seeking for a treatment for the improvement in his appearance so after the treatment his self-esteem increased noticeably.

## CONCLUSIONS

The combined orthodontic and orthognathic treatment of this patient with severe asymmetry and Class III malocclusion resulted in a Class I occlusion and esthetically pleasing results.

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## IMPORTANCE OF BIFID MANDIBULAR CANAL IN IMPLANTOLOGY AND IN ORAL SURGERY: REVIEW OF THE LITERATURE AND REPORT OF THREE CASES

*Bifid Mandibuler Kanalin İmplantoloji ve Oral Cerrahideki Önemi:  
Üç Vaka Raporu ile Birlikte Literatürün Gözden Geçirilmesi*

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**Makale Kodu/Article Code** : 129166

**Makale Gönderilme Tarihi** : 07.06.2015

**Kabul Tarihi** : 06.03.2017

### ABSTRACT

The mandibular canal or the inferior alveolar canal typically extends from the mandibular foramen to the mental foramen and includes the inferior alveolar artery, vein and the inferior alveolar nerve. During embryonic development three canals fuse to form a single canal. Failure of these canals to fuse can explain presence of multiple canals in some individuals. It is important to localize the course of the mandibular canal at the site of implant placement as altered sensation of the inferior lip due to inferior alveolar nerve injury. It is one of the most serious complication of mandibular implant surgery. Also the difficulty in performing mandibular anesthesia is the other problematic issue for patients and the clinicians.

The purpose of this study is to call attention to a rare anatomical variation. This case report reveals an unusual variant of the bifid mandibular canals. Three new cases, two of which are in the same family, have been presented.

**Key words:** Bifid mandibular canal, implant surgery, third molar extraction, inferior alveolar nerve, mandibular canals

### ÖZ

Mandibuler kanal veya inferior alveoler kanal inferior alveoler arter, ven ve inferior alveoler siniri içerecek şekilde tipik olarak mandibuler foramenden mental foramene kadar uzanır. Emriyolojik gelişim sırasında üç kanal tek bir kanal formu şeklinde füzyona uğrar. Bu kanalların füzyona uğramasındaki başarısızlık bazı bireylerdeki çoklu kanalların varlığını açıklayabilir. İnfierior alveoler sinir yaralanması sebebiyle alt dudak duyu değişikliğinde olduğu gibi implant yerleşim bölgesindeki mandibuler kanalın seyriinin lokalizasyonu önemlidir. Bu, mandibuler implant cerrahisinin çok ciddi komplikasyonundan biridir. Aynı zamanda mandibuler anestezi uygulamasındaki zorluk, hastalar ve klinisyenler için başka bir problematik bir konudur.

Bu çalışmanın amacı nadir görülen bir anatomik varyasyona dikkat çekmektir. Bu vaka raporu bifid mandibuler kanalların alışılmamış varyantını ortaya çıkarmaktadır. Üç yeni vaka, ikisi aynı aileden olmak üzere, sunulmuştur.

**Anahtar kelimeler:** Bifid mandibuler kanal, implant cerrahisi, üçüncü molar çekimi, inferior alveoler sinir, mandibuler kanallar

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## INTRODUCTION

Mandibular canal is usually seen as a single channel, enclosed by bony tissue, forming an upward concave curve.<sup>1</sup> The canal which houses the inferior alveolar nerve and blood vessels, begins at the mandibular foramen, curves downward and forward, and turns into a horizontal course below the roots of the molars. In the region of premolars the mandibular canal splits into two canals of unequal width: the narrower incisive canal continues the course toward the midline; the wider branch, the mental canal, turns laterally, superiorly, and posteriorly to open at the mental foramen.<sup>2</sup> In medical imaging, its appearance has been described as “a radiolucent dark ribbon between two white lines”.<sup>3</sup>

Bifid mandibular canal needs a special attention in oral surgical interventions. Some complications such as damage to accessorial canal, bleeding and traumatic neuroma may occur during the placement of dental implants. Nerve damage can arise as a consequence of inferior alveolar nerve anatomical variation; or the excessive intrusion of drills or implant fixture into the mandibular canal.<sup>4</sup> Also possible complications may occur during regional anesthesia of the mandible, surgery of the lower third molar and orthognatic or reconstructive mandibular surgery.<sup>5, 6</sup>

The term bifid is derived from the Latin word meaning cleft into 2 parts of branches.<sup>6</sup> The various types of bifid mandibular canals have been classified according to anatomical location and configuration.<sup>7, 8</sup> Bifid mandibular canal was first described and classified by Nortje *et al.*<sup>7</sup> as an important variation of the mandibular canal (Table 1). Later, Langlais *et al.*<sup>8</sup> reported another classification for the variation of bifid mandibular canal.

**Table 1** Classification of Nortje *et al.*<sup>7</sup>

Description of Nortje <i>et al.</i> <sup>7</sup> about patterns of duplication of mandibular canals	
Type 1	(most common) Duplicate canals originating from a single mandibular foramen, usually the same size
Type 1a	The lower canal is smaller
Type 1b	The upper canal is the smallest of the two canals
Type 2	A short upper canal extending to the second or third molar areas
Type 3	(less common) 2 canals of equal size, arising from separate foramina, that join in the molar area
Type 4	A double canal variation in which the supplemental canals arise from the retromolar pad area and join the main canals in the retromolar areas.

Three distinct inferior dental nerve branches, innervate three groups of mandibular teeth; incisors, primary and permanent molars— are fused together during embryonic development to form a single nerve branch. During rapid prenatal growth and remodeling in the ramus region there is spread of intramembranous ossification that eventually forms the mandibular canal. Occurrence of bifid or trifid mandibular canals in some patients is secondary to incomplete fusion of these three inferior dental nerves.<sup>9, 10</sup>

The purpose of this study is to particularly call attention to a rare anatomical variation. Bifid mandibular canals have been observed on panoramic radiographs. This report also, is including three new cases, deals with unusual variants of the bifid mandibular canals.

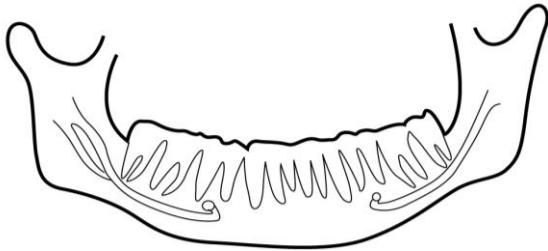
## CASE REPORTS

### Case 1 and Case 2

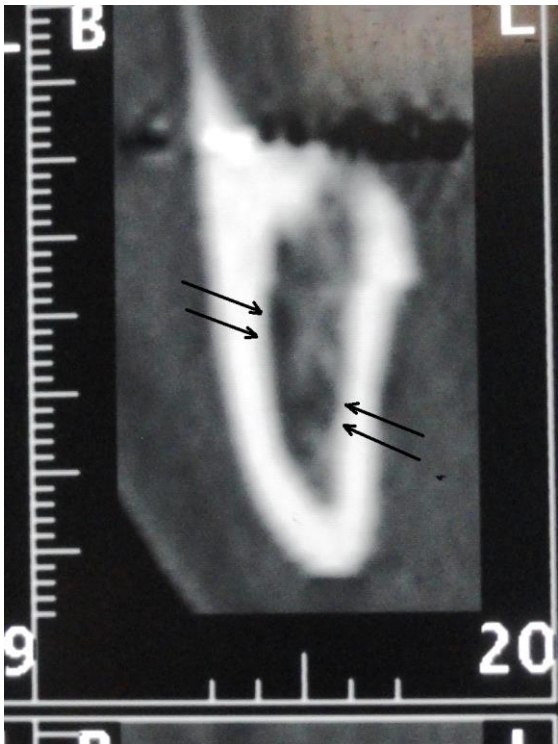
*Case 1;* A 25-year-old woman was referred to the dentistry school with some dental problems. Medical history revealed that the patient was in excellent health. On the routine panoramic radiographic examination (Figure 1a), bifid mandibular canal was observed on the right side of the mandible. The type of the bifid mandibular canal was similar to Type 2 according to the Nortje's<sup>7</sup> classification (Figure 1b). Short lower canal had extended to the second and third molar areas. Computed tomography (CT) evaluation confirmed the existence of bifid mandibular canal (Figure 2). Panoramic radiographs of the other members of the family were taken in order to analyse the effect of genetics on bifid mandibular canal.



**Figure 1a.** Panoramic radiograph (\*Black arrows show the bifid mandibular canal).



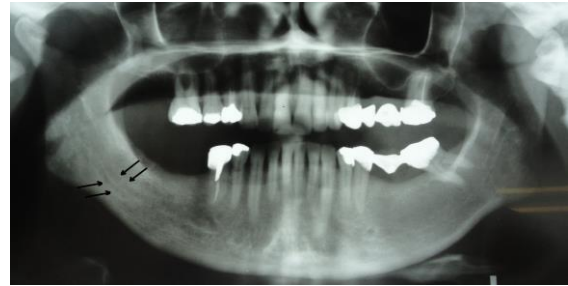
**Figure 1b.** Diagrammatic picture of landmarks, constructed points and lines used to identify the bifid mandibular canal of Case 1.



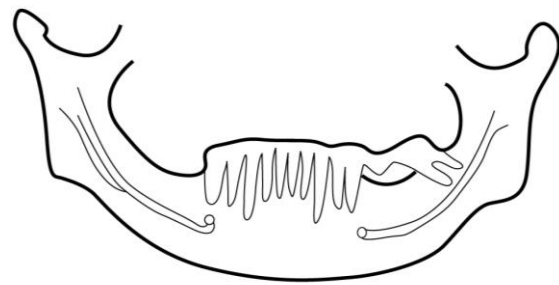
**Figure 2.** Mandibular cross-section computed tomographic image showing the bifid mandibular canal of case 1 (\*Black arrows show the bifid mandibular canal).

*Case 2;* Examination of radiographs revealed the presence of unilateral double canal on the right side of the mandible of the mother of patient No: 1 (Figure 3a). The type of the mandibular canal was similar to Type 2 as described by Nortje *et al.*<sup>7</sup> (Figure 3b). Her medical history was quite well, whereas her

dental history revealed difficulties in performing mandibular anesthesia in the past during the course of a medical treatment.



**Figure 3a.** Panoramic radiograph (\*Black arrows show the bifid mandibular canal).



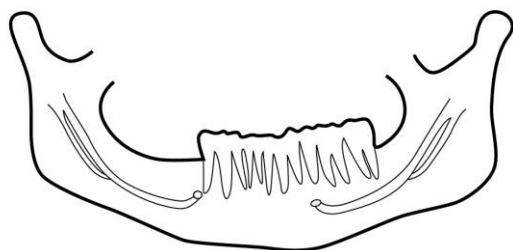
**Figure 3b.** Diagrammatic picture of landmarks, constructed points and lines used to identify the bifid mandibular canal of case 2.

### Case 3

A 58-year-old man was referred to the dentistry school for prosthetic rehabilitation with the dental implant supported restoration. Medical history indicated that the patient had diabetes however well-controlled. On the routine panoramic radiograph, bifid mandibular canal was observed bilaterally on the right and left side of the mandible (Figure 4a). The types of the canals were Type 2 according to the classification of Nortje *et al.*<sup>7</sup> His dental history revealed difficulty in performing mandibular anesthesia during surgical removal of the right lower teeth. The patient was informed about the complications of anesthesia before implant surgery and thereupon he refused the treatment.



**Figure 4a.** Panoramic radiograph shows the bifid mandibular canal (\*black arrows show the bifid mandibular canal).



**Figure 4b.** Diagrammatic picture of landmarks, constructed points and lines used to identify the bifid mandibular canal of case 3.

## DISCUSSION

Several studies on panoramic evaluation and incidence of bifid mandibular canal have been reported.<sup>7, 8, 11, 12</sup> Durst and Snow<sup>11</sup> have examined 1024 panoramic radiographs and found the 8.3% bifid canals, Nortje *et al.*<sup>7</sup> have examined 3612 panoramic radiographs and found 0.9% bifid mandibular canals. Langlais *et al.*<sup>8</sup> have stated a similar prevalence of bifid canals (0.9%) based on an analysis of 6000 radiographs. Grover and Lorton<sup>12</sup> have reported a prevalence only 0.08% after examining 5000 panoramic radiographs. In our study 950 panoramic radiographs have been examined and four bifid canals in three patients were found (0.4%). Also Nortje *et al.*<sup>7</sup> and Langlais *et al.*<sup>8</sup> have classified bifid mandibular canal variants by slightly different criteria. The cases in this study seem to somewhat fit to Type 2 described by Nortjé.<sup>7</sup> Nevertheless, taking into account the distinction in canal variations, these cases may be defined as a different, and apparently new, variant.

Bifid mandibular canals were seen unilaterally and bilaterally almost at the same frequency.<sup>7, 8</sup> In this study, two cases (Patient

No: 1 and 2) had unilateral bifid mandibular canals whereas that of the third was bilateral.

It has been claimed that bifid mandibular canals occur more frequently in females.<sup>6, 7, 13</sup> An interesting variation of the mandibular canal has been reported by Auluck *et al.*<sup>6,14</sup> who have recently described a case of a triple mandibular canal in a 20-year-old patient, where the third branch perforated the lingual cortex in the retromolar area.

Damage to the nerve and inadequate anesthesia are the most common problems encountered in patients with bifid mandibular nerve canals.<sup>6</sup> In this study, Patient No: 2 and 3 had had the difficulty of mandibular anesthesia during dental treatment. This problem is usually resolved by performing inferior alveolar nerve anesthesia at a higher level, before the bifurcation of the mandibular nerve. This technique is called “Gow-Gates” technique.<sup>6, 13</sup>

Clinicians should be cautious during the course of the third molar surgery. The tooth may infringe on or be within the canal itself. A second neurovascular bundle may exist within the bifid canals; complications such as traumatic neuroma, paresthesia and bleeding may arise if the presence of this anomaly is overlooked and/or underestimated.<sup>9</sup>

Other complications may occur during the process of orthognathic or reconstructive mandibular surgery. Especially, bifid mandibular canals need particular attention in dental implantology. Surgeon must have a detailed examination of patient before placement of implant; in cases with bifid mandibular canal due to possible damage to the second mandibular canal.<sup>5, 10</sup> Kiyak *et al.*<sup>14</sup> reported 43.5% paresthesia 2 weeks after mandibular implant placement; Bartling *et al.*<sup>15</sup> reported 8.5% of patients with altered sensation and Ellies<sup>16</sup>, in a retrospective questionnaire addressing sensory changes, recorded 37% of altered sensation 1 month after implant placement.<sup>14, 15, 16</sup>

Another probable complication is alveolar bone resorption in the proximity of the mental foramen; patients with a mandibular prosthesis experience pain because of the pressure on the neurovascular bundle. Such a problem can be encountered in cases of bifid mandibular canal with branches extending to the third molar and retromolar pad areas. Therefore, awareness of this probable anomaly will enable the clinician to modify the prosthetic design and impression techniques.<sup>17, 18</sup>

The patients No: 1 and 2 had had an interesting clinical and radiographic situation which was presence of the bifid canal both in daughter and the mother. Panoramic radiograph was not sufficient to conclude whether the pathologic condition has a genetic character or not. Further studies should be carried out in order to check the genetical tendency of bifid mandibular canals.

It is important for dentists to identify the presence of bifid canals to modify anaesthetic techniques to avoid pain and discomfort to patients. Therefore identification of such variations in patterns of mandibular nerve canal is of considerable interest to dentists.

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## PARKINSON'S DISEASE IN DENTISTRY AND PERIODONTOLOGY

*Diş Hekimliğinde ve Periodontolojide Parkinson Hastalığı*

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**Makale Kodu/Article Code** : 299338

**Makale Gönderilme Tarihi** : 22.03.2017

**Kabul Tarihi** : 01.06.2017

### ABSTRACT

Parkinson's disease (PD) is a progressive neurological condition which is characterised by motor (movement) and non-motor symptoms. The disorder is characterized by hypokinesia, tremor, muscular rigidity, and a shuffling gait. Oral hygiene procedures may be adversely affected by tremor, disturbance of motor skills and depression which are seen with these patients. It is also known that the medicines used in the treatment of the disease have various side effects that affect the oral area. It has been demonstrated in previous studies that the oral and dental health status of Parkinson's patients is worse than healthy individuals, and they have a larger number and more deep periodontal pockets. The purpose of this review is to compare the relationship between Parkinson's disease with dental and periodontal health and to compile up-to-date information by scanning the literature to better understand the possible mechanism.

**Key Words:** Parkinson's Disease, Periodontal Health, Oral hygiene

### ÖZ

Parkinson Hastalığı (PH) motor ve motor olmayan semptomlarla karakterize ilerleyici nörolojik bir hastalıktır. Hastalık hipokinezi, tremor, kas katılığı ve yürüme bozukluğu ile karakterizedir. Hastalarda gözlenen tremor, motor becerilerdeki zayıflama ve depresyon, oral hijyen uygulamalarını güçleştirebilmektedir. Ayrıca hastalığın tedavisinde kullanılan ilaçların da oral bölgeyi etkileyen çeşitli yan etkileri olduğu bilinmektedir. Parkinson hastalarının oral ve dental sağlık durumlarının sağlıklı bireylere göre daha kötü olduğu, ayrıca daha çok sayıda ve daha derin periodontal ceplere sahip oldukları geçmiş çalışmalarda gösterilmiştir. Bu derlemenin amacı, Parkinson hastaları ile ağız diş sağlığı ve periodontal sağlık arasındaki ilişkiyi, olası mekanizmayı daha iyi anlamak amacıyla literatürü tarayarak güncel bilgileri derlemeyi hedeflemektir.

**Anahtar kelimeler:** Parkinson Hastalığı, Periodontal Sağlık, Oral hijyen

## GİRİŞ

Parkinson hastalığı; hareket, kas kontrolü, denge gibi motor fonksiyonları etkilediği kadar, çeşitli non-motor fonksiyonları da etkileyen ilerleyici nörodejeneratif bir bozukluktur.<sup>1,2</sup> Hastalarda tremor, hareketlerde yavaşlama, (bradikinezi) kas rijiditesi, postür ve yürüme bozukluğu karakteristiktir.<sup>3</sup> Shaking palsy olarak da bilinen bu hastalık, ismini hastalığın semptomlarını ilk kez tanımlayan James Parkinson'dan almaktadır. Parkinson hastalığını tanımlayan semptomlardan M.Ö 5000 yılında Hindistan'da bulunan tıbbi yazılarda ve yaklaşık 2500 yıl öncesinde Çin'deki yazılarda bahsedildiği görülmüştür.<sup>2</sup>

Parkinson hastalığı, en sık görülen hareket bozukluğu ve Alzheimer'dan sonra en sık görülen ikinci nörodejeneratif bozukluktur. Çalışmalar erkeklerde insidansın daha yüksek olduğunu göstermişlerdir.<sup>4</sup> Hastalığın başlama yaşı ortalama 57'dir, 40 yaşından önce ve 85 yaşından sonra tanı konmuş az sayıda vaka da bildirilmiştir, fakat vakaların sayısı 60 yaşından sonra şiddetli bir artış göstermektedir. 50 yaşından önce rapor edilmiş vakalar çoğunlukla genetik ile ilişkili iken, geç yaşta başlayanlar sıklıkla çevresel faktörler ile ilişkilendirilmiştir.<sup>4,5</sup>

Parkinson hastalığı nörotransmitterlerde veya dopamin üretiminde bir bozulma ile meydana gelir ve bu da bazal ganglionda beyin hücreleri arasında iletişim bozukluğuna sebep olur. Dopamin seviyesinin azalması sinir hücrelerinin kontrolsüz bir şekilde uyarılmasına ve kas aktivitesinin kontrol edilememesine sebep olur. Aynı zamanda substantia nigra'da bulunan dopamin üretici hücrelerin ölümü de corpus striatumda dopamin seviyesinin düşmesine sebep olur ve bu da Parkinson hastalığındaki primer patolojidir. Parkinson hastalığının motor semptomlar klinik olarak gözlemlenmeden çok önce başladığı bilinmektedir. Semptomlar gelişmeye başladığında substantia nigra'da dopamin üreten hücrelerin en az %60'ı kaybedilmiştir ve corpus striatumda dopamin kaybı %80 ila 90'dır.<sup>2</sup>

Ayrıca son on yılda yapılmış çalışmalarda, hastalığın patogenezinde enflamasyon ve enfeksiyonun çok önemli bir rolü olduğunu gösteren kanıtlar mevcuttur.<sup>6-8</sup> Periodontal hastalığın da lokal ve sistemik enflamasyona yol açabildiği, ayrıca sistemik enflamatuvar mediatörlerin salınımına sebep olduğu çeşitli çalışmalarca gösterilmiştir.<sup>6</sup> Bu bilgiler ışığında Parkinson hastalığı patogenezinde Periodontal hastalıkların da rol oynayabileceği düşünülmektedir.<sup>9</sup>

Parkinson hastalığının tanısı; detaylı bir anamnez, fizik muayene ve bazı durumlarda da dopaminerjik ilaçlara verilen pozitif cevapla konur. Laboratuvar testleri ve görüntüleme çalışmaları rutinde kullanılmamaktadır.<sup>10</sup> Kesin tanı ancak postmortem doğrulama ile mümkündür.

Parkinson hastaları, motor yetersizlik, disfaji, apati (kayıtsızlık), depresyon, demans (bunama), hipersalivasyon, kserostomi ve medikasyon gibi birkaç faktör sebebiyle oral hijyen prosedürlerini yerine getirmekte güçlük çekebilirler.<sup>11</sup> Bu hastalarda dental sağlığın kötü olduğunu gösteren çalışmalar bulunmaktadır.<sup>2, 11-17</sup> Ayrıca, Uppoor ve ark. bu iki hastalık arasındaki ilişkinin iki yönlü olabileceğini bildirmiştir.<sup>9</sup>

## SİSTEMİK BULGULAR

Parkinson hastalığı motor ve motor olmayan semptomlar sergiler. Motor bulgular çoğunlukla tek taraflı tremorlardır ve bir elde para sayma hareketi şeklinde başlar. Tremorlar daha sonra bacaklara, yüz, dil ve mandibulaya yayılabilir. Bunlar genellikle istirahat tremorları olup istemli hareketlerde şiddeti azalmaktadır.<sup>2</sup> Bradikineziye ek olarak hastalarda akinezi görülür. Akinezi yüzde ifadesizlik, göz kırpması ve yutkunmada azalma, giyinme, yıkanma ve sandalyeden kalkmada zorluk, yorgunluk ve tükenmişlik hissi olarak görülür. İskeletsel kaslardaki tonus artışı nedeniyle diz ve bilek gibi eklem etrafındaki pasif ekstremitelere karşı direnç oluşur.<sup>7,9,17</sup> Bu hastalarda görülen postür bozukluğu ve yürüme

güçlüğü onların düşerek yaralanmalarına yol açar (orofacial yaralanmalar dahil) ve hasta özgürlüğünü kısıtlar.<sup>18-20</sup>

Parkinson hastaları aynı zamanda geniş bir nonmotor semptomlar spektrumuna sahiptir. Kan basıncındaki değişiklikler, özellikle de ortostatik hipotansiyon; kardiyak disritmiler; aşırı terleme ve idrar, dışkılama ve seksüel disfonksiyonlarla kendini gösteren otonomik disfonksiyonun bu hastaların yarısından çoğunda görüldüğü rapor edilmiştir.<sup>21</sup> İnsomnia, uyku apnesi ve uyku bölünmelerini içeren uyku bozuklukları yaygındır ve bu da gün içinde uyukulu olmaya sebep olur.<sup>22</sup>

Parkinson hastalığında depresyon, kavramsal zayıflık ve demans gibi primer olarak hastalıktan kaynaklanan birçok davranışsal bozukluğun yanı sıra dopaminerjik ilaçların sebep olduğu psikoz da görülebilmektedir.<sup>23</sup> Depresyon, hastaların neredeyse yarısını etkilemektedir fakat hastalarda hareketlerde yavaşlama, yüzde ifadesizlik, uykusuzluk hali, kilo ve enerji kaybı gibi bulguların varlığı nedeniyle depresyonun tanısı zorlaşmaktadır.<sup>15</sup> Hastalığın ileri evrelerinde planlama, sıralama, görsel motor beceriler, uzaysal algıda bozukluk ve sözlü veya sözlü olmayan komutlara yanıtta ve akıcı konuşmada aksamalar gibi demans kriterleri hastalarda % 10-30 oranında gözlenmektedir.<sup>24</sup>

## ORAL BULGULAR

Parkinsonlu bireylerde oral bulgular çeşitli şekillerde karşımıza çıkabilmektedir. Orofasiyal bölgede parkinson tremoru dil ve/veya dudakları etkileyerek; çiğneme, yutkunma ve konuşma gibi fonksiyonları bozabilir.<sup>1</sup> Ayrıca, hastalığın tedavisinde sıklıkla kullanılan dopaminin yan etkisi olarak dilde (fly-catching) ve dudaklarda (pursing) diskinetik hareketler görülebilir. Parkinson hastalarının yüzleri tipik olarak ifadesiz "maske yüz" şeklindedir.<sup>25,26</sup>

Parkinson hastalarında en sık görülen oral bulgular; oral hijyen uygulamalarında

karşılaşılan güçlükler, kserostomi, burning mouth/ mukozit, yutkunma güçlüğü, salya akışı ve kontrol grubuna göre aynı yaştaki sağlıklı bireylerden daha az çürük sayısı ve daha fazla dişe sahip olmalarıdır. Oral bulguların çoğu Parkinson hastalığının kendisi ile değil kullandıkları ilaçların tükürük akışında meydana getirdiği değişiklikler ile ilişkilidir.<sup>11</sup>

## Disfaji

Parkinson hastalığında normal yutkunma işlemi bile bir sorun oluşturabilir. Bu durum hastaların %75'ini etkiler ve normal tükürüğün yutulma işlemi de etkilenmiştir. Hastalığın ilerlemesiyle birlikte en büyük risk olan "sessiz aspirasyon" da artmaktadır. Bu durum normal koruyucu refleks mekanizmaların yokluğunda küçük miktarda yiyecek veya tükürük aspirasyonuna yol açar. Parkinson hastalarında bu şekilde oluşan çok sayıda pnömöni vakası rapor edilmiştir.<sup>2</sup> Japonya'da yapılan bir çalışmada, 4mm'den derin cebi bulunan on veya daha fazla dişe sahip bireyler pnömöniye bağlı mortalite açısından periodontal cebi bulunmayan bireylere kıyasla 3.9 kat daha fazla risk taşıdıkları bildirilmiştir.<sup>25</sup> Bu nedenle Parkinson hastalarında periodontal hastalığın mevcut aspirasyon riskini önemli oranda artırabileceğini söylemek mümkündür.

## Siyalore ve Salya akışı

Parkinson hastalarında normal tükürük fonksiyonları bozulmuştur ve çeşitli derecelerde azalmış tükürük akışı veya kserostomi ile sonuçlanabileceği gibi artmış tükürük akışı veya siyalore de görülebilmektedir.<sup>26</sup> Sonuç olarak lubrikasyon, yiyeceklerin çözünmesi, çiğnemeye ve yutmaya yardım ve tamponlama gibi normal tükürük fonksiyonları bozulmuştur.<sup>27</sup> Parkinson hastalığı sıklıkla artmış saliva ve tükürük akışı ve yutkunmada zorluk ile ilişkilidir. Hastaların %78 kadarında rapor edilmiş siyalore görülmektedir ve bu da fungal enfeksiyonlara (angular şelitisi) sebep olmaktadır.<sup>28</sup>

### **Kserestomi**

İlginç bir şekilde Parkinson hastalığında siyalorenin yaygın görülmesine rağmen kserostomi de sık rastlanan bir komplikasyondur. Çürük ve periodontal hastalık için hazırlayıcı bir etken olan kserostominin Parkinsonlu bireylerde en sık gözlenen oral bulgulardan biri olduğu rapor edilmiştir. Clifford ve Finnerty' nin yaptıkları anket çalışmasına göre, Parkinsonlu hastalar genel popülasyona göre en az iki kat daha sık kserestomiden yakınmaktadır. Parkinsonlu bireylerin yaklaşık %55'inde kserestomi gözlenmektedir.<sup>14,15</sup>

### **Yanan Ağız Sendromu**

Yanan ağız sendromu, fiziksel veya laboratuvar bulguları ile korele olmayan intraoral dokularda ağrı ve yanma hissi ile karakterize olan bir durumdur.<sup>29,30</sup> Parkinson hastalarında kserestomi, ilaç medikasyonu, beslenme bozukluğu ve hatta diş fırçalamayı zorlaştıran azalmış kas koordinasyonu gibi etkenlerin varlığı sebebiyle bu sendrom sık görülebilmektedir.<sup>15,17</sup> Diğer yandan, anksiyete, depresyon, kompulsif hastalıklar, stres gibi fizyolojik faktörler bu sendromda rol oynamaktadır.<sup>31</sup> Parkinson hastalarında yüksek oranda gözlenen depresyon ve anksiyetenin de bu sendrom ile Parkinson hastalığı arasındaki ilişkiyi açıklayabileceği belirtilmiştir.<sup>32</sup>

### **Tat ve Koku Almadaki Değişiklikler**

Parkinson hastaları tat ve koku almadaki değişikliklere karşı oldukça hassastır. Değişmiş tükürük fonksiyonları ve kullanılan ilaçlar bu değişikliklerde major rol oynamaktadır. Gastrointestinal sistemdeki kaslar da Parkinson hastalığından etkilenebilir. Bu durum yemek parçalarının boğaza yapıştığı hissini yaratır ve mide ekşimesi veya gastroözefajiyal reflüye sebep olabilir.<sup>13,17</sup> Tat duyusu sadece santral sinir sistem dejenerasyonundan değil; aynı zamanda depresyon, azalmış tükürük üretimi, zayıf oral hijyen, gastrointestinal hastalıklar ve kullanılan ilaçlar gibi fiziksel durumlardan da

etkilenmektedir.<sup>33</sup> Bu faktörlerin Parkinson hastalarında gözlenen tat kaybını açıklayabileceği bildirilmiştir.<sup>32</sup>

### **Çiğneme Bozuklukları**

Çiğneme fonksiyonunun, Parkinson hastalarında birkaç farklı yoldan etkilendiği düşünülmektedir. Çene hareketliliği ve çene hareket hızı azalmıştır. Rijidite, çene ve dilin hareketliliğinin azalması ve çenede tremor oluşumu, gıdaların ağza yerleştirilmesi, çiğneme ve yutma işlemlerini güçleştirmektedir. Çiğneme ve orofasiyal fonksiyonlar hastalığın orta-ileri evrelerinde daha sık görülmekte ve hastalığın ilerlemesi ile artmaktadır.<sup>12</sup>

### **Konuşma bozuklukları**

Konuşma bozukluklarının Parkinson'da hastalıkla ilişkili gözlenen ilk non-motor semptom olabileceği bildirilmiştir. Kısık ses, kelimelerin ağızda yuvarlanması, hızlı konuşma, konuşmaya başlamadan önce tereddüt sık görülen bulgulardır.<sup>34</sup>

### **Parkinson Hastalarında Periodontal Sağlık İle İlgili Geçmiş Çalışmalar**

Literatür incelendiğinde, Parkinson hastaları ve oral sağlık ile ilgili yapılan çalışmaların bir kısmında bu hasta grubunda dental durumun daha kötü olduğu bildirilirken, bazı araştırmacılar da farklı sonuçlar ortaya koymuşlardır.<sup>14,35,36</sup> Buna ilaveten, geçmiş çalışmalarda Parkinsonlu hastalarda daha fazla periodontal patolojiler gözlemlendiği gösterilmiştir.<sup>9,15,35</sup> Kısaca bu çalışmalarda; Parkinsonlu bireylerde kontrol grubuna göre daha yüksek CPITN değerleri, daha derin periodontal cep değerleri ve daha sık gözlenen periodontal cep varlığı rapor edilmiştir.

Parkinson hastaları ile ilgili derlemelerde hastaların rutin oral hijyen uygulamalarını yapamamaları, tükürük akışındaki ve çiğnemedeki disfonksiyonel değişimlerin dental komplikasyonlara sebep olduğu belirtilmiştir.<sup>37,38</sup> Grover ve ark., Parkinson hastalarının durumlarından dolayı daha komplike hastalar olduklarının ve dental tedavilerinde; tıbbi ve

kognitif durumlarına ve ilaç kullanımlarına göre dental tedavi prosedürlerinin modifiye edilebileceğini bildirmişlerdir.<sup>2</sup> Hanaoka ve Kenichi' nin 89 Parkinson hastasını dahil ettikleri çalışmalarında, Parkinsonlu bireylerde kontrol grubuna göre daha yüksek prevalansta çürük, periodontal hastalık ve daha çok sayıda diş kaybı olduğu rapor edilmiştir. Periodontal hastalığın, henüz günlük aktivitelerinin olumsuz etkilenmediği Parkinson hastalığının erken evrelerinde dahi daha sık gözlemlendiği bildirilmiştir.<sup>17</sup>

Müller ve arkadaşlarının çalışmasında, parkinsonlu hastaların kontrol grubuna göre daha az sayıda dişe sahip oldukları ve oral hijyen uygulamalarının daha kötü olduğu gösterilmiştir.<sup>19</sup> Schwartz ve arkadaşları cinsiyete göre Parkinson hastaları ve sağlıklı kontrol grubunda periodontal sağlığı değerlendirdikleri çalışmalarında, kontrol grubundaki kadınlarda periodontal sağlığın daha iyi olduğunu bildirmişlerdir. Parkinson hastalığının şiddeti ile oral hijyenin olumsuz etkilendiği ancak cinsiyetin etkili olmadığı görülmüştür.<sup>39</sup>

Parkinson hastalığı birçok dental, oral ve maksillofasial problemle ilişkili olabilir. Periodontal hastalık ile kuron ve kök çürükleri prevalansı hastalığın ilerleme sürecinde artabilir. Ayrıca oral sağlığın devam etmesinde; bakteriyel plağın uzaklaştırılması, tamponlama, lubrikasyon gibi koruyucu birçok etkisi bulunan tükürükte yaşanan değişimler bu hasta grubunda periodontal hastalıklara ve diş çürüklerine neden olabilmektedir.<sup>15</sup>

Orta ve ileri derecedeki Parkinson hastalarında yapılan güncel bir çalışmada, orofasiyal disfonksiyon ve oral sağlık aynı yaş ve cinsiyetteki kontrol grubuna göre daha düşük bulunmuştur ayrıca hastalık şiddetlendikçe bu fark belirginleşmektedir.<sup>12</sup> Hastalarda görülen artmış plak akümülyasyonunun, bu hasta grubunda gözlenen kas rijiditesi, el ve çene tremoru ile azalmış motor becerilerden kaynaklanabileceği belirtilmiştir.

Clifford ve Finnerty parkinsonlu hastaların %51'inde dental problem olduğunu rapor etmişlerdir.<sup>11</sup> Nakayama ve ark ise parkinsonlu hastaların kontrol grubuna göre daha az dişe sahip olduklarını, çürük, periodontal hastalık ve diş kaybı açısından daha yüksek riske sahip olduklarını rapor etmişlerdir. Çürük ve periodontal hastalık görülme sıklığı hastalığın erken evrenlerinde bile sağlıklı bireylere göre daha fazladır.<sup>40</sup>

Bu sonuçların aksine Persson ve ark. Parkinsonlu hastaların aynı yaş aralığındaki kontrol grubuna göre daha az diş kaybı ve çürük insidansı gösterdiğini rapor etmişlerdir.<sup>41</sup> Fukayo ve arkadaşları da kontrol grubuna göre daha az çürük diş ve ilgili değişiklikler bulmuşlardır.<sup>16</sup>

Parkinsonlu hastalarda motor ve kognitif bozulmalarla ilişkilendirilen diş çürükleri sık görülen komplikasyonlar arasındadır. Fukayo ve ark. tükürük pH'nın 6'dan düşük olmasını, günlük diş fırçalama sıklığının iki kez veya daha az sayıda olmasını ve ana öğünler arasındaki atıştırmanın parkinsonlu hastalarda çürük için risk faktörü olarak tanımlamışlardır.<sup>16</sup> Ayrıca Merchant ve ark. artmış fiziksel aktivitenin erkeklerde peridontitis riskini azalttığını belirtmişlerdir.<sup>42</sup> Parkinsonlu bireyler, çoğunlukla ileri yaşta, yürüme gücünü çekebilen, ileri evrelerde yardıma muhtaç, büyük oranda deprese bireyler olmalarından dolayı fiziksel aktiviteleri büyük çoğunluğunda azalmıştır. Bu hastalarda daha yüksek prevalansta gözlenen periodontitis olgularını sebeplerinden biri olabileceği düşünülmektedir. Nakayama ve ark. parkinsonlu hastaların kontrol grubundakiler kadar düzenli dişlerini temizlemediklerini belirtmişlerdir.<sup>40</sup> Ayrıca artmış periodontal patoloji ve çürük insidansı Alzheimer hastalarında da rapor edilmiştir. Bu da kognitif yetersizliğin kötü oral hijyene yol açtığını göstermektedir. Parkinsonlu hastalarda diş fırçalama alışkanlığı tremor, akinezi, kas

rijiditesi ve demans gibi motor ve kognitif disfonksiyonlardan etkilenebilmektedir.<sup>14</sup>

Bunların yanında, otonomik disfonksiyon ve/veya anti-Parkinson ilaçlardan kaynaklanan disfaji, çiğneme güçlüğü, oral diskinezi, hipersiyalore veya kserestomi ağzın kendi kendine temizleme mekanizmasını etkileyerek oral hijyeni bozabilir. Apati ve depresyon da demans gibi hastanın dental problemlerinin farkına varmasına engel olabilir. Ayrıca yürüme bozukluğu, akinezi ve postural instabilite diş hekimi ziyaretini ve dolayısıyla oral sağlığın korunmasını engelleyebilir.

Bazı semptomlar ve kullanılan ilaçlar da parkinsonlu hastalarda oral dengenin bozulmasına sebep olarak çürük ve periodontal hastalıkla ve nihayetinde diş kaybıyla sonuçlanabilir. Azalmış diş sayısı çiğnemeyi ve kendi kendine beslenmeyi zorlaştırır, fiziksel ve mental sorunlara yol açabilir.

## SONUÇ

Parkinson hastalarında fonksiyonel bozukluğun görülmediği erken evrelerde dahi yüksek prevalansta görülen periodontal patolojiler dental bakımın önemini vurgulamaktadır. Hastalar günlük oral hijyen uygulamalarını düzenli yapsalar bile el hareketlerindeki bozukluk, tremor ve azalmış hareket ağız bakımının yetersiz olmasına sebep olacaktır. Motor ve kognitif yetersizlikler parkinsonlu hastalarda zayıf periodontal sağlığa neden olmaktadır. Dahası bu hastalarda gözlenen yaygın periodontal problemlerin önüne geçmek üzere bu hastaların daha sık diş hekimi kontrollerine gitmeleri, periodontal sağlık açısından farkındalıklarının artırılması ve oral hijyen prosedürleri açısından motivasyonlarının yüksek tutulması büyük bir önem arz etmektedir. Ayrıca hastalığın seyri ve ilişkili komplikasyonları yönetmek adına hasta, diş hekimi ve nörolog arasında kurulacak bağlantı ve iş birliği hastaların yaşam kalitelerini artıracaktır. Bu konuda yapılacak geniş katılımlı çalışmalar mevcut bilgileri daha da artıracaktır.

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