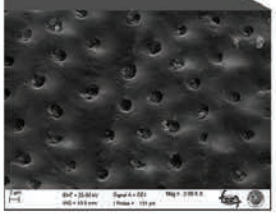
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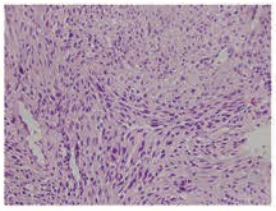
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Clinical Dentistry and Research
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Tel : +90 312 305 2287
Faks : +90 312 3104440
E-mail: clindentres@hacettepe.edu.tr
http://www.clindentres.hacettepe.edu.tr

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 3-10 Original Research Article

FRACTURE STRENGTH OF CAD/ CAM FABRICATED ZIRCONIUM-OXIDE COPINGS IN THE MOLAR AREA

Bahadır Ersu, DDS, PhD
Associate Professor, Department of Prosthododontics, Faculty of Dentistry, Hacettepe University, Ankara, Turkey

Wolfgang B. Hannak, DDS, PhD
Associate Professor and Clinical Lecturer, Department of Prosthetic Dentistry, Charité University, Campus Benjamin Franklin, Berlin, Germany

Dilek Pınar Şenyılmaz, DDS, PhD
Department of Prosthodontics, ADA Oral and Dental Health Clinic, Aydın, Turkey

Wolfgang B. Freesmeyer, DDS, PhD
Professor and Head, Department of Prosthetic Dentistry, Charité University, Campus Benjamin Franklin, Berlin, Germany

Lamia Mutlu-Sağesen DDS, PhD
Department of Dentistry, Ankara Education and Research Hospital, Ministry of Health, Ankara, Turkey

Correspondence
Bahadır Ersu, DDS, PhD
Department of Prosthodontics, Faculty of Dentistry, Hacettepe University, 06100 Ankara, Turkey
Phone : +90 312 305 2240
Fax: +90 312 311 3741
E-mail: bersu@hacettepe.edu.tr

ABSTRACT

Background and Aim: High strength ceramics fabricated with CAD/ CAM technology have widely extended the applications of all ceramic restorations from inlay, onlay and single crowns to multi-unit bridges, showing more favorable mechanical characteristics compared to the conventional metal ceramic materials. The aim of this in-vitro study was to investigate the fracture strengths of high strength CAD/ CAM fabricated zirconium oxide copings with two different core structure materials in the molar area.

Materials and Methods: Ten metal and twenty DC-Tell dies produced by the means of Lava® procedure for the mandibular I. molar were manufactured. Partially stabilized zirconia blanks (DC-Zircon) have been used to prepare the ceramic copings. Thermo-cycling was for done to ten metal and ten DC-Tell die specimens. All the samples were then tested for their fracture characteristics with a universal testing machine (Zwick-010, Ulm, Germany).

Results: The fracture strength results of the DC-Tell samples with thermo-cycling showed the lowest values (753,60 N) and the metal samples showed the highest values (2282,20 N). ($p = 0.001$)

Conclusion: While constructing cores under crowns with CAD/ CAM fabricated zirconium-oxide copings, good mechanical properties and clinical successes can be achieved with metallic materials.

Key words: Biomechanics, CAD/ CAM, Fracture Strength, Zirconium-Oxide.

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 3-10 Orjinal Araştırma

MOLAR BÖLGEDE CAD/ CAM İLE ÜRETİLEN ZİRKONYUM-OKSİT KOPİNGLERİN KIRILMA DAYANIKLILIĞI

Bahadır Ersu
Doç. Dr. Hacettepe Üniversitesi, Diş Hekimliği Fakültesi,
Protetik Diş Tedavisi Anabilim Dalı,
Ankara, Türkiye

Wolfgang B. Hannak
Doç. Dr., Charité Üniversitesi, Prostetik Diş Hekimliği Bölümü,
Benjamin Franklin Kampüsü,
Berlin, Almanya

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Berlin, Almanya

Lamia Mutlu-Sağesen
Dr., Sağlık Bakanlığı Ankara Eğitim ve Araştırma Hastanesi,
Diş Hekimliği Bölümü,
Ankara, Türkiye

ÖZET

Amaç: CAD/CAM teknolojisi ile üretilen yüksek dayanıklılığa sahip seramikler, geleneksel metal-seramik materyallere göre daha olumlu mekanik özellik sergilediklerinden, tam seramiklerin uygulama alanları, inley, onley ve tek kronlardan, çoklu-üyeli köprülere genişlemiştir. Bu in-vitro çalışmanın amacı, molar bölgede, iki farklı kor materyali için hazırlanan, CAD/CAM ile üretilen yüksek dayanıklılığa sahip zirkonyum-oksit kopinglerin kırılma dayanıklılıklarının araştırılmasıdır.

Gereç ve Yöntem: Lava® yöntemi ile alt 1. azı diş için 10 adet metal ve 20 adet DC-Tell day üretildi. Seramik kopinglerin hazırlanması için kısmi-stabilize zirkonyum bloklar (DC-Zircon) kullanıldı. On metal ve on DC-Tell daya termal siklus uygulandı. Daha sonra tüm örnekler, kırılma karakteristiklerin tespiti için evrensel test cihazında (Zwick-010, Ulm, Almanya) test edildi.

Bulgular: Termal-siklus uygulanmış DC-Tell örneklerin kırılma dayanıklılık değerleri en düşük bulunurken (753,60 N), en yüksek değeri metal örnek grubu gösterdi (2282,20 N). ($p = 0.001$)

Sonuçlar: CAD/ CAM ile üretilen zirkonyum oksit alt yapılı kronlara kor hazırlanırken, metalik materyaller ile daha iyi mekanik özellik ve klinik başarı elde edilebilir.

Sorumlu Yazar
Bahadır Ersu
Hacettepe Üniversitesi,
Diş Hekimliği Fakültesi,
Protetik Diş Tedavisi Anabilim Dalı,
06100 Sıhhiye, Ankara, Türkiye
Telefon: +90 312 305 2240
Faks: +90 312 311 3741
E-mail: bersu@hacettepe.edu.tr

Anahtar Kelimeler: Biyomekanik, CAD/CAM, Kırılma Dayanıklılığı, Zirkonyum Oksit

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INTRODUCTION

All-ceramic crown and bridge systems are becoming to be very popular because of their good aesthetics, excellent biocompatibility and enhanced mechanical properties when compared to the conventional metal-ceramic technology.[1,2] However, their inadequate mechanical long term properties limit their application mainly in the anterior regions.[3] In order to extend the application of all-ceramic systems in the stress bearing posterior areas, high strength ceramic materials on the base of aluminum oxide [Al_2O_3], zirconium-oxide [ZrO_2], silicon carbide [SiC] and silicon nitrite [Si_3N_4] have been developed.[4-9] In dentistry, the most common are aluminum and zirconium oxide which have passed for many years of clinical experience in hip replacement.[10,11] Because studies have shown that the aluminum oxide does not have sufficient mechanical properties to make larger bridges, especially zirconium oxide ceramics represent an important indication extension of all-ceramic restorations for crowns and multi-unit bridges.[12,13] Various studies suggest that the mechanical properties of zirconium oxide are sufficient for crowns and bridges (Table 1).[14-16] Zirconium oxide has a white color, which provides a good base to achieve high-quality aesthetic results. Despite dense sintering characteristic of high-strength ceramics, the zirconium oxide frameworks exhibit high translucency to allow a harmonious transition for reconstructing the lost tooth structure.[17-19]

MATERIALS AND METHODS

In this investigation, ten metal and twenty DC-Tell dies produced by the means of Lava® (3M, ESPE, Seefeld, Germany) procedure for the mandibular I. molar with a chamfer preparation design were manufactured. The physical properties of DC-Tell are shown in Table 2. To achieve the equal distribution of stresses in the apical area, the root cross section was designed (Figures 1 and 2). The

Table 1. Material properties of DC-Zirkon.

Properties DC-Zirkon	Value
ZrO_2/ Y_2O_3	95/5 %
Purity (Zr/Hf/Y)	99.9 %
Flexural Strenth	1200 MPa
Hardness, Vickers	1200s HV
Compression resistance	2000 MPa
Wear (ring on disc)	<0.002 mm³/h
Coefficient of thermal expansion t 25-500°C	10×10^{-6}/K
Elasticity Modulus	210 GPa
Colour	White

Table 2. Material Properties of DC-Tell.

Properties DC-Tell	Value
Density	1.69 g/cm³
Elastic Modulus	22000 Mpa
Flexural Strenth	380 MPa
Solubility	<1 mg/mm³
Melting Point	260°C
Water Absorbtion	30.2 mg/mm³
Max. Working Temperature (continuous)	100-120°C
Max. Working Temperature (short term)	180°C



Figure 1. Metal die sample with cross section root design.



Figure 2. DC Tell sample.

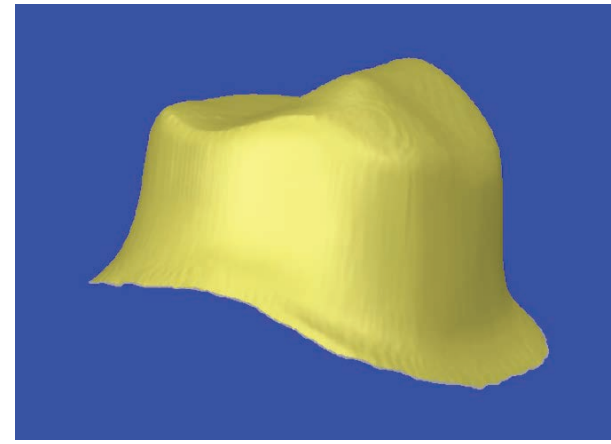


Figure 3. Three-dimensional optical digitizing of the die surface.



Figure 4. Computer-aided designing of the zirconia core.

three-dimensional data was set after full optical digitizing of the die surface. (Figure 3) DCS system® (DCS dental AG, Switzerland) based on the optical digitizing was used for the preparation of the frameworks. (Figure 4) This system allows fabrication of crown and bridge substructures made of titanium, aluminum-oxide and zirconium-oxide. The blanks of partially stabilized zirconium dioxide ceramic (DC-Zircon, DCS Dental AG, Switzerland) have been used to prepare the ceramic copings for to test their strengths of fracture in this study. The thickness of the Precident DCS copings were 0.6 mm for all samples. The frameworks were checked for their fit to the corresponding dies and cemented with fast-curing Zincoxid-phosphate cement (Harvard Dental, Berlin, Germany). All samples were stored in distilled water for 24 hours before testing.

Ten metal and ten DC-Tell samples were exposed to a thermocycling of 20.000 cycles before fracture tests. The remaining ten DC-Tell die specimens without thermocycling served as the control group. Using a 3 mm diameter ceramic antagonist ball with a traverse speed of 1 mm/min, and a loss of force by 30%, all the samples were tested for their fracture resistances with a universal testing machine (Zwick-010, Ulm, Germany) until the fracture occurred. (Figure 5) The strength of the fracture has been defined by the occurrence of the first crack.

The statistical analyses were carried out by using Statistical Product and Service Solutions (SPSS) version 11.5. The means and standard deviations for each group

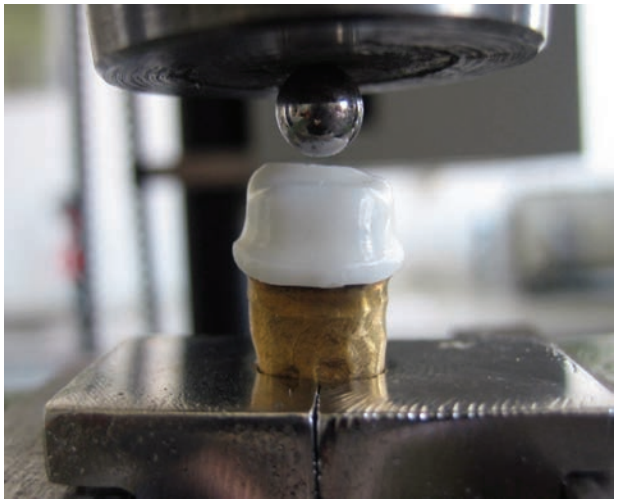


Figure 5. Statical fracture strength testing of zirconia core with a universal testing machine.

were calculated. The fracture values (Mpa) of each group were first compared by Kruskal Wallis test. When statistical significance was found among the groups with Kruskal Wallis, Bonferroni corrected Mann-Whitney U test was done for the pairwise comparisions.

RESULTS

All 20 specimens survived the thermocycling of 20000 cycles and no fracture occured. The results of the subsequent static fracture tests were seen in Table 3 and Figure 6.

With Kruskal Wallis test for the independent samples were determined the differences of strength differences among the group. The fracture strengths of DC-Tell samples with thermocycling showed the lowest (753,60 MPa) while the metal samples with thermocycling showed the highest values (2282,20 MPa). In addition, DC-Tell dies had significatly lower resistance capacity after thermocycling compared to the DC-Tell specimens without thermocycling. Significant difference was found in (MPa) values among three groups ($p=0.001$). According to the pairwise comparisons, all the three groups were statistically different from each other ($p<0.05$). The results of significances are shown in Table 3.

DISCUSSION

This in-vitro study took place under laboratory conditions. Therefore, the clinical situation is not precisely simulated where as additional dynamic occlusal stresses within the material occur in clinical conditions. However, in order to simulate the natural conditions as closely as possible, all the samples of this study were produced with same dimensions and in the same material quality. In both groups, the cores were accomplished as if they were intended for clinical use. The CAD/CAM copings were performed according to the manufacturer's instructions, with appropriate dimensions and identical for all groups. Cementations were made according to the manufacturer's recommendations, with fast-curing Zincoxid-phosphate cement on metallic and DC-Tell die cores. In addition, DC-Tell was used to simulate the dentine. The elastic modulus of DC-Tell is 22 Gpa similar to that of dentin which is 18-20 Gpa.[20-24] DC-Tell also has thermal expansion and water absorption capacity similar to the dentin. Hence, the fracture lines of all models were equal by standardized ratios (Figure 7).[25,26] Depending on the less variances within the models, more accurate analyzes on the fracture strength could be achieved.

According to Scherrer[20], increasing elastic modulus of the supporting material results in increased fracture strength. In this study, zirconia copings supported with the metallic core samples showed higher fracture strength values than the DC-Tell cores which is also in accordance with the literature.[21,22]

From the static fatigue, it is generally assumed that there is a chemical reaction between water vapor and surface defects within the ceramic restoration. Ceramic structures tend to fail

Table 3. Results of the statistical analysis [MPa].

Group	Mean	Std. Deviation	Median	Min.	Max.
Metal with Thermocycling	1700,38	266,76	1627,65	1425,70	2282,20
DC-Tell with Thermocycling	916,22	115,99	888,45	753,60	1120,80
DC-Tell without Thermocycling	1192,87	86,95	1219,10	1027,30	1320,10

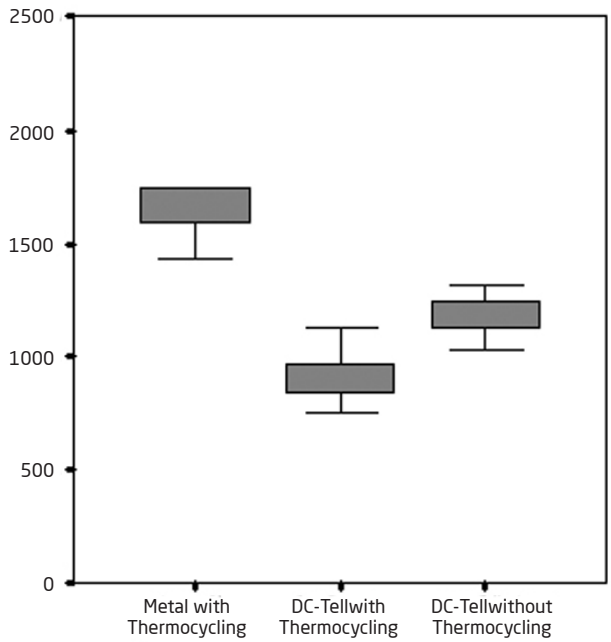


Figure 6. Box- plot of load at fracture values [MPa].

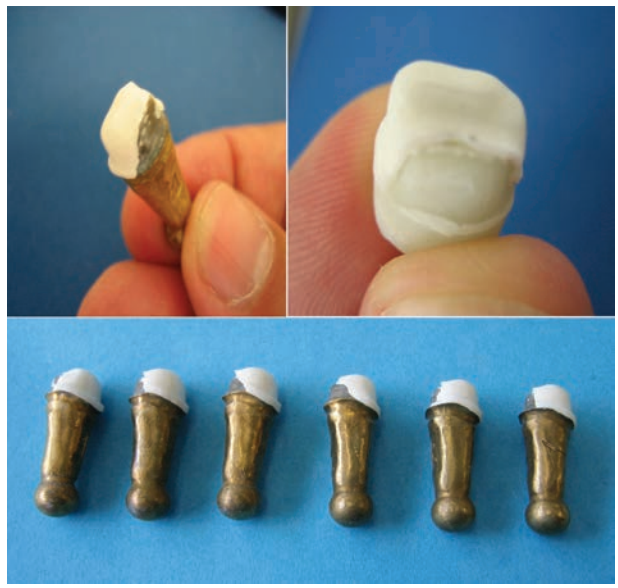


Figure 7. Illustrates the fracture of zirconia copings where the fracture surface is clearly visible for both metal and DC Tell samples.

because of surface tension, here cracks and flaws propagate by slow crack growth leading to the catastrophic failure. In all-ceramic systems, the flaw population (size, number and distribution) can be related to the material, or be affected by the fabrication process. An outgoing crack defect growth can reach to a critical size so as a consequence it comes to spontaneous breakage of the ceramic.[27,28] For this reason, ceramic crowns, which are long in the mouth, can break at comparatively with low occlusive forces.

This study showed that DC-Tell dies had a lower resistance capacity after thermocycling compared to the DC-Tell specimens without thermocycling. This was to be expected, because the inner corrosion stress forces cracking with thermocycling.[28-29] As a result of the hydrolytic processes, the increase of fracture toughness during water storage (thermocycling) could be observed.

According to the findings of this study, the abutment material, as mentioned above, has a significant influence and affected the fracture load of CAD/CAM fabricated zirconia copings for the mandibular first molar. The question that arises is weather the results of the present study can be transferred to the clinical situation and in what extent the fracture strength affects the lifespan of zirconia for different types of cores. CAD/CAM manufacturers have to provide the prerequisites before this technique can be widely advocated for immediate implementation in the market.[30] Further studies are needed to validate the results of this investigation.

CONCLUSION

Good mechanical properties and clinical successes can be achieved with metallic materials while constructing cores under crowns with CAD/CAM fabricated zirconium-oxide copings. Further clinical trials are needed to validate the results of this in-vitro study.

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 11-20 Original Research Article

THE EFFECTS OF DIFFERENT DENTIN HYPERSENSITIVITY TREATMENTS ON THE SHEAR BOND STRENGTH BETWEEN ADHESIVE COMPOSITE RESIN AND DENTIN

Erhan Dilber, DDS, PHD
Assistant Professor, Department of Prosthodontics, Faculty of Dentistry, Şifa University, İzmir, Turkey

Pınar Çevik, DDS, PHD
Assistant Professor, Department of Prosthodontics, Faculty of Dentistry, Gazi University, Ankara, Turkey

Yusuf Ziya Akpınar, DDS, PHD
Assistant Professor, Department of Prosthodontics, Faculty of Dentistry, Abant Izzet Baysal University, Bolu, Turkey

A.Nilgün Öztürk, DDS, MSC, PHD
Professor, Department of Prosthodontics, Faculty of Dentistry, Selcuk University, Konya, Turkey

Correspondence
Erhan Dilber DDS, PHD
Department of Prosthodontics, Faculty of Dentistry, Şifa University, Mansuroğlu Mah. 293/1 Sk. No: 2, 35100, Bayraklı, İzmir
Phone: +90 2324864140(4344)
Fax: +902324864147
E-Mail : dilberhan@gmail.com

ABSTRACT

Background and Aim: The aim of this in vitro study was to evaluate the effects of different hypersensitivity treatments on the shear bond strength of flowable adhesive composite resin to dentin.

Materials and Methods: The whole dentin specimens were etched to remove any smear plugs and to mimic the open dentinal tubules of sensitive dentin using 0.5 M EDTA (pH 7.4) for two minutes: Forty dentin specimens were randomly divided into four groups (n=10) (1) Group C (control); (2) Group N (treated with Nd:YAG laser); (3) Group G (treated with Gluma Desensitizer); (4) Group N+G (treated with Nd:YAG laser following Gluma Desensitizer). Flowable composite resin cement was applied to dentin surface and shear bond strength tests were performed. The mean SBS values were evaluated, failure modes were determined, and data were analyzed by one-way ANOVA test and compared with Tukey HSD test.

Results: There was significant difference among Group G (11.7±4.6 MPa) and Group N (18.5±2.5 MPa) (p=0.05). There were no significant differences among the other groups. SEM evaluation revealed that Group N occluded open dentinal tubules in some areas by melting and modifying of dentin tubule periphery. Group G showed prominent narrowing and reduction in the diameter of the affected tubules. Group N+G occluded dentinal tubules to varying degrees.

Conclusion: Nd:YAG laser treatment following Gluma Desensitizer could be an effective treatment for dentin hypersensitivity and does not affect the bond strength of adhesive composite resin to dentin surface detrimentally.

Key words: Bond Strength, Dentin Hypersensitivity Treatment, Dentin Tubule Occlusion, Gluma, Nd:YAG

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 11-20 Orjinal Araştırma

ADEZİV KOMPOZİT REZİNİN DENTİNE BAĞLANMASI ÜZERİNE FARKLI DENTİN HASSASİYETİ TEDAVİLERİNİN ETKİLERİ

Erhan Dilber
Yar. Doç. Dr., Şifa Üniversitesi, Diş Hekimliği Fakültesi, ,
Protetik Diş Tedavisi Anabilim Dalı,
İzmir, Türkiye

Pınar Çevik
Yar.Doç.Dr., Gazi Üniversitesi Diş Hekimliği Fakültesi,
Protetik Diş Tedavisi Anabilim Dalı,
Ankara, Türkiye

Yusuf Ziya Akpınar
Yar.Doç.Dr., Abant Izzet Baysal Üniversitesi,
Diş Hekimliği Fakültesi, Protetik Diş Tedavisi Anabilim Dalı,
Bolu, Türkiye

A. Nilgün Öztürk
Prof. Dr. Selçuk Üniversitesi,
Diş Hekimliği Fakültesi, Protetik Diş Tedavisi,
Konya, Türkiye

ÖZET

Amaç: Bu invitro çalışmanın amacı farklı duyarlılık tedavilerinin, adeziv akışkan kompozit rezinin dentine makaslama bağlanma dayanıklılığı üzerine etkilerini değerlendirmekti.

Gereç ve Yöntem: Tüm dentin örnekleri, smear tabakasını uzaklaştırmak ve hassas dentin yüzeylerini taklit edecek şekilde dentin tübüllerini açmak için 0,5 EDTA (pH 7.4) ile iki dakika pürüzlendirildi: Kırk örnek rastgele dört gruba ayrıldı (n=10) (1) Grup C (kontrol); (2) Grup N (Nd:YAG lazer tedavisi); (3) Grup G (Gluma Hassasiyet giderici tedavisi); (4) Grup N+G (Gluma hassasiyet giderici uygulamasının ardından Nd:YAG lazer tedavisi). Dentin yüzeyine akışkan kompozit rezin uygulandı ve makaslama bağlanma dayanıklılık testi uygulandı. Ortalama MBD değerleri değerlendirildi, kırılma tipleri belirlendi ve veriler tek-yönlü ANOVA ile analiz edilip Tukey HSD testi ile karşılaştırıldı.

Bulgular: Grup G (11,7±4,6 MPa) ve Grup N (18,5±2,5 MPa) arasında anlamlı fark bulundu (p=0.05). Diğer gruplar arasında anlamlı fark gözlenmedi. SEM değerlendirmesi, Grup N'nin bazı bölgelerde, dentin tübüllerinin periferini modifiye ederek ve eriterek açık dentin tübüllerini tıkadığını gösterdi. Grup G'de etkilenen tübüllerin çapında azalma ve belirgin daralma gözlendi. Grup N+G, dentin tübüllerini değişen derecelerde tıkadı.

Sonuç: Gluma hassasiyet giderici ardından Nd:YAG lazer uygulaması, dentin hassasiyeti için etkili bir tedavi olabilir ve adeziv kompozit rezinin dentin yüzeyine bağlanma dayanıklılığını olumsuz yönde etkilemez.

Sorumlu Yazar
Erhan Dilber
Şifa Üniversitesi
Diş Hekimliği Fakültesi,
Protetik Diş Tedavisi Anabilim Dalı
Mansuroğlu Mah. 293/1 Sk. No: 2, 35100, Bayraklı, İzmir
Telefon: +90 2324864140(4344)
Faks: +90 2324864147
E-posta: dilberhan@gmail.com

Anahtar Kelimeler: Bağlanma Dayanıklılığı, Dentin Hassasiyeti Tedavisi, Dentin Tübül Tıkama, Gluma, Nd:YAG

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INTRODUCTION

Dentin hypersensitivity is a clinical problem commonly encountered in dental practice. It is characterized by a short, sharp pain when dentinal tubules in the cervical region of a tooth are exposed to thermal, chemical, or tactile stimuli.[1-3] To date, several theories have been proposed to explain this phenomenon, but the mechanism responsible remains poorly understood. The most commonly accepted theory is the hydrodynamic theory[4,5]; this theory proposes that in hypersensitive dentin the tubules are wide, open, and contain a fluid. [6,7] The thermal, chemical, or tactile stimuli that induce painful symptoms are associated with the movement of this fluid within the pulp–dentin complex.[4,8,9]

Several treatments are available for dentinal hypersensitivity [6,10,11], including varnishes, anti-inflammatory agents, tubular obturating procedures, adhesives, and lasers (neodymium-doped: yttrium aluminum garnet (Nd:YAG) and carbon dioxide (CO_2).[12] Desensitizing agents block the open dentinal tubules and thus reduce fluid infiltration, thereby reducing dentinal hypersensitivity.[11,12] The desensitizing effects of fluoride-containing solutions are due to the mechanical blocking of exposed dentinal tubules by precipitating fluoride compounds.[10,13,14] Primers containing glutaraldehyde (GA) and hydroxyethyl methacrylate (HEMA) can reduce hypersensitivity by precipitating plasma proteins in the dentinal fluid and so blocking the exposed dentinal tubules.[10-12,15] Laser therapy is an alternative means of managing dentinal hypersensitivity.[1] For example, Nd:YAG laser therapy is an effective, U.S. Food and Drug Administration (FDA) approved alternative for managing dentinal hypersensitivity.[16] The frequency, energy, and duration of irradiation influence laser efficiency. If applied correctly, Nd:YAG laser therapy can reduce dentinal hypersensitivity for at least 4 months.[17,18] Nd:YAG laser could produce a sealing depth of approximately 4 μm within the tubules, usually causing an immediate reduction in dentin hypersensitivity.[19]

There are lots of studies about conventional desensitizers on the luting and bonding characteristics of adhesive composite resin to dentin surface in literatures.[11,20-25] However, little is known about the effect of Nd:YAG laser hypersensitivity treatment and its association with desensitizing agents on the luting and bonding characteristics of composite resin and dentin.[26] Lopes et al.[27] found that Nd:YAG laser treatment following Gluma Desensitizer treatment is an effective treatment strategy that has immediate and long-lasting effects. However, desensitizing agent application could reduce the bond strength between dentin and composite resin.[28] Huh et al.[28] also stated that crystal precipitation on the dentin surface could reduce the bond strength. Thus, the aim of this in vitro study was to evaluate the effects of hypersensitivity treatments on the shear bond strength between flowable adhesive restorative composite resin and dentin, and to observe dentin tubule occlusion using a scanning electron microscope (SEM). The null hypothesis was that different hypersensitivity treatments would not alter the shear bond strength between the flowable adhesive restorative composite resin and dentin.

MATERIALS AND METHODS

Tooth Selection and Specimen Preparation

Forty-three freshly extracted caries-free human first molars were used in this study. Any surrounding soft tissues were removed by immersion in 2.5% NaOCl solution for 10 min. The teeth were then stored in sterile saline (0.9% NaCl) until use. The crowns of the teeth were cut using a diamond disc (Rotary Dental Instruments, Kahla, Germany) to obtain buccal surfaces; they were then immersed in an acrylic mould with the buccal surfaces face-up. Buccal cervical enamel was removed with a water cooling diamond disc (Isomet 11-1180; Buehler Ltd, Evanston, IL) at a thickness of approximately 2 mm, and 40 smooth dentin surfaces were thus obtained for the shear bond strength tests (Figure 1).

Three additional 1.5-mm-thick buccal dentin slices were obtained from 3 specimens for SEM analysis. To simulate dentin hypersensitivity, the dentin slices were etched with 0.5 M ethylenediaminetetraacetic acid (EDTA) (pH = 7.4) for 2 min, and then washed with distilled water for 30 s and dried [7,29,30]. Each dentin slice was divided into 2: one side was not exposed to additional surface treatments and served as a control, the other side was exposed to further surface treatments with Nd:YAG, Gluma, and Nd:YAG+Gluma.

The entire dentin surface of each sample was etched to remove any smear plugs and to mimic the open dentinal tubules of sensitive dentin using 0.5 M EDTA (pH 7.4) for 2 min (applied with a microbrush); the samples were then rinsed with an air-water syringe for 30 s and dried. The specimens were then randomly divided into 4 groups (n = 10) according to the surface treatments performed:



Figure 1. Smooth dentin specimen immersed in acrylic mould

Group C: (control) No additional treatment was performed after the smear layer was removed with EDTA.
Group N (Nd:YAG): Dentin surfaces were manually irradiated by scanning movements performed perpendicular to and approximately 1 mm away from the surface with a Nd:YAG laser (Fotona, AT Fidelis, Ljubljana, Slovenia) under the following conditions: 1 W, 10 Hz, 100 mJ, short pulse (SP) mode (180 µs) for 60 s, 300 µm quartz fiber optic delivery system. Therefore, energy density calculated was approximately 130 J/cm^2.
Group G (Gluma): Gluma desensitizer (Heraeus Kulzer, Dormagen, Germany) was applied with a microbrush on the surface of each specimen and left for 1 min and dried, then rinsed with water.
Group N+G (Nd:YAG+Gluma): The Nd:YAG laser was applied and this was followed by the application of the Gluma desensitizer.

Shear Bond Strength

After the respective pretreatment and adhesive sequences, a round-hole phyllosilicate (mica) mould with an inner diameter of 3 mm and a height of 3 mm was attached to each of the prepared dentin surfaces embedded in the acrylic moulds. A two-step adhesive procedure (Clearfil® SE Bond, Kuraray Co. Ltd, Osaka, Japan) was used to treat the dentin surface according to the manufacturer's instructions. The primer (Clearfil SE Bond, Kuraray Co. Ltd, Osaka, Japan) was applied to the dentin surfaces for 20s, and the primed dentin surface was then dried with oil-free compressed air. The bonding agent (Clearfil SE Bond, Kuraray Co. Ltd, Osaka, Japan) was applied to dentin surface with a brush tip and polymerized for 10s. Flowable resin composite (Filtek TM Ultimate Flowable, 3M ESPE) was injected into Teflon tubes with a 3-mm internal diameter and height and light cured with a Light Emitting Diode (LED) curing light (Bluephase, Ivoclar Vivadent) for 40 s (Figures 2 and 3). The curing light was in contact with the Teflon tube. Thermal cycling (Thermal Cycler Tester, DentalTechnik, Konya, Turkey) was performed for 5 000 cycles between 5°C and 55°C (±2°C) with a dwell time of 20s to simulate oral conditions and the specimens were stored in distilled water at 37°C for 24h and then loaded onto a universal testing machine (TSTM 02500, Elisa Ltd, Istanbul, Turkey) with a metal rod held parallel and close to the bonding interface at 0.5 mm/min in the shear

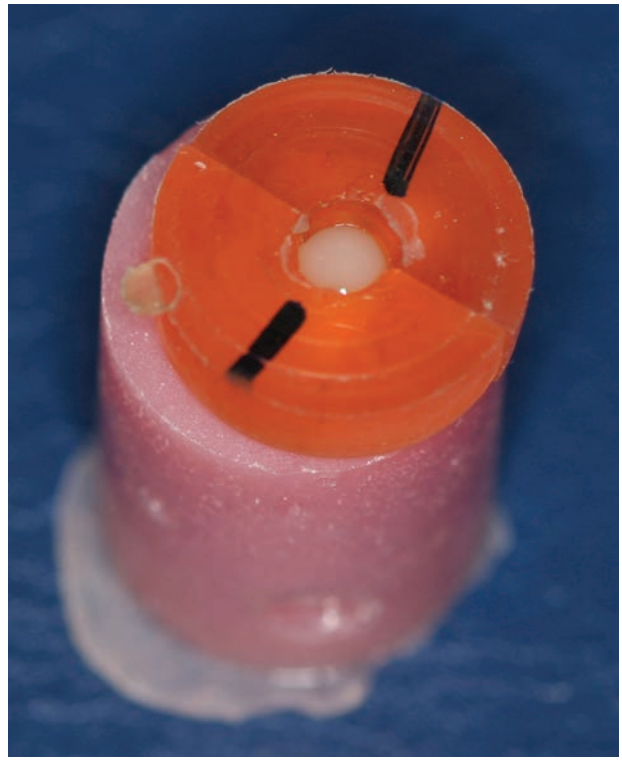


Figure 2. Flowable composite resin bonded dentin specimen among teflon tubes



Figure 3. Light curing of flowable composite resin

mode until fracture occurred. Shear bond strength values were calculated as the ratio of the fracture load relative to the bonding area and were expressed in megapascals.

The fractured surface of each specimen was examined with a stereomicroscope (Olympus SZ 40, SZ-PT, Japan) at ×40 magnification to determine the mode of failure. The failure mode was classified as either adhesive, cohesive, or mixed (a combination of adhesive and cohesive failures). The data obtained from the shear bond strength testing were then subjected to statistical analyses to test for any differences between and within groups.

SEM Analysis

The specimens were dried with a critical point dryer and mounted on SEM stubs then sputter-coated with gold palladium (Cressington 108 Auto Sputter Coater, Cressington MTM-20, Elektronen Optic Service, Dortmund, Germany) and analyzed with a SEM (Evo LS10, Carl Zeiss, Oberkochen, Germany) at ×2000 magnification.

Statistical Analysis

Levene test was performed to evaluate homogeneity of variances. The shear bond strength data were normally distributed, and so a one-way analysis of variance (ANOVA) was used for data comparison. Tukey's HSD test was used to determine whether there were any statistically significant differences among groups. Significance was determined at a probability value of $p<0.05$. All the statistical analyses were performed using Statistical Package for Social Sciences (SPSS 17.0, Chicago, IL).

RESULTS

One-way ANOVA revealed a significant difference among groups ($p=0.02$). The mean shear bond strengths and the differences between groups are shown in Table 1. According to Tukey's HSD pair-wise multiple comparison test there was only a significant difference between Group G (11.7 ± 4.6 MPa) and Group N (18.5 ± 2.5 MPa) ($p=0.01$). There were no significant differences among the other groups.

SEM evaluation revealed that the Nd:YAG laser (Group N) occluded the open dentinal tubules in some areas by melting and modifying the dentin tubule periphery (Figure 4). Dentin specimens treated with Gluma desensitizer showed prominent narrowing and a reduction in the diameter of the affected tubules (Figure 5). The samples treated with the Nd:YAG laser followed by the Gluma desensitizer occluded dentinal tubules, but to varying degrees (Figure 6).

The fracture types and failure mode distributions are shown in Figure 7. The fracture types in Group C were generally mixed (90%) whereas adhesive fractures were less common in Group N (10%), Group G (20%), and Group N+G (10%). Cohesive fractures also occurred in all treatment groups.

DISCUSSION

Dentinal hypersensitivity is a common problem that is specifically associated with periodontal diseases.[31] Various treatments have been applied for dentin hypersensitivity.[32] A number of different sealant agents are usually effective in rapidly reducing sensitivity, but their effectiveness is rapidly diminished.[33] Recently, an increasing number of studies relating to laser therapy for dentin hypersensitivity have been published.[2,34,35] Laser therapy is an effective and reliable method that provides rapid pain relief without any detrimental pulpal effects.[36] However, although the application of a Nd:YAG laser and desensitizing agents

Table 1. Mean and SD values for shear bond strength (MPa)

Groups	Mean±SD	
Group C (Control)	16.83±6.15	
Group N (Nd:YAG)	18.56±2.56	*
Group G (Gluma)	11.76±4.65	*
Group N+G (Nd:YAG+Gluma)	15.61±5.25	

*, shows statistical significance, ($p<0.05$)

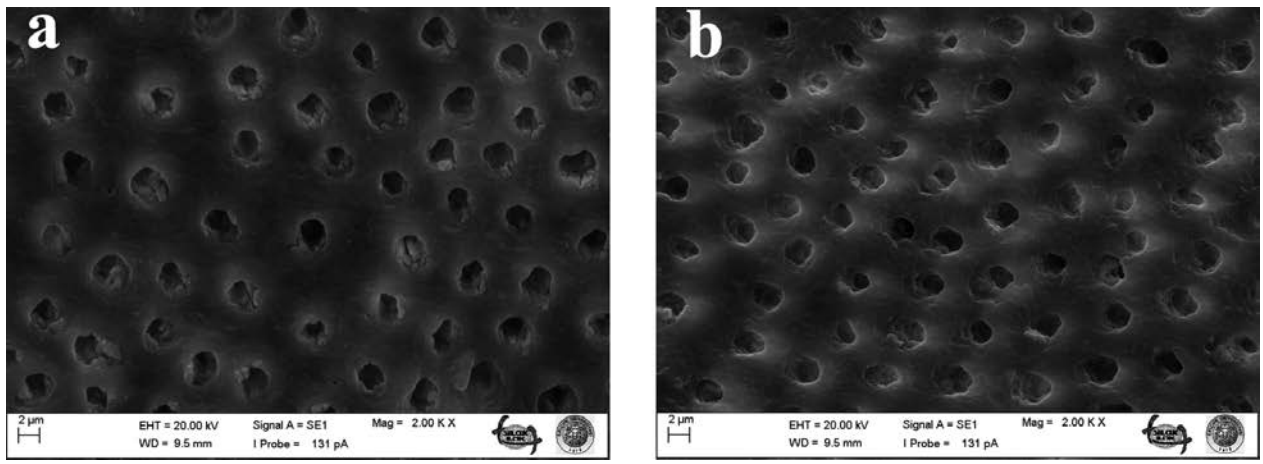


Figure 4. a. SEM views of dentin surface treated with 0.5 M EDTA (control group) b. SEM views of dentin surface treated with Nd:YAG laser (Group N)

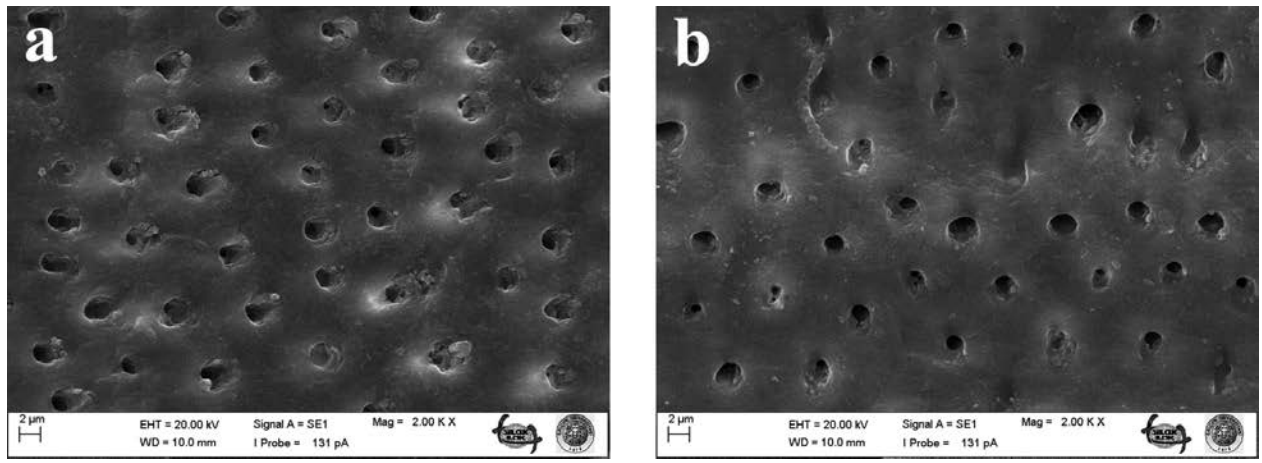


Figure 5. a. SEM views of dentin surface treated with 0.5 M EDTA (control group) b. SEM views of dentin surface treated with Gluma Desensitizer (Group G)

affects the strength of the bond between the composite resin materials and dentin, few studies have investigated these effects. In this in vitro study, a Nd:YAG laser, a desensitizing agent (Gluma), and both combined were tested to evaluate their effects on the bond strength between flowable resin cements and dentin surface. All of the dentin surfaces tested were etched with 0.5 M EDTA prior to treatment to remove the smear layer or plugs to simulate the open tubules characteristic of sensitive teeth, and prepared for bonding.[7,37]

Gluma consists of an aqueous solution of 35% HEMA and 5% GA and occludes dentinal tubules by coagulating

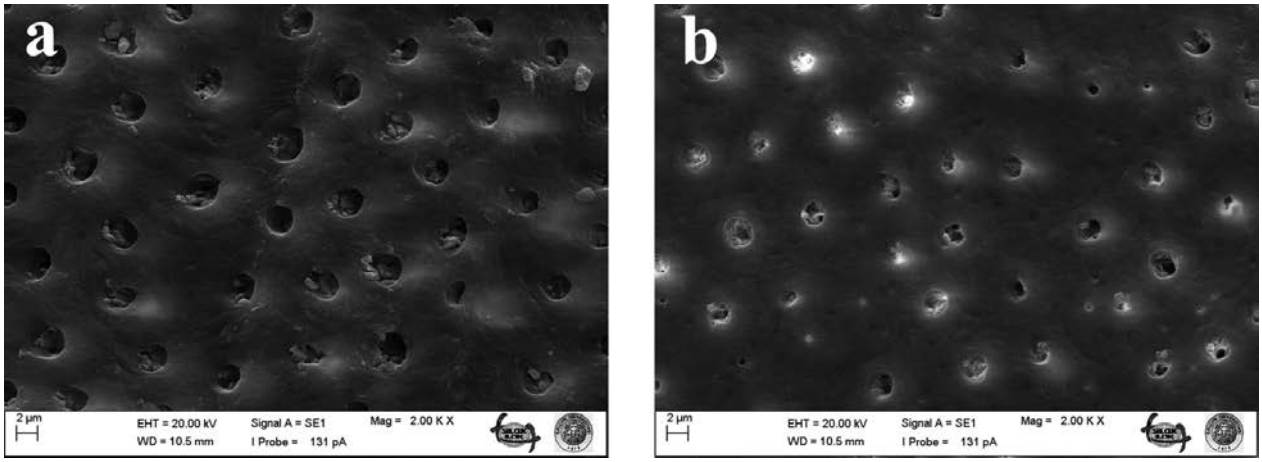


Figure 6. a. SEM views of dentin surface treated with 0.5 M EDTA (control group) b. SEM views of dentin surface treated with Nd:YAG laser following Gluma Desensitizer (Group N+G)

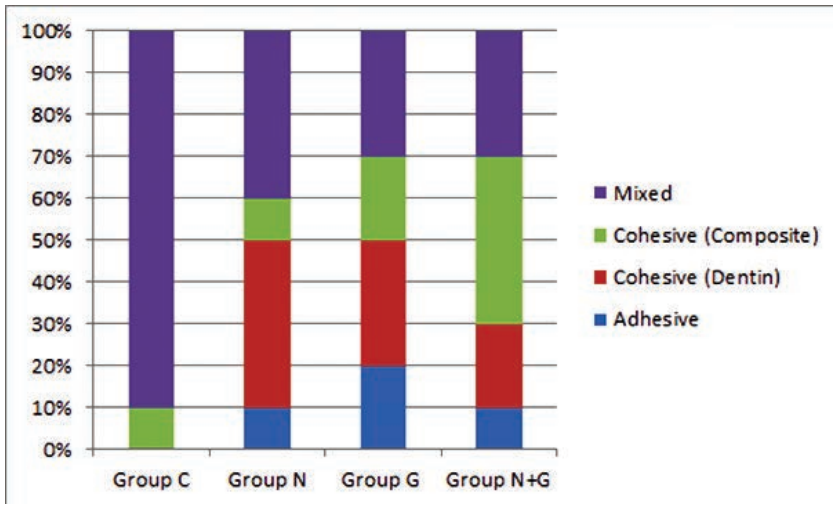


Figure 7. Fracture types and failure mode distributions (%) of dentin specimens.

dentin fluid proteins.[38] Araha and colleagues[20] evaluated the effects of different desensitizing agents (Gluma and Oxa-gel; Art Dent, Araraquara, SP, Brazil) and a low-intensity laser (MM Optics; Sao Carlos, SP, Brazil) on the bond strength between total-etch adhesive resin cement and dentin. They found that the Gluma desensitizer did not have any detrimental effects on bond strength. Huh and colleagues[28] examined the effects of previously applied desensitizers (SuperSeal, Phoenix Dental, Inc., USA; MS-Coat, Sun Medical Co. Ltd, Japan; Gluma and Copalite Varnish, Cooley & Cooley Ltd, USA) on the bond strength of resin cements using a self-etching primer. They reported that the group treated with the Gluma desensitizer (5.2 MPa) had lower shear bond strength than the control group (14.7 MPa). Our findings are consistent with theirs as our Group G (11.7 MPa) had a lower bond strength than Group C (control) (16.8 MPa).

Nd:YAG laser therapy has long been used to treat dentin hypersensitivity.[36,39,40] Thermal energy absorption leads to laser-induced occlusion and narrowing of dental tubules and melting of the hydroxyapatite structure.[7,18,34,41] However, the effects of previously applied laser sensitivity treatments on the bond strength of resin cement when a self-etching primer is used have yet to be clarified. While some researchers[26] have investigated the bond strength of agents applied after dentin Nd:YAG laser irradiation, others[42] have investigated the effect of Nd:YAG laser irradiation of the hybrid layer or Nd:YAG laser irradiation performed after an adhesive has been applied but prior to polymerization.[43] Ferraira et al.[42] evaluated the bond strength and hybrid layer morphology of different adhesive systems after Nd:YAG laser irradiation (0.8 W, 10 Hz; 1, 2 W, 20 Hz). They found that Nd:YAG laser irradiation of

the hybrid layer promoted morphological changes in dentin and negatively influenced bond strength. By contrast, Yazici et al.[26] evaluated the shear bond strength of two-step self-etch adhesives applied to coronal dentin exposed to Nd:YAG laser therapy (1 W, 15 Hz) for dentin hypersensitivity. They found that Nd:YAG laser irradiation of dentin reduced the bond strength compared with the control group, but there were no statistically significant differences among the groups.

In our study there were no significant difference between Group N and the control group (p= 0.102), but Nd:YAG laser therapy increased the shear bond strength compared to the control group. Consistent with our study findings, Rolla et al.[44] found that Nd:YAG laser iradiation of dentin increased bond strength for different adhesive systems (Tyrian SPE/One Step Plus and Adper Prompt L-Pop) and favored greater micromechanical retention of self-etch adhesives compared with non-irradiated dentin, but did not influence the bond strength of the single bond adhesive system. The adhesive system that is generally used by most clinicians was used in our study, and so different adhesive systems should be compared to evaluate the effects of different hypersensitivity treatments. The limitation of this study was the use of one adhesive system for luting composite resin and non vital teeth which probably caused some loss of dentin fluid protein.

CONCLUSION

Different hypersensitivity treatments significantly altered the strength of the bond between flowable resin composites and dentin. The bond strength of the composites applied to dentin samples irradiated with the Nd:YAG laser was significantly higher than that of those applied to the samples treated with the Gluma desentisizer. Nd:YAG laser irradiation following the application of the Gluma desensitizer could be an effective treatment for dentin hypersensitivity, and this combination did not have a detrimental effect on the strength of the bond between the resin cement and the dentin surface. Further, in vivo studies could be helpful for determining the effects of different dentin hypersensitivity treatments on the bond strength of adhesive materials.

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 21-27 Original Research Article

THE EFFECTIVENESS OF PRECLINICAL DEMONSTRATION IN ACCESS CAVITY PREPARATION PERFORMANCE

Behram Tuncel, DDS, PhD
Assistant Professor, Department of Endodontics, Faculty of Dentistry, Hacettepe University, Ankara, Turkey

Zeliha Yılmaz, DDS, PhD
Associate Professor, Department of Endodontics, Faculty of Dentistry, Hacettepe University, Ankara, Turkey

Derya Deniz Sungur, DDS, PhD
Research Assistant, Department of Endodontics, Faculty of Dentistry, Hacettepe University, Ankara, Turkey

Zeynel Emre Nagas, DDS, PhD
Assistant Professor, Department of Endodontics, Faculty of Dentistry, Hacettepe University, Ankara, Turkey

Mehmet Ömer Görduysus, DDS, PhD
Professor, Department of Endodontics, Faculty of Dentistry, Hacettepe University, Ankara, Turkey

Correspondence
Zeliha Yılmaz, DDS, PhD
Department of Endodontics, Faculty of Dentistry, Hacettepe University, 06100 Sıhhiye Ankara,Turkey
Phone:+90 3123052260
Fax: +90 3123052832
E-mail: zeliha@hacettepe.edu.tr, dtzeliha@gmail.com

ABSTRACT

Background and Aim: A well-designed access cavity reduces procedural errors during endodontic treatment. The aim of this study was to assess the effect of visual demonstration on the improvement of the access cavity preparation done by preclinical students.

Materials and Methods: This study included 102 third-grade students. The students were asked to prepare the access cavity of an extracted human maxillary central incisor in a 40 minutes lesson time and score their own access preparation (Group I). The access cavities were then scored by 3 instructors including a post graduate student with 2 years of experience, an endodontist with PhD 4 years of experience and a professor (Group II). Following the assessment, specialists with at least two years of experience demonstrated the access cavity preparation of a central incisor. The students were asked to prepare the other mounted extracted teeth of access cavity. Access cavity preparations after the demonstration were assessed and scored by the students themselves (Group III) and by the instructors (Group IV). The differences in scores before and after demonstration were statistically analyzed by repeated-measures ANOVA and McNemar tests.

Results: As a result of this study no statistically difference was found between the scores of Group I and III ($p=0.392$) but there was a significant difference between the scores of Group II and IV ($p<0.001$).

Conclusion: It can be concluded that the demonstration procedure improved the success of access cavity preparation.

Key words: Access Cavity preparation, Demonstration, Preclinical Education

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PREKLİNİK DEMONSTRASYONUN GİRİŞ KAVİTESİ HAZIRLIĞINDAKİ BAŞARIYA ETKİSİ

Behram Tuncel
Yar. Doç. Dr., Hacettepe Üniversitesi, Diş Hekimliği Fakültesi, Endodonti Anabilim Dalı, Ankara, Türkiye

Zeliha Yılmaz
Doç. Dr. Hacettepe Üniversitesi, Diş Hekimliği Fakültesi, Endodonti Anabilim Dalı, Ankara, Türkiye

Derya Deniz Sungur
Araştırma Görevlisi, Hacettepe Üniversitesi, Diş Hekimliği Fakültesi, Endodonti Anabilim Dalı, Ankara, Türkiye

Zeynel Emre Nagas,
Yar. Doç. Dr., Hacettepe Üniversitesi, Diş Hekimliği Fakültesi, Endodonti Anabilim Dalı, Ankara, Türkiye

Mehmet Ömer Görduysus,
Prof. Dr., Hacettepe Üniversitesi, Diş Hekimliği Fakültesi, Endodonti Anabilim Dalı, Ankara, Türkiye

Sorumlu Yazar
Zeliha Yılmaz
Hacettepe Üniversitesi
Diş Hekimliği Fakültesi
Endodonti Anabilim Dalı,
06100 Sıhhiye, Ankara, Türkiye
Telefon:+90 3123052260
Faks: +90 3123052832
E-mail: zeliha@hacettepe.edu.tr, dtzeliha@gmail.com

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ÖZET

Amaç: İyi hazırlanmış bir giriş kavitesi, endodontik tedavi sırasında oluşan işlemsel hataları azaltır. Bu çalışmanın amacı, preklinik öğrencileri tarafından hazırlanan giriş kavitelerinin başarısını arttırmada, demonstrasyonun etkinliğini değerlendirmektir.

Bireyler ve Yöntem: Çalışmaya 102 Dönem 3 öğrencisi katılmıştır. Öğrencilerden, 40 dakikalık bir ders saati içerisinde, bir adet çekilmiş insan üst santral keser dişin giriş kavitesini hazırlamaları ve kendi açtıkları kaviteleri değerlendirmeleri istenmiştir (Group I). Sonra giriş kaviteleri, iki yıllık tecrübesi olan bir doktora öğrencisi, doktorasını tamamlamış dört yıllık tecrübeli bir uzman endodontist ve bir profesörden oluşan 3 öğretim elemanı tarafından tekrar değerlendirilmiştir. (Group II). Değerlendirmeleri takiben, en az iki yıllık tecrübesi olan bir endodonti uzmanı tarafından bir adet santral keser dişin giriş kavitesi hazırlığı demonstre edilmiştir. Öğrencilerden başka bir adet çekilmiş üst santral keser dişi alçı modele almaları istendi. Demonstrasyondan sonra, öğrenciler tarafından giriş kavitesini açmaları ve kendileri tarafından tekrar değerlendirmeleri istendi (Group III). Aynı kaviteler ayrıca öğretim elemanları tarafından da değerlendirildi (Group IV). Demonstrasyon öncesi ve sonrası farklılıklar, ANOVA ve McNemar testleri kullanılarak istatistiksel olarak analiz edildi.

Bulgular: Bu çalışmanın sonucunda, Grup I ve Grup III skorları arasında istatistiksel olarak anlamlı bir fark bulunamadı ($p=0.392$). Ancak Grup II ve Grup IV arasında istatsitiksel bir fark vardı ($p<0.001$).

Sonuçlar: Bu çalışmanın sonuçlarından demonstrasyon işleminin giriş kavitesi hazırlığında başarıyı arttırdığı ifade edilebilir.

Anahtar Kelimeler: Giriş Kavitesi Hazırlığı, Demonstrasyon, Preklinik Eğitimi

INTRODUCTION

The objective of dental education is to train dentists who will treat oral tissue diseases while carrying on conservative dental applications by integrating theoretical and practical knowledge of dental science. Endodontic education in dentistry faculties takes part in the syllabus, including both theoretical and practical applications. The first step in practical endodontic education is the preclinical training process, while theoretical knowledge is applied by some teaching methods such as explanations, lectures and demonstrations.

Endodontic preclinical education in many dental schools includes endodontic access cavity preparation, rubber dam applications and localizing, negotiating, cleaning, shaping and, filling the root canals on extracted human teeth. Access cavity preparation, the first and the most important phase of root canal treatment; aims to achieve a straight-line access to apical foramen by removing all caries, entire pulp chamber and pulpal remnants while conserving the sound tooth structure. It also establishes restorative margins to minimize marginal leakage of the restored tooth. A well-designed access cavity will promote proper cleaning, shaping, irrigation and filling of root canals to reduce procedural errors during treatment process. Therefore, access cavity preparation used to be referred as the "sine qua non" for good-quality endodontics.[1] Students graduating from dental school should understand the principles involved and the problems associated with the access cavity preparation.

Many studies have been conducted to evaluate the quality of root canal treatment undertaken by general practitioners in different nations.[2,3] These studies have demonstrated that many root canal treatments do not show good quality. It has been argued that shortcomings in endodontic education are one of the reasons for this lack of quality.[4] Homez et al.[5] assessed the ability of private practitioners to perform adequate root fillings, with respect to density and length, by examining the radiographs of clinical endodontic cases; the authors observed that "the results underscore the need for more and better clinical and didactic training in dental schools". Moreover, Qualthrouh et al.[6] argued that the academic staff especially in charge of endodontic training might have some impact on the quality of root canal treatment results. Also, Brookman[7] reported that general practitioners were not satisfied with the undergraduate training experience in endodontics.

Dental students have many sources to learn during their clinical practice such as the clinical procedures themselves, from interactions with patients, their colleagues and instructors. However, a rich literature about student learning in dentistry is not existent.[8] Based on the impact of preclinical education on the results of root canal treatment; the aim of this study was to assess the effect of visual demonstration on the improvement of the access cavity preparation performed by preclinical students.

MATERIALS AND METHODS

This study was carried out via the voluntary participation of 102 third grade students enrolled in the Faculty of Dentistry of Hacettepe University. The students had not attended any practical endodontic classes before. The students were asked to mount two extracted human maxillary central incisors in separate cast moulds and prepare one of the access cavities within a 40 minutes lesson time. They prepared one of the access cavities by using a hand piece mounted to an educational unit system without any magnification. Initially, each of the students scored their own access preparation (n=102, Group I). Later, the instructors including a post graduate student with 2 years of experience, an endodontist with PhD 4 years of experience and a professor, blindly scored each access preparations (n=102, Group II). Anterior access cavity guidelines considered by the students and instructors during the scoring procedure were listed in Table 1.[1] The evaluation of the access cavity preparation was made as a percentage. The each successfully completed criterion were collected and saved as note. Following this assessment, endodontic specialists with at least 2 years of experience demonstrated the preparation of an anterior access cavity while explaining the theory at the same time. The demonstration procedure was monitorised and the students watched it via their own monitors. Following the demonstration, the students were asked to prepare the other mounted extracted teeth of access cavity. Access cavity preparations after the demonstration were assessed and scored by the students themselves (n=102, Group III) and by the instructors (n=102, Group IV) as in the same manner previously described. The scores more than 60 points (the dental school requires 60 points for passing the lesson) were assumed as successful and the ones less than

Table 1. The guideline followed for anterior access cavity preparation scoring and the percentage in total scoring.

	Anterior access cavity preparation guidelines	%
1	Removal of caries and permanent restoration	20
2	Initial external outline form	20
3	Complete removal of pulp chamber roof	20
4	Identification of all canal orifices	20
5	Removal of lingual shoulder and orifice and canal flaring	20

Table 2. Designed groups of the study.

Groups	Scoring	n
Group I	Students' scoring before demonstration	102
Group II	Instructors' scoring before demonstration	102
Group III	Students' scoring after demonstration	102
Group IV	Instructor' scoring after demonstration	102

60 points were assumed as failed. The groups included in the study were summarized in Table 2.

The coherence between the notes given by the instructors before and after the demonstration was examined by Intra Class Correlation Coefficient (ICC). ICC values were 0.75 and 0.78 for before and after demonstration, respectively. As a result of high ICC values, the instructors' scores were averaged and a single note was used as the data belongs to Group II and IV.

Statistical evaluation

The differences between the groups were analyzed by repeated measures ANOVA. The quantitative evaluation was determined with McNemar test. Statistical significance was set at $p<0.05$.

RESULTS

The statistical analyses revealed that there were no statistical difference between Group I and III ($p=0.392$) however Group II and IV were significantly different ($p<0.001$) (Figure 1). The students got the passing mark 60 and more were assumed successful. Then, according to the students scoring before demonstration; 91 of the students were successful, but the 11 were failed. However, 93 of them were successful, but 9 were failed after demonstration. When the instructors scoring were considered, 75 of the students were successful, but 27 were failed before demonstration. Nevertheless, 97 of them were successful, but just 5 were failed after demonstration (Table 3).

DISCUSSION

Although the success of root canal treatment has been ranged between 53% and 97%, undesirable results identified as "failures" may arise.[9,10] There are many causes for endodontic failures including poor access cavity design, untreated canals, poorly cleaned and obturated canals, perforations, overextensions of filling materials, apical and coronal leakage.[6,11-14] It has been reported that access cavity preparation may be the most important mechanical phase of root canal therapy to minimize these failures.[15,16] According to the guidelines for an ideal access cavity, removal of the pulp chamber roof, conserving the tooth structure as much as possible, providing the straight- line access to avoid iatrogenic mishaps such as perforations are required.[6,16] Barone et al.[17] reported that the perforations in endodontics can occur during access cavity preparation and in case, the healing rate decreases. Besides, the failure to identify the extra canals, which was reported as a common reason for failure in endodontic treatment, increase in case of insufficient access preparation.

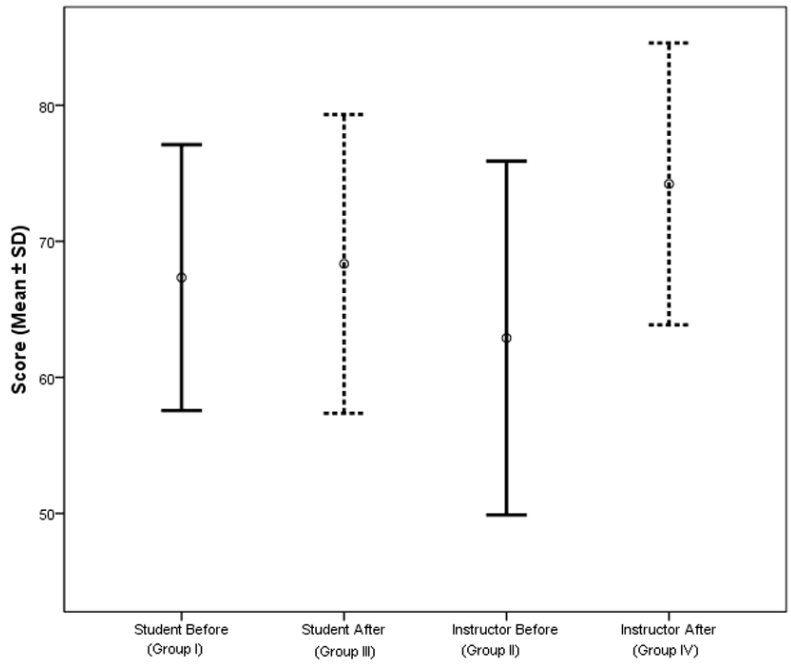


Figure 1. The scores of students' and instructors' groups before and after the demonstration

Table 3. The assessment results of students' and instructors' groups before and after demonstration.

		Students					Instructors				
		Success	Failure	Mean	Std. D	Total	Success	Failure	Mean	Std D	Total
Before	n	91	11	67.3	9.7	102	75	27	62.8	13.1	102
	%	89.2%	10.8%			100%	73.5%	26.5%			100%
After	n	93	9	68.3	10.9	102	97	5	74.2	10.3	102
	%	91.2%	8.8%			100%	95.1%	4.9%			100%

Endodontic education at dental schools is a basic factor affecting the success of root canal therapy. Dental schools are responsible to educate the students to manage to the challenges during a standard root canal therapy.[5] Homez et al.[5] stated that the endodontic curriculum was frequently substandard thus, better clinical and didactic endodontic training in dental schools were necessary. Dummer also concluded that the endodontic education in the United Kingdom was given a lower priority in UK than that in some schools in Europe and the United States.[18] Barrieshi-Nusair et al.[4] also assessed the technical quality of root canal treatment performed by undergraduate students and concluded that endodontic should be taught as a separate specialty by endodontists.

As a result of this study, no significant difference was found between the access cavities performed before and after demonstration in terms of students. They scored 89.21% and 91.17% of the cavities as successful before and after demonstration, respectively. Students scored their own access cavities and this may lead them not to be objective in scoring themselves and result in high scores. Also, the type of the access cavity may affect the results. Less complicated anterior access cavity preparation compared to molars, may be the reason of high success rates before and after demonstration. When the scores given by instructors before and after the demonstration were analyzed, it was observed that the cavities after the demonstration were significantly

more successful than before demonstration. 71.56% of the cavities were successful before demonstration while 95.09 % were successful after demonstration. This result confirms that the demonstration improves the success of access cavity preparation. At the beginning of the practical learning process, students are reluctant because of the fear of failure and are not fully able to apply their theoretical knowledge in the practical applications. Also, an accepted method in the learning process for adults is imitating a role model. In the study of Victoroff and Hogan 'Modeling and Demonstrations' were emphasized as one of the characteristics of the learning process.[19] Besides, demonstration is thought to be a significant factor in learning psychomotor skills.[20,21] A brief, specific and easily seen demonstration of the procedure by an expert may help students to understand and visualize what they actually have to do.

CONCLUSION

Within the limitations of this study, it can be concluded that demonstration might be supposed as an effective method improving the learning process and so the success and quality in endodontic education. However we cannot say "the demonstrations are the best way to teach or enough efficient itself" or a panacea for all. To enhance the success in preclinical endodontic training and overall in endodontic education some other methods must be used for the consolidation of the existing ones.

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 28-35 Original Research Article

MEDICAL PROFILE OF A DENTAL SCHOOL PATIENT POPULATION

Özgür Başlarlı, DDS, PhD
Department of Oral and Maxillofacial Surgery,
Faculty of Dentistry, Hacettepe University,
Ankara, Turkey

Ilgar Adiloğlu, DDS, PhD
Private Practice,
Ankara, Turkey

Ferda Taşar, DDS, PhD
Professor retaired from Hacettepe University, Faculty of Dentistry,
Department of Oral and Maxillofacial Surgery,
Ankara, Turkey

Celal Tümer, DDS, PhD
Professor., Private Practice,
Ankara, Turkey

Mustafa Yiğit Saysel, DDS, PhD
Associate Professor, Department of Oral and Maxillofacial Surgery,
Faculty of Dentistry, Hacettepe University,
Ankara, Turkey

ABSTRACT

Background and Aim: The improvements in medical sciences and technology are reflected in better oral health in a number of patients since they still retain their natural teeth into the old age. Systemic conditions may affect the dental treatment options. Dentists should be aware of medical problems and their treatments. This study aims to assess the medical profile of patients seeking treatment at Hacettepe University, Faculty of Dentistry, Department of Oral Maxillofacial Surgery (OMFS).

Subjects and Methods: The data were collected through a personal interview conducted by the same clinician group who completed the questionnaire. The study population was composed of 500 randomly selected patients who presented at the OMFS clinic.

Results: More than half of the patients (290) included in this study, had one or more medical conditions. Among to our evaluation cardiovascular diseases were the most common with a rate of 48%.

Conclusion: Dentists and dentistry students should be aware of their patient's detailed medical history.

Correspondence
Özgür Başlarlı, DDS, PhD
Department of Oral and Maxillofacial Surgery,
Faculty of Dentistry,
Hacettepe University
06100 Sıhhiye, Ankara,Turkey
Phone: +90 312 3052220
Fax:+90 312 3104440
E-mail: ozgurbaslarli@gmail.com

Key words: Dental School, Dentist, Diseases, Student

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 28-35 Orjinal Araştırma

DİŞ HEKİMLİĞİ FAKÜLTESİ HASTALARININ MEDİKAL PROFİLİ

Özgür Başlarlı
Dr., Hacettepe Ünversitesi, Diş Hekimliği Fakültesi,
Ağız Diş ve Çene Cerrahisi Anabilim Dalı,
Ankara, Türkiye

Ilgar Adiloğlu
Dr., Serbest Diş Hekimi,
Ankara, Türkiye

FerdaTaşar
Prof. Dr., Hacettepe Ünversitesi, Diş Hekimliği Fakültesi
Ağız Diş ve Çene Cerrahisi Anabilim Dalı'ndan Emekli

Celal Tümer
Prof. Dr. Serbest Diş Hekimi,
Ankara, Türkiye

Mustafa Yiğit Saysel
Doç. Dr. Hacettepe Ünversitesi, Diş Hekimliği Fakültesi
Ağız Diş ve Çene Cerrahisi Anabilim Dalı
Ankara, Türkiye

Sorumlu Yazar
Özgür Başlarlı
Hacettepe Ünversitesi,
Diş Hekimliği Fakültesi,
Ağız Diş ve Çene Cerrahisi Anabilim Dalı,
06100 Sıhhiye Ankara, Türkiye
Telefon: +90 312 3052220
Faks:+90 312 3104440
E-mail: ozgurbaslarli@gmail.com

Yayın Başvuru Tarihi : 18.07.2013
Yayına Kabul Tarihi : 12.02.2014

ÖZET

Amaç: Tıbbi bilimler ve teknolojideki gelişmeler bir grup hastada ağız sağlığının daha iyi olmasına ve ileri yaşlarda da daimi dişlerinin ağızda kalmasına sebep olur. Bireylerin sistemik durumları dental tedavi seçeneklerini etkilemektedir. Diş hekimleri tıbbi sorunlar ve tedavileri hakkında dikkatli olmalıdır.Bu çalışma ile Hacettepe Üniversitesi Diş Hekimliği Fakültesi Ağız, Diş ve Çene Cerrahisi Anabilim Dalı'na tedavi amaçlı başvuran hastaların tıbbi durumlarının incelenmesi amaçlanmıştır.

Bireyler ve Yöntem: Bilgiler aynı klinik ekip tarafından yapılan kişisel görüşmelerle doldurulan anketler üzerinden toplanmıştır. Çalışma Ağız, Diş ve Çene Cerrahisi Anabilim Dalı'na başvuran hastalar üzerinden rastgele seçilen 500 kişiyi içerir.

Bulgular: Çalışmaya katılan hastaların yarısından fazlasında (290) en az bir tane sistemik sorun bulunmuştur. Değerlendirmemize göre en sık rastlanılan hastalık grubu %48 ile kardiyovasküler hastalıklardır.

Sonuçlar: Diş hekimleri ve diş hekimliği öğrencileri hastlarının tıbbi geçmişlerini kapsamlı olarak incelemelidirler

Anahtar Kelimeler: Diş Hekimliği Fakültesi, Diş Hekimi, Hastalıklar, Öğrenci

INTRODUCTION

The advances in medical sciences and technology, better socio-economic conditions make people live longer and better than ever before. These improvements are also reflected in better oral health in a number of patients since they still retain their natural teeth into the old age.[1] Dental treatment may affect and be affected by systemic conditions that are varied and plentiful by the increasing age.[2, 3] Dentists should be aware of medical problems and their treatments as well as the dental and oral soft tissue problems that can arise as a result of the patients' medical conditions.[1]

This study aims to assess the medical profile of patients seeking treatment at Hacettepe University, Faculty of Dentistry, Department of Oral Maxillofacial Surgery (OMFS). The prevalence of systemic diseases in a dental school patient population and correlation between the general population by the medical status of a dental school's patient population were investigated via obtained surveys.

SUBJECTS AND METHODS

This study was carried out at Hacettepe University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery (OMFS), Ankara, Turkey. Patients, included in this study were selected randomly. The data were collected through a personal interview conducted by the same clinician group who completed the questionnaire. The study population was composed of 500 randomly selected patients who presented at the OMFS clinic.

A standardized medical questionnaire (Figure 1), which included information on age, gender, marital status, education level and occupation, was used. Patients were asked if they had any specific medical conditions such as cardiovascular diseases, auto-immune diseases, gastrointestinal diseases, respiratory diseases, hematologic diseases, neurologic and psychological diseases, endocrinal diseases, gynecologic diseases, tumoral diseases, otorhinolaryngological diseases, urogenital diseases, visional diseases and osteoarthropathic diseases. In addition, medications, smoking and alcohol habits were questioned.

The results were analyzed by Department of Biostatistics, Hacettepe University.

RESULTS

Of the randomly selected 500 patients, 220 (44%) were males and 280 (56%) were female whose ages varied between 16 and 80 years. More than half of the patients (290) had one or more medical conditions (58%). Table 1 shows the disease categories and frequency of diseases. Table 2 categorizes the patients to their ages and systemic conditions.

Within respect to our evaluation, cardiovascular diseases were the most common with a rate of 48%. In this group hypertension is the leading problem with a prevalence of 55%. 5% of the cardiovascular patients had hypotension. 11% and 9% of this group had history of angiography operation and by-pass surgery operation, respectively. 5% of the patients had a history of myocardial infarction.

Frequency of visional diseases was ranked second with a prevalence of 33.2%. Myopia was the leading problem (43%). Hypermetropia was the second prevalent problem (36%). 9% of the patients in this group had cataract and 2% had glaucoma and 2% had conjunctivitis.

The third prevalent disease group was respiratory diseases with a prevalence of 21.2%. In this group sinusitis was the most common problem with a rate of 52%. Asthma (20%), bronchitis (18%) and chronic obstructive pulmonary disease (COPD) (6%) were ranked next.

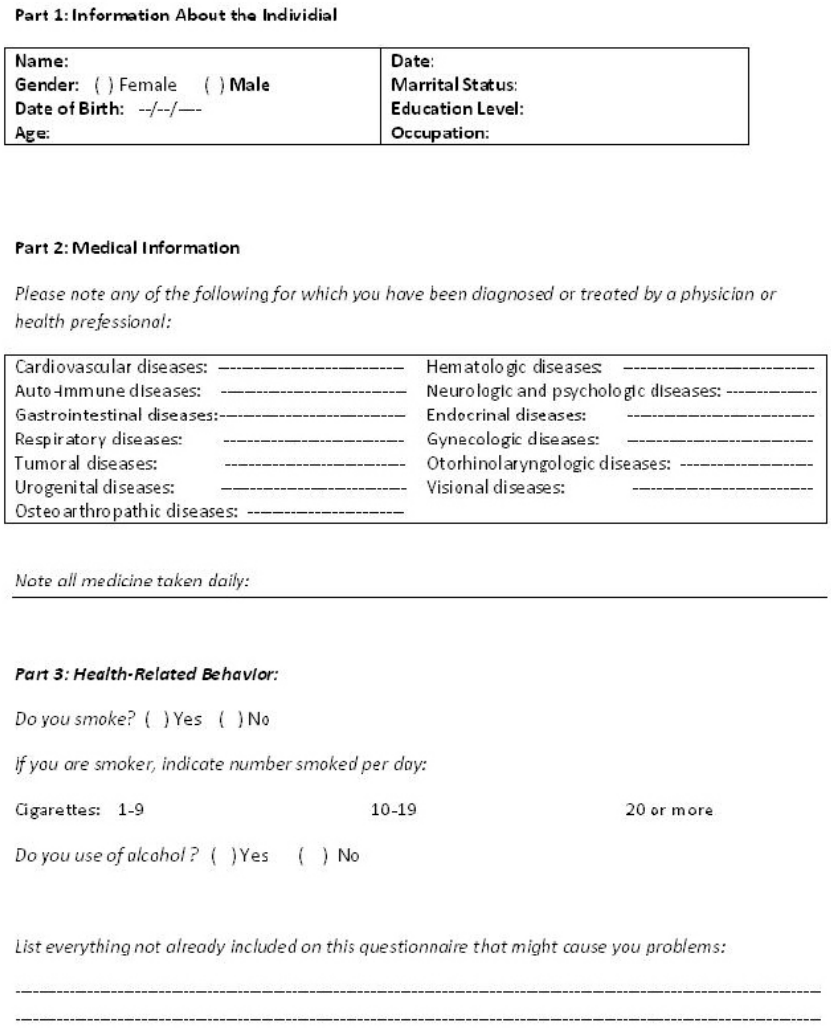
Gastrointestinal diseases were observed with a rate of 18.2%. In this group gastritis had a prevalence of 54%. 26% of this group had hepatitis. Colitis was encountered in 4% of this group.

Endocrine system diseases were encountered with a rate of 17.8%. Diabetes mellitus (Type I -6%, Type II-46%) was the most common in this group, followed with thyroid diseases (7.8%).

Osteoarthropathic disease had a prevalence of 17.8%. Arthrosis (46%) was the most common in this group. Osteoporosis (33%), arthritis (10%) and Paget's disease (5%) were ranked next.

In this study, 6.4% of the patients had hematologic disorders including 76% anemic patients, 9% hemophilic patients, 10% of the patients with other disorders.

The other disease groups had relatively fewer prevalence (neurologic and psychologic diseases -15.4%, gynecologic diseases -11.2%, urogenital diseases -7.4%,otorhinolaryngologic diseases-6.4%, tumoral diseases 4%, auto-immune diseases -1.2%).



Part 1: Information About the Individial

Name: **Gender:** ( ) Female ( ) **Male** **Date of Birth:** --/--/—- **Age:**	**Date:** **Marrital Status:** **Education Level:** **Occupation:**

Part 2: Medical Information

Please note any of the following for which you have been diagnosed or treated by a physician or health prefessional:

Cardiovascular diseases: ----------	Hematologic diseases: ----------
Auto-Immune diseases: ----------	Neurologic and psychologic diseases: ----------
Gastrointestinal diseases:----------	Endocrinal diseases: ----------
Respiratory diseases: ----------	Gynecologic diseases: ----------
Tumoral diseases: ----------	Otorhinolaryngologic diseases: ----------
Urogenital diseases: ----------	Visional diseases: ----------
Osteoarthropathic diseases: ----------	

Note all medicine taken daily:

Part 3: Health-Related Behavior:

Do you smoke? ( ) Yes ( ) No

If you are smoker, indicate number smoked per day:

Cigarettes: 1-9 10-19 20 or more

Do you use of alcohol ? ( ) Yes ( ) No

List everything not already included on this questionnaire that might cause you problems:

Figure 1. Questionnaire including information about the individual, medical status and health- related behaviors.

192 patients reported to take at least one medication prescribed by a physician. 9 patients were on medications without a physician's prescription. 7 patients were on herbal medications. 47 patients were on poly-medication, using 3 or more medications daily. Table 3 illustrates the rate of medication use on various systemic conditions.

98 patients were smokers. Of those who smoked, 48 patients were smoking less than 10 cigarettes per day, 28 patients were smoking more than 10, and less than 20 cigarettes per day, and 22 patients were smoking more than 20 cigarettes per day. Alcohol use was reported as a social event by 3.6% of the patients.

DISCUSSION

Aim of this study was to assess the prevalence of certain medical conditions among dental patients attending to the clinic of OMFS. In this study female: male ratio was 1.27:1 that reflects the fact that females pay more attention to their oral health. Dhanuthai et al.[1] reported such a result in 2009. They underlined the female:male (1,5:1) ratio.

58% of patients who attended to OMFS clinic had one or more medical conditions. Rhodus et al.[4] reported the prevalence of medical conditions in dental patients increased from 7.3% in 1976 to 24.6% in 1986. Smeets et al. [3] reported medically compromised dental patients 28.2% of 29424 dental patients. Saengsirinavin et al.[5] and Umino

Table 1. Disease categories and prevalence of diseases in 500 patients

Disease Category	N	%	Type of Disease
Cardiovascular diseases	240	(48)	Hypertension, hypotension myocardial infarcts, congenital heart diseases,bacterial endocarditis, coronary bypass, angina pectoris, valve prolapse, valve replacement, others
Endocrine diseases	89	(17.8)	Diabetes mellitus, thyroid and parathyroid diseases, others
Hematologic diseases	32	(6.4)	Anemia, hemophilia, purpura, thalassemia, others
Respiratory diseases	106	(21.2)	Tuberculosis, sinusitis, bronchitis, asthma, emphysema, others
Gastrointestinal diseases	91	(18.2)	Hepatitis, gastritis, colitis, others
Osteoarthropathic diseases	89	(17.8)	Osteoarthritis, osteoporosis, osteopetrosis, Paget's diseases of bone, joint prosthesis, others
Neurologic and psychological d.	77	(15.4)	Epilepsy, chronic head aches, migraine, neuralgia, SVD, Parkinson, depression, psychological diseases, others
Urogenital diseases	37	(7.4)	Syphilis, acute-chronic kidney failure, others
Dermatologic diseases	15	(3)	Dermatitis, eczema, psoriasis, others
Auto-immune diseases	6	(1.2)	SLE, Behçet's disease, Sjögren's syndrome, others
Visional diseases	166	(33.2)	Myopia, cataract, hypermetropia, conjunctivitis, glocom, others
Otorhinolaryngologic diseases	32	(6.4)	Middle ear inflammation, vertigo, deafness, others
Gynecologic diseases	56	(11.2)	Myoma, polycystic over syndrome, benign or malign advensial masses, others
Tumoral diseases	21	(4.2)	Breast ca, prostate ca, lymphoma, multiple myeloma, lung,skin ca, others

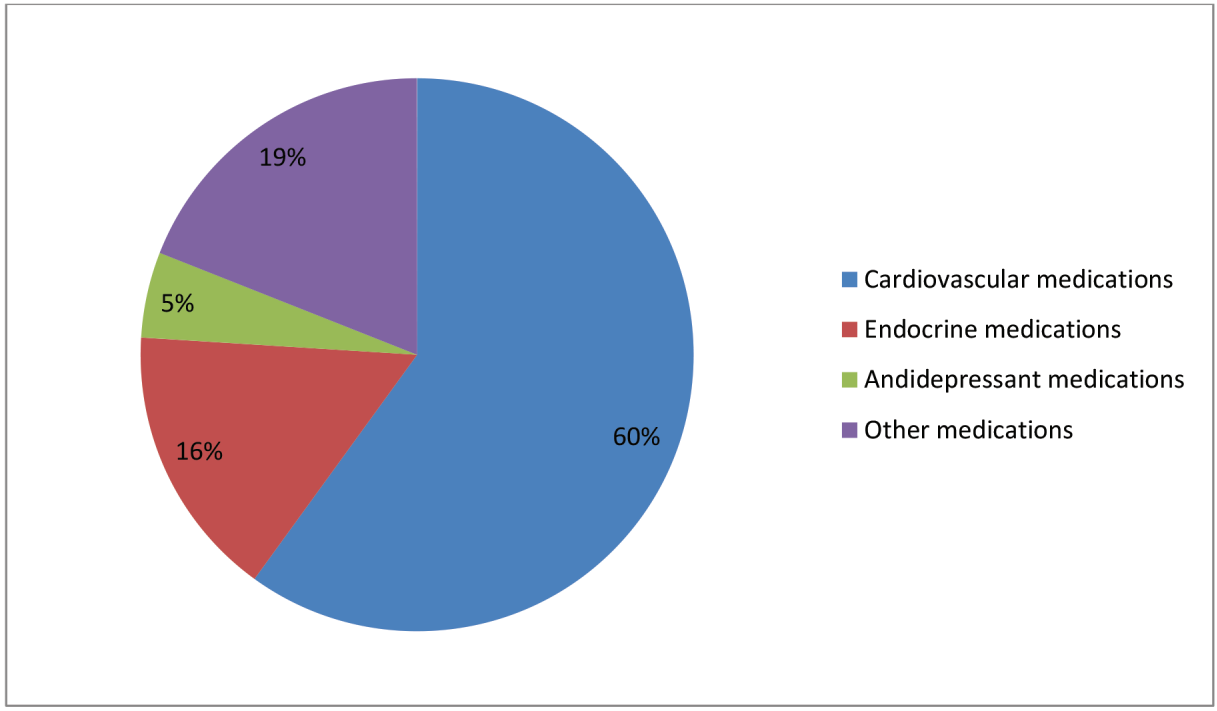
Table 2. The age-distribution of some medical problems

Patient Categories		Age in Years (number)	
	<40	40-65	>65
Cardiovascular diseases	72	132	36
Endocrine diseases	30	42	17
Tumoral diseases	2	7	11
Osteoarthropathic diseases	3	54	32
Auto-immune diseases	1	4	1

et al.[6] reported similar results to this study. The findings of this study shows an increase of the elderly in the population which will eventually lead to more medically compromised patients in the future.

The most commonly reported diseases were cardiovascular diseases. A number of previous studies reported that cardiovascular diseases were the most prevalent among medically compromised patients.[1,4,7] The high prevalence of HT has been consistently reported in numerous epidemiological studies, with prevalence estimates of 25–55% in the adult population samples in most industrialized countries.[8] Altun et al.[9] indicated

Table 3. Prevalence of medications



presence of approximately 15 million hypertensive patient in the adult population in Turkey. In our study, the rate of hypertension was observed as 26.6% which is comparable to previous studies.

According to the 1997 American Heart Association recommendations for prevention of bacterial endocarditis, high risk and medium risk patients need antibiotic prophylaxis prior to certain dental procedures.[10] In this study the overall prevalence of patients needing antibiotic prophylaxis was 6.2%. Dentists should be aware of the significance of these patients.

Myopia is the most common refractive condition in young adults.[11] Goh and Lam[12] found that 71% of a sample of 122 subjects aged 19 and 39 years were myopic while 46% of their sample aged 40 to 44 years were myopic.[13] Edwards et al. [11] found the prevalence of myopia in 29% in their study. As myopia was rated the second most common disease in our study, this result is comparable to above-mentioned results. Furthermore this study is the first one in the literature that also assesses the optical diseases among dental school's patient population as a part of their medical history.

In this study, tumoral diseases presented with an overall prevalenceof 4.2%. Breast cancer was the leading malignancy in contrast to our results. Radfar et al.[7] reported the prevalence of tumoral diseases as 1.5%.

In this study only 11 patients had chronic renal failure. When this ratio is taken into consideration, it can be regarded as "low" when compared to previously conducted studies in the literature.[14]

Due to the advances in medical sciences and technology with better socio-economic conditions being reflected in better oral health, more natural teeth are retained into the old age.[1] As the incidence and prevalence of systemic diseases keep increasing, the demand for medications correlatively increase.

According to our results 192 patients (38.4%) were taking at least one medication. In a geriatric study by Helf and Mariotti, 40% of patients were taking at least three medications per day.[15] Radfar et al.[7] reported 51% of patients were taking one or more drugs per day. For our patients, the category with highest medication use was cardiovascular conditions, antihypertensive drugs in particular. Endocrine system medications (16.9%) and

antidepressant medications (5%) were reported as the second most common. Dentists must be aware of the drugs and their interactions.

In our study, prevalence of smoking was 19.6%. This result is lower than the other studies aiming with the smoking habits in Turkey's population.[16] Comparing the alcohol habits, the prevalence of this study was 3.6%, as Turkey's prevalence was 20.5%. Alcohol use was reported as a social event. Both smoking and alcohol consumption habits were reported to a lesser extent than the country's total prevalence reported in previous studies. Such a fact may be dependent on patients' drawback on declaring their habits.

Miller et al.[17] reported changing oral needs from multiple national data bases and indicated a significantly increased demand for diagnosis and management of patients with oral conditions and patients with oral manifestations of systemic conditions, and an increase in general oral care needs of patients who are medically compromised in the next decade.

CONCLUSION

The advances in medical technology, greater access to medical facilities and better socio-economic conditions enable people to live longer as evidenced by an increase in the life expectancy in many parts of the world.[1,18] These advances provide better oral health and retain natural teeth into the older age. This makes more medically compromised patients. Dentists are increasingly treating more medically compromised patients. The statement is that dentists and dentistry students should be aware of their patient's detailed medical history. In terms of both risk and type of medical problem, there seems to be sufficient grounds for dentists to consider their patient's medical condition before commencing dental treatments.[3]

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 36-41 Case Report

AN INTRAORAL LEIOMYOSARCOMA MIMICKING DENTAL INFECTION: A CASE REPORT

Figen Cizmeci Şenel, DDS, PhD
Professor, Department of Oral and Maxillofacial Surgery,
Faculty of Dentistry, Karadeniz Technical University,
Trabzon, Turkey

Kürsat Er, DDS, PhD
Associate Professor, Department of Endodontics,
Faculty of Dentistry, Akdeniz University,
Antalya, Turkey

Mustafa Çankaya, DDS, PhD
Private Practice,
Trabzon, Turkey

Cem Üngör, DDS, PhD
Department of Oral and Maxillofacial Surgery,
Faculty of Dentistry, Karadeniz Technical University,
Trabzon, Turkey

Emre Tosun, DDS, PhD
Asistant Professor, Department of Oral and Maxillofacial Surgery,
Faculty of Dentistry, Hacettepe University,
Ankara, Turkey

Fatih Taskesen, DDS, PhD
Private Practice,
Trabzon, Turkey

Kadriye Yıldız, MD, PhD
Professor, Department of Pathology, Faculty of Medicine,
Karadeniz Technical University
Trabzon, Turkey

Correspondence
Emre Tosun, DDS, PhD
Department of Oral and Maxillofacial Surgery,
Faculty of Dentistry,
Hacettepe University,
06100 Sıhhiye, Ankara, Turkey
Phone: +90 532 6175599
E-mail: emretosun1980@gmail.com

ABSTRACT

The aim of this study is to evaluate and discuss an oral leiomyosarcoma case which was misdiagnosed as an odontogenic infection. Leiomyosarcoma is a malignant smooth-muscle tumor that accounts for 5–10% of all soft tissue sarcomas. It is extremely rare in the oral cavity and has a low survival. The occurrence of oral leiomyosarcoma is 3-10% of all leiomyosarcomas arising in head and neck. The tumor is usually encountered as a slow growing, firm and non-ulcerated painless mass. In our case after the biopsy and histological examination, hemimaxillectomy and adjuvant radiotherapy was our treatment of choice. Our survival was 2 years. Due to the clinical appearance, tumor can appear misleadingly as a benign lesion or an infection. Early and correct diagnosis is crucial to avoid metastasis and follow-up examinations are essential on account of recurrence possibility.

Key words: Intraoral, Leiomyosarcoma, Malign, Tumor

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 36-41 Olgu Bildirimi

DENTAL ENFEKSİYONU TAKLİT EDEN LEİOMYOSARKOM: VAKA RAPORU

Figen Cizmeci Şenel
Prof. Dr., Karadeniz Teknik Üniversitesi, Diş Hekimliği Fakültesi, Ağız Diş ve Çene Cerrahisi Anabilim Dalı, Trabzon, Türkiye

Kürşat Er
Doç. Dr., Akdeniz Üniversitesi, Diş Hekimliği Fakültesi, Endodonti Anabilim Dalı, Antalya, Türkiye

Mustafa Çankaya
Dr., Ağız Diş ve Çene Cerrahisi Uzmanı, Serbest Diş Hekimi, Trabzon, Türkiye

Cem Üngör
Dr., Karadeniz Teknik Üniversitesi, Diş Hekimliği Fakültesi, Ağız Diş ve Çene Cerrahisi Anabilim Dalı, Trabzon, Türkiye

Emre Tosun
Yrd. Doç. Dr., Hacettepe Üniversitesi, Diş Hekimliği Fakültesi, Ağız Diş ve Çene Cerrahisi, Ankara, Türkiye

Fatih Taşkesen
Dr., Ağız Diş ve Çene Cerrahisi Uzmanı, Serbest Diş Hekimi, Trabzon, Türkiye

Kadriye Yıldız
Prof. Dr., Karadeniz Teknik Üniversitesi, Tıp Fakültesi Patoloji Anabilim Dalı, Trabzon, Türkiye

Sorumlu Yazar
Emre Tosun
Hacettepe Üniversitesi, Diş Hekimliği Fakültesi, Ağız Diş ve Çene Cerrahisi, 06100 Sıhhiye, Ankara, Türkiye
Telefon: +90 532 6175599
E-mail: emretosun1980@gmail.com

ÖZET

Bu olgu raporunun amacı odontojenik enfeksiyon olarak yanlış teşhis edilen leiomyosarkom vakasının değerlendirilmesi ve tartışılmasıdır. Leiomyosarkom malign bir düz kas tümörü olup, tüm yumuşak doku sarkomları arasında görülme oranı %5-10'dur. Oral kavitede çok nadir olarak izlenir ve düşük hayatta kalma oranına sahiptir. Oral leiomyosarkomlar, baş ve boyun bölgesinde görülün leiomyosarkomların %3-10'unu oluşturur. Sıklıkla yavaş büyüyen, sıkı ve ülsere olmayan şişlik şeklinde izlenir. Olgumuzda biyopsi ve histolojik inceleme sonrası tedavi seçeneği olarak hemimaksillektomi ve destekleyici radyoterapi uygulanmıştır. Hayatta kalma oranımız 2 yıldır. Klinik görünümü nedeni ile bu tümör benign lezyonlar ve enfeksiyonlar ile karışabilmektedir. Metastazın önlenmesi için erken ve doğru tanı çok önem taşımaktadır ve lezyonun olası tekrarı açısından hastalar yakın takibe alınmalıdır.

Anahtar Kelimeler: İntraoral, Leiomyosarkom, Malign, Tümor

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INTRODUCTION

Leiomyosarcoma (LMS) is a malignant mesenchymal smooth muscle neoplasm that most commonly occur in the uterine myometrium, the gastrointestinal tract and the retroperitoneum.[1-3] They are 7% of all soft tissue sarcomas.[4] The occurrence of this highly malignant tumor in the head and neck region is extremely rare, 3%-10% of all LMS's, probably because of the lack of smooth muscle tissue in this region.[1-5] LMS of the head and neck region is considered to originate from the tunica media of blood vessels, the ductus lingualis, the circumvallate papillae or pluripotential mesenchymal cells which undergo differentiation during the course of neoplastic transformation.[2, 4, 6-9] The cause of the LMS remains unknown however there are reports in the literature associating it with trauma, estrogenic stimulation, ionizing irradiation and Epstein-Barr virus.[10-12] LMS may occur as a primary tumor, metastasis or a radiation-associated tumor.[3] It is associated with aggressive clinical behavior and low survival.[13] The prognosis is usually poor because of high recurrence and metastatic rates.[10,14,15] The most common sites of metastasis are the lungs, bone, brain and the lymph nodes.[16] The recommended treatment for LMS is primarily wide surgical excision with histologically proven tumor-free margins based on the cases and literature.[17-19] The aim of this article is to report a case of misdiagnosed intraoral LMS, mimicking dental infection located in the right posterior maxilla managed with wide surgical excision and postoperative adjuvant radiotherapy. We emphasize the importance of early diagnosis and careful clinical and radiological evaluation of the suspicious lesions.

CASE REPORT

A 45-years-old woman was referred to our clinic for a painless, firmly adherent expansive mass at her right palatal and alveolar mucosa that had appeared 3 months before. An endodontist suspected dental infection and the patient had undergone endodontic treatment for her affected teeth. She had no clinical improvement in her condition after the endodontic treatment. The clinical examination disclosed that the pink-reddish lesion expands both labially and palatally (Figure 1). Periapical radiograph of the affected area revealed bone resorption, loss of trabecules and lamina dura (Figure 2). Her CT scan revealed a vertical bone resorption with irregular border from her right maxillary 1st premolar to right 1st molar region (Figure 3). No pathologic lymph nodes were found and patient had no history of malignancy or radiotherapy. The patient had undergone excisional biopsy from the lesion under local anesthesia. Lesion was excised including the overlying mucosa and the affected bone was removed with curettage. Excessive bleeding was not observed. The wound site was primarily closed with buccal flap.

Histological examination at x20 magnification (HEx20) revealed a mesenchimal neoplasm infiltrating into the bone trabecules with irregular borders. With x400 magnification (Hex400) leiomyosarcoma with fusiform cells was observed (Figures 4 and 5). The mitotic activity was clear. Immunohistochemical analysis was performed for the definitive diagnosis of LMS (Figure 6). The patient underwent hemimaxillectomy and adjuvant radiotherapy due to the invasive spread of tumor.



Figure 1. Intraoral view of the lesion after the extraction of tooth number 14



Figure 2. Periapical radiograph after root canal treatment

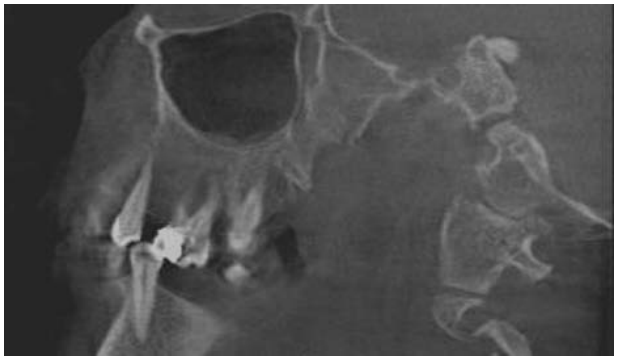


Figure 3. CT scan of the affected area

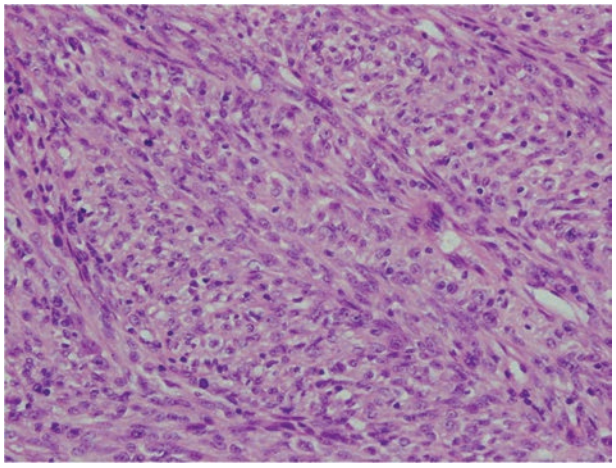


Figure 4. High-power view of the tumour demonstrating a rich cellularity and the spindle cell appearance of the cells (H&EX400).

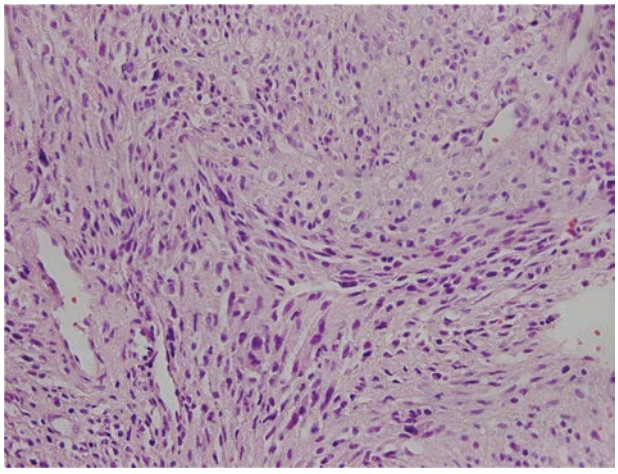


Figure 5. Illustrating the biphasic nature of the myofibroma with elongated spindle cells and more rounded cells with eosinophilic cytoplasm (H&EX400).

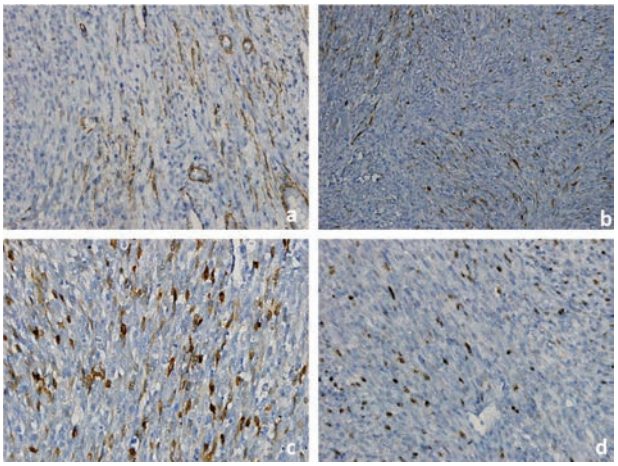


Figure 6(a). Demonstrating α-smooth muscle actin focal positivity within the tumour (immunoperoxidase-haematoxylinX400) (b). Demonstrating desmin focal positivity within the tumour (immunoperoxidase-haematoxylinX400) (c). Demonstrating S100 focal positivity within the tumour (immunoperoxidase-haematoxylinX400) (d). Demonstrating Ki-67 positivity(>%10) within the tumour (immunoperoxidase-haematoxylinX400)

The final diagnosis was primer LMS. In our case, there is no evidence of recurrence or metastasis at 12 months follow-up examination. However the patient died after 24 months.

DISCUSSION

LMS's of the head and neck region are quite rare with a ratio of 3-10% in total LMS's. Within this area the nose and paranasal sinuses (19%), skin and subcutaneous tissues (16%) and cervical esophagus (12%) are the most commonly affected sites.[20] LMS's occurring in the oral cavity is exceptionally rare. Maxilla and mandible are the most common involved sites (65%).[21] Larynx, hypopharynx, tongue, floor of the mouth, gingiva, soft palate, para pharyngeal space, lips and thyroid are the other intraoral sites of occurrence.

In a review Nagpal et al.[22] reported that among 63 patients reported in English literature among the past 20 years, mandible is the most frequent site with 20 cases. It was followed by maxilla with 15 cases. Our case has maxillary gingival, alveolar and palatal involvement. No involved lymph nodes or metastasis were detected.

LMS's occur over a wide age from 10 months to 91 years, with a mean age of 45 years.[21] Oral LMS does not display any significant gender predilection.[15]

LMS mostly presents as a well-circumscribed slow growing, discreet non-ulcerated painless mass that is firmly adherent

to the surrounding soft tissues, similar to our case.[10, 21] Pain and tenderness are unlikely features.[17] These lesions are easily misdiagnosed or go unnoticed due to the lack of definitive symptoms and the rarity of the disease. Also in our case this lesion was misdiagnosed as a dental infection and endodontic treatment was performed to the involved tooth, which was a waste of time for the patient. Clinical information, a thorough physical examination, imaging studies and a careful histopathological examination are extremely important for the correct diagnosis of LMS.[9] The presented case showed a painless pink-reddish mass mimicking dental infection at the maxilla expanding labially and palatally.

The treatment of LMS is wide and complete surgical excision to assure low local recurrence and longer survival.[2] Some authors also recommend adjuvant radiotherapy for high-grade sarcomas, large tumors and close or positive surgical margins.[23-26] Maxillary LMS's seem to have an unfavorable prognosis because of the greater difficulty in resecting maxillary lesions.[14,15,27,28] In our case a radical surgery was performed with hemimaxillectomy and adjuvant radiotherapy that may lead to a favorable prognosis.

Histologically LMS's are composed of bundles and fascicles of spindle-shaped cells with elongated, "cigar-shaped" nuclei and abundant eosinophylic cytoplasm.[28] The differential diagnosis of LMS may be challenging therefore the diagnosis should be supported by immunohistochemistry. Our diagnosis is also supported with immunuhistochemistry in our case.

The prognosis of LMS is usually poor. Ethunandan et al.[21] reported a local recurrence rate of 34% and metastasis rate of 35%. LMS arising from uterus, gastrointestinal tract and retroperitoneum can metastasize to the lungs, bone, brain and oral cavity and oral LMS tends to metastasize to the cervical nodes and lungs.[29,30] In another study Lo Muzio et al.[31] considered the prognosis as uncertain; reporting a local recurrence rate of 20.6% and distant metastasis rate of 20%. When LMS is diagnosed it is important to determine whether the lesion is primary or metastasis.[20] 2 to 5 years survival rate has been reported.[17] The survival of our case was 2 years. As the course of this disease is unpredictable and a high rate of recurrence, metastasis and mortality has been reported, long-term follow up of these patients is extremely important.[15,32]

Patel et al.[33] reported that there was no specific radiological finding for LMS; computed tomography and magnetic resonance imaging only reveal a soft tissue mass. Therefore clinical and radiological evaluation should be performed with caution for these lesions as there is always a risk of misdiagnose.

As a conclusion all the dental practitioners should be awake and aware for LMS's and other malignancies, which are easily misdiagnosed or go unnoticed; as time can be life saving for these patients.

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 42-47 Case Report

ALL-CERAMIC FIXED PARTIAL DENTURE FOR CLEFT LIP AND PALATE PATIENT: A CASE REPORT

Şule Tuğba Deniz, DDS, PhD
Postdoctoral Fellow, Department of Prosthodontics, Faculty of Dentistry, Ankara University, Ankara, Turkey

Pelin Özkan, DDS, PhD
Professor, Department of Prosthodontics, Faculty of Dentistry, Ankara University, Ankara, Turkey

Ersan Çelik, DDS, PhD
Assistant Professor, Department of Prosthodontics, Faculty of Dentistry, Ordu University Ordu, Turkey

ABSTRACT

Patients with cleft lip and palate eventually require definitive fixed or removable dental prostheses for aesthetic and functional demands when they become adults. This case report presents application of a zirconia all-ceramic fixed partial denture utilized as a definitive prosthesis for a bilateral cleft palate and unilateral cleft lip patient after surgical and orthodontic treatments had been completed. The zirconia all-ceramic fixed partial denture provides adequate aesthetics and function.

Correspondence
Şule Tuğba Deniz, DDS, PhD
Department of Prosthodontics, Faculty of Dentistry, Ankara University, Beşevler, 06500 Ankara, Turkey
Phone: +90 535 6464783
Fax.+90 312 2123954
E-mail: suletugba@yahoo.com

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CLINICAL DENTISTRY AND RESEARCH 2014; 38(1): 42-47 Olgu Bildirimi

DUDAK DAMAK YARIĞI OLAN HASTADA TAM SERAMİK SABİT BÖLÜMLÜ PROTEZ: VAKA RAPORU

Şule Tuğba Deniz
Dr., Ankara Üniversitesi, Diş Hekimliği Fakültesi,
Protetik Diş Tedavisi Anabilim Dalı,
Ankara, Türkiye

Pelin Özkan
Prof. Dr., Ankara Üniversitesi, Diş Hekimliği Fakültesi,
Protetik Diş Tedavisi Anabilim Dalı, Beşevler,
Ankara, Türkiye

Ersan Çelik
Yar. Doç. Dr., Ordu Üniversitesi Diş Hekimliği Fakültesi
Protetik Diş Tedavisi Anabilim Dalı,
Ordu, Türkiye

ÖZET

Damak ve dudak yarığına sahip olan hastalar, erişkin yaşlara geldiklerinde, çoğunlukla estetik ve fonksiyonel nedenlerle sabit veya hareketli protez kullanmaya ihtiyaç duyarlar. Bu vaka raporunda, bilateral damak yarığı ve unilateral dudak yarığı bulunan bir hastaya, cerrahi ve ortodontik tedavilerin tamamlanmasından sonra daimi protez olarak yapılan zirkonyum tam-seramik sabit bölümlü protez uygulaması sunulmuştur. Zirkonyum tam-seramik sabit bölümlü protez uygun estetik ve fonksiyon sağlamıştır.

Sorumlu Yazar
Şule Tuğba Deniz
Ankara Üniversitesi Diş Hekimliği Fakültesi,
Protetik Diş Tedavisi Anabilim Dalı,
Beşevler, Ankara, 06500, Türkiye
Telefon:+90 535 6464783
Fax: +90 312 2123954
E-mail: suletugba@yahoo.com

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INTRODUCTION

The restorative dental care and management of cleft lip and palate patients calls for a complex multidisciplinary approach with longterm involvement.[1,2] Many cleft lip and palate patients who undergo prosthodontic procedures have already undergone one or both of surgical and orthodontic intervention.[3] These patients eventually require definitive fixed or removable prosthesis for aesthetic and functional demands when they become adults.[4] They usually possess a constricted alveolar arch due to the scar after the surgical cleft palate repair in their childhood. Orthodontic treatment, such as arch expansion and monitoring of tooth eruption during adolescence, is usually necessary for subsequent prosthetic rehabilitation.

Many patient with clefts that also affect the alveolar ridge present with either congenital absence of the permanent maxillary lateral incisors, or teeth that are in a rudimentary form, eg, peg-shaped or small crowns and short roots. The maxillary central incisors are often hypoplastic with short roots and are severely malposed. This malpositioning, in addition to the tooth-lip relationhip and the extent of hard and soft tissue deficiency, influences the aesthetic appearance and phonetics. Thus, prosthodontists, when rehabilitating these patients, face the difficult decision of whether to use fixed or removable partial dentures. In patients with minimal tissue deficiency, fixed or even resin-bonded prosthesis can be used. The treatment plan provided must bear in mind each patient's individual needs and demands and the outcome must be functional, aesthetic and should seek to preserve the remaining tissues.[5,6,7] Aesthetics are especially compromised in the maxillary anterior portion of the mouth where the pontic-ridge relationship of the deformed area may differ from the dentogingival relationship of adjacent unmutilated areas.[8]

The Lava all-ceramic system (Lava™ All-Ceramic System, 3M ESPE Dental Products, St. Paul, MN), which is a high-strength zirconia system and the CAD/CAM technology used in manufacturing all ceramic crowns and fixed partial dentures (FPDs) for anterior and posterior regions, meet high demands regarding aesthetics and function.[9] Although zirconium-oxide–based restorations for fixed partial denture prostheses are available for use, clinical studies evaluating their longevity and related complications are not adequate.[10]

This clinical report describes a zirconia all-ceramic multi-unit fixed partial denture for a bilateral cleft palate and unilateral cleft lip patient after completion of adolescent orthodontic and surgical treatments.

CASE REPORT

A 23-year-old woman with bilateral cleft palate and unilateral cleft lip was referred to the Department of Prosthodontics at Ankara University. She had already completed her surgical and orthodontic treatments in the same university and subsequently presented for prosthetic evaluation (Figure 1). Clinical examination of the patient revealed a repaired bilateral cleft palate and moderate tissue deficiency with a fistulae in the palate. This fistulae extended rightwards to the alveolar ridge and this defect caused a space between upper right lateral incisor and canine (Figure 2). The upper left lateral incisor was extracted due to caries related to the loss of dental tissue and the increased mobility caused by weak bone support. The gingival margins of the right lateral incisor were not at the same level with the central incisors and the tissue defect had caused bone and soft tissue lose around this tooth. The root of the right lateral incisor was appreciably curved in a distal direction. Bone grafting and implant placement were not indicated due to the extency of the defect area in the palate. There were no food or liquid leakage into the nasal cavity but the extent of hard and soft tissue deficiency influences the aesthetic appearance and phonetics.

A zirconia all-ceramic fixed partial denture was chosen as a definitive restoration since this system has an acceptable marginal fit, adequate function and excellent esthetic properties. The abutment teeth chosen were both central incisors, both canines and right lateral incisor. After preparation of these teeth, an impression was made using an fabrication tray and two types (light and heavy body) silicone impression material (Zetaplus C-Silicone Impression Material, Zhermack Clinical, Rovigo, Italy). The master cast was transferred to an articulator using an interocclusal record when the molars were in the maximal intercuspal position. CAD/CAM technology was used for the fabrication of the 7-unit zirconium-oxide frameworks. We had to use one more pontic (except the left incisor pontic) to restore the defect area between upper right lateral incisor and canine. We made this pontic like an upper right canine for the best aesthetic results. The fitting accuracy of the frameworks was tested in the patient's mouth before the ceramic veneer was applied. The frameworks were evaluated intraorally for accuracy of fit after the addition of veneering ceramic (Figures 3 and 4). The gingival margins of the right canine pontic and lateral incisor abutment were not at the same level with the other abutment teeth



Figure 1. Frontal view of the patient referred for prosthetic evaluation. Note the extensive tissue deficiency in the cleft region and unesthetic incisors.



Figure 4. Palatal view of the maxillary arch showing fistulae in the palate and the fit of the veneering ceramic.



Figure 2. The defect on the alveolar ridge between upper right lateral incisor and canine.



Figure 3. The zirconium-oxide frameworks after the addition of veneering ceramic.

so pink porcelain was used after this level. As the gingival margins were not visible in the smile line, the defect on the alveolar ridge could also be restored by extending the length of the canine pontic with pink porcelain (Figure 5). The completed prosthesis was luted with a resin cement (Clearfil SA Cement, Kuraray America, Inc., New York). To date, the restorations have been in function for 3 years without any complications (Figure 6). The defect area on the alveolar ridge was healthy and aesthetically compatible with the restorations (Figure 7). However, it was seen that pregnancy gingivitis has been developed when the patient came for the control appointment (Figure 8).

DISCUSSION

The treatment of patients with cleft lip and palate calls for a complex multidisciplinary approach with longterm involvement.[1] Management should, ideally, begin early and be part of the overall team approach to the care of these patients, with good oral hygiene and dietary advice being given to patients at the outset, and thereafter continually reinforced.[5]

Options to patient and practitioner for treatment are numerous, from no restorative intervention – the rehabilitation of function and appearance being provided by surgical and orthodontic means – to the use of various forms of fixed or removable prostheses. Numerous factors affect decisions for the most appropriate restoration.[5] Henry and Tan[11] addressed issues of patient psychology, particularly the age at which patients are receiving prosthetic care, following on a long sequence of surgery and orthodontic treatment. The evolution prosthesis for cleft lip and palate patients must be borne in mind, as tooth tissue and oral health, time and financial cost.



Figure 5. Esthetics of the completed restorations.



Figure 8. The restorations have functioned favourably without any fracture or colour degradation for 3 years. However, pregnancy gingivitis has been developed.



Figure 6. Three year follow-up of the all-ceramic zirconia fixed partial dentures.



Figure 7. Frontal view of the defect area on the alveolar ridge after 3 years with the restorations.

Adolescent cleft lip and palate patients present special prosthodontic problems and demand particular attention to aesthetic considerations. For aesthetic crown and bridgework, metal-ceramic is still the most widely prescribed material among dentists. With growing awareness of aesthetics and biocompatibility, patients increasingly request metal-free solutions. The Lava™ All-Ceramic system has an acceptable marginal fit and excellent aesthetic properties such as opalescence and translucence even after three-year follow-up in this patient. Based on the test results available in the literature, the Lava™ all-ceramic system is indicated for crowns and fixed partial denture restorations in the anterior and posterior areas.[12,13]

Cleft palate patients have a cleft in the upper jaw thus, the bone structure of the upper jaw is weaker than the lower. Also, relapse after orthodontic procedure has been a risk that prosthodontists have had to address. For these reasons, some teeth must be splinted across the cleft in the prosthodontic procedure in order to increase the functional loading capability.[3] Authors described the use of multiple unit bridges (6-10 units) to replace missing teeth and stabilise the maxillary arch.[14,15] This patient had a wide space between right lateral incisor and canine because of the alveolar defect. Therefore, one more canine pontic was placed to restore this area. The crown for the right canine abutment was fabricated like an upper first premolar to maintain symmetrical balance. The provisional fixed partial denture had a configuration similar to the definitive prosthesis except for the inciso-gingival length of the right canine pontic. During the provisional phase, aesthetics, phonetics, retention and occlusion were assessed. The patient was not comfortable with the space under the canine pontic which were anatomically proportional in

length with the other abutments. As the gingival margins were not visible in the smile line, the length of the canine was extended with pink porcelain for the final prosthesis. Thus, the defect on the alvealer ridge could also be restored and the gingival margin of the right canine pontic was at the same level with the other abutment teeth.

Prosthetic techniques are being transferred from non cleft lip and palate patients to cleft lip and palate patients and in many cases it is not clear whether this is appropriate. Validation of successful reconstruction in non cleft lip and palate patients needs to be tested in the cleft lip and palate group. The mean survival time for this case report is about 3 years.

CONCLUSIONS

In the prosthodontic treatment of the cleft lip and palate patients, it is imperative to prevent the regression and collapse of the alveolar segments and the teeth after surgical and orthodontic correction. These patients eventually require definitive fixed prosthesis for aesthetic and functional demands when they become adults. This zirconia all-ceramic fixed partial denture has functioned favourably without any fracture or colour degradation for 3 years.

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