Original Investigation
Orijinal Araştırma
DOI: 10.4274/turkderm.86836
Turkderm - Arch Turk Dermatol Venerology 2016;50

Evaluation of patients with oral lichenoid lesions by dental patch testing and results of removal of the dental restoration material

Oral likenoid lezyonu olan hastalarda dental yama testi sonuçları ve dental restorasyon materyalinin uzaklaştırılması ile alınan yanıtlar

Emine Buket Şahin, Fatma Çetinözman*, Nihal Avcu, Ayşen Karaduman*****

Ankara Numune Training and Research Hospital, Clinic of Dermatology, Ankara, Turkey
*Leiden University Faculty of Medicine, Department of Dermatology, Leiden, Holland
**Hacettepe University Faculty of Dentistry, Department of Oral Diagnosis and Radiology, Ankara, Turkey
***Hacettepe University Faculty of Medicine, Department of Dermatology, Ankara, Turkey

Abstract

Background and Design: Oral lichenoid lesions (OLL) are contact stomatitis characterized by white reticular or erosive patches, plaque-like lesions that are clinically and histopathologically indistinguishable from oral lichen planus (OLP). Amalgam dental fillings and dental restoration materials are among the etiologic agents. In the present study, it was aimed to evaluate the standard and dental series patch tests in patients with OLL in comparison to a control group and evaluate our results.

Materials and Methods: Thirty-three patients with OLL or OLP and 30 healthy control subjects, who had at least one dental restoration material and/or dental filling, were included in the study. Both groups received standard series and dental patch test and the results were evaluated simultaneously.

Results: The most frequent allergens in the dental series patch test in the patient group were palladium chloride (n=4; 12.12%) and benzoyl peroxide (n=2, 6.06%). Of the 33 patients with OLL; 8 had positive reaction to allergents in the standard patch test series and 8 had positive reaction in the dental patch test series. There was no significant difference in the rate of patch test reaction to the dental and standard series between the groups. Ten patients were advised to have the dental restoration material removed according to the results of the patch tests. The lesions improved in three patients [removal of all amalgam dental fillings (n=1), replacement of all amalgam dental fillings with an alternative filling material (n=1) and replacement of the dental prosthesis (n=1)] following the removal or replacement of the dental restoration material.

Conclusion: Dental patch test should be performed in patients with OLL and dental restoration material. Dental filling and/or prosthesis should be removed/replaced if there is a reaction against a dental restoration material-related allergen.

Keywords: Oral lichenoid lesion, contact stomatitis, dental patch test

Öz

Amaç: Oral likenoid lezyon (OLL) oral mukozada beyaz retiküler ya da eroziv yamalar, plak benzeri lezyonlarla seyreden; klinik ve histopatolojik olarak oral liken planustan (OLP) ayırt edilemeyen kontakt bir stomatittir. Amalgam dolgular ve dental restorasyon materyalleri etiyolojik nedenler arasında yer almaktadır. Bu çalışmada OLL tanısı almış hastalarda ve kontrol grubunda dental yama testi sonuçlarını karşılaştırmayı ve sonuçlar doğrultusunda ilişkili olabilecek materyalin değiştirilmesi ya da uzaklaştırılması sonrasında gözlenen yanıtları sunmayı amaçladık.

Gereç ve Yöntem: Çalışmaya OLL veya OLP tanısı ile takip edilen en az bir tane diş dolgusu ve/veya restorasyon materyali mevcut olan 33 hasta ve 30 sağlıklı gönüllü dahil edildi. Her iki grupta standart ve dental seri yama testleri eş zamanlı olarak değerlendirildi.

Bulgular: Hasta grubunda dental seride en sık pozitif reaksiyon saptanan alerjenler paladyum klorid (n=4, %12,12), benzoil peroksit (n=2, %6,06) idi. OLL'li 33 hastanın sekizinde dental, sekizinde standart seride pozitif reaksiyon saptandı. Standart ve dental serideki yama testi pozitif reaksiyon oranları açısından karşılaştırıldığında gruplar arasında anlamlı fark tespit edilmedi. On hastaya yama testleri sonuçları doğrultusunda dolgu ve/veya protezlerinin değiştirilmesi ya da çıkarılması önerildi. Bir hastanın tüm amalgam dolguları çıkarıldıktan sonra, bir hastanın ise

Address for Correspondence/Yazışma Adresi: Dr. Emine Buket Şahin, Ankara Numune Training and Research Hospital, Clinic of Dermatology, Ankara, Turkey
Phone.: +90 535 480 37 43 E-mail: buket.karaca@hotmail.com **Received/Geliş Tarihi:** 15.10.2015 **Accepted/Kabul Tarihi:** 02.02.2016

tüm amalgam dolguları değiştirildikten sonra şikayetlerinde tamamen düzelme izlendi. Bir hastada mevcut diş protezi değiştirildikten sonra şikayetlerinde düzelme tespit edildi.

Sonuç: Oral mukozada likenoid lezyonu olan ve birlikte dental restorasyon materyali olan hastalarda dental yama testi yapılmalıdır. Dental restorasyon materyali ile ilişkili bir alerjene karşı reaksiyon saptanırsa dolgu ve/veya protezde değişiklik yapılması önerilmelidir.

Anahtar Kelimeler: Oral likenoid lezyon, kontakt stomatit, dental yama testi

Introduction

Oral lichenoid lesions (OLL) is characterized by white reticular or erosive patches, plaque like lesions that are clinically and histopathologically indistinguishable from the oral lichen planus (OLP)[1]. The spread and morphology in oral mucosa is not characteristic for OLL; also named as oral lichenoid tissue reaction, lichenoid contact stomatitis, lichen planus like lesions; when compared to OLP[2]. Among the causative factors that are found to play a role in the etiology of OLL are the amalgam teeth fillings and dental restoration materials, chronic graft versus host reactions, certain drugs (such as non-steroid anti inflammatory drugs, angiotensin concerting enzyme inhibitors, antihypertensive agents, beta-blockers, penicillamine and etc.) or autoimmune diseases such as lupus erythematous. The gums and toothpastes that have cinnamon flavor, mint, clorhexydine, latex, paraben, preservatives, fragrances, acrylates and resins may cause lichenoid hypersensitivity reactions in oral mucosa. Lichenoid mucositis have been linked to hypertension, diabetes and psychogenic factors[2-7].

Previously amalgam dental filling materials have been suspected in the etiology of OLP and treated accordingly; however the physician must keep in mind that OLL is clinically and histopathologically indistinguishable from OLP and treatment should be tapered according to this possibility. There are some reports in which; removal or replacement of the dental material in suspected OLL cases may cause reduction or total remission of the mucosal lesions[4,6].

The aim of the present study is to evaluate the dental patch test results of the patient with OLL and OLP evaluated in our institution and furthermore to investigate the outcome of the mucosal lesions following removal of the dental restoration materials in patch test positive patients group.

Materials and Methods

Thirty three patients with the diagnosis of OLP or OLL; between 2009 and 2012; in our university; departments of Dermatology, Oral diagnosis and Oral Radiology were included in our study. All patients included in the study had at least one tooth filling or other kind of tooth restoration material. Patient related data such as age, gender, disease onset age, family history, disease aggravating factors, previous treatment regimens, concomitant disease, dermatologic findings are recorded to patient follow up forms. All the data were prospectively collected and retrospectively evaluated.

19 patients (57.5%) had fillings, 8 had prosthesis (24.2%), 3 had both filling and prosthesis (9%), other 3 had other kinds of treatment apparatus (9%). The examination of the oral mucosa of the patients revealed lesions in the buccal mucosa in 24 patients (72.7%), gingiva in four patients (12.01%), lateral part of the tongue in one patient (3.03%) and whole oral mucosa in four patients (12.01%). The type of the lesions were reticular in 16 patient (48.4%), erosive-bullous in six patients (18.1%), erythematous-atrophic in three patients (9.09%), combined lesions in eight patients (24.2%). The history of the patients revealed previous medical therapy including topical, intralesional corticosteroid injection as well as oral steroid therapy, systemic retinoid therapy, topical anti-fungal therapy and topical anesthetic therapy have been tried and had been unsuccessful.

The control group was chosen among the healthy individuals without any systemic disease and individuals who did not receive any systemic or topical therapy and who consented to be recruited to the study. Thirty volunteers were selected as the healthy control (19 female, 11 male). The healthy volunteers were required to have at least one tooth filling.

The patch test application

Patient and the control groups both received standard series (European standard series, Brial Patch Test, Say Pharmaceuticals) and dental series (Teeth and teeth prosthesis series, Say Pharmaceuticals) patch test. The patch test in the back region of the patient and the control group were simultaneously removed in the 48 hours following application. In order to rule out skin irritation and false positive results the evaluation was performed 30 minutes following removal. The test results were re-evaluated at the 72. hour. The results were evaluated according to the criteria of the international contact dermatitis study group[8] and evaluation was performed by the same and single physician. All patients were discontinued topical treatment and systemic treatment 3 weeks and 3 months prior to patch test; respectively. Table 1 summarizes the allergen contents of standard series and dental series patch tests.

According to the results of standard and dental series patch test the patients were advised to have their dental restoration material and/ or prosthesis removed or changed to the possibility of relationship with the oral lesions. Following removal and change the remission or reduction of the severity of the symptoms of the patients were evaluated.

Statistical Analysis

Continuous data are given as mean+standard deviation (range; minimum and maximum values). Continuous data among the patient and the control groups were analyzed by student t test. P values calculated that were less than 0.05 ($p<0.05$) considered as a statistically significant difference.

Results

Thirty-three (25 female) patients with the diagnosis of OLP or OLL were included in to the study. The mean age of the patients were 46.78±14.58 (19-76) years. Mean duration of the disease were 2.68±3.28 years (median 1 year; 3 months-16 years). Only one patient had a family history. In six patients (18.1%) stressful event related with the initiation or aggravation of the oral lesions. In only one patient (3.03%) dental filling/prosthesis in the last 4 weeks was present in the history related with the initiation of the oral lesions.

There were concomitant presence of cutaneous lesions (n=3), nail lesions (n=3), genital mucosal lesions (n=1); however there were no

Table 1. Patch test antijens	
European standard series	
Bufexamac	5% pet*
Colophony	20% pet
Sesquiterpene-lactone-mix	5% pet
Cobalt chloride hexahydrate	1% pet
Cetylstearyl alcohol	20% pet
Dibromodicyanobutane	0.3% pet
Dispersions-mix blue	1% pet
Epoxy resin	1% pet
Formaldehyde	1% aq**
Fragrance mix	8% pet
N-isopropyl-N-phenyl-p-phenylenediamine (IPPD)	0.1% pet
Lyral	5% pet
2-mercaptobenzothizole	2% pet
Mercapto mix	1% pet
5-chloro-2-methyl-4-isothiazolin-3-one	0.01% aq
Nickel sulfate	5% pet
Propolis	10% pet
Balsam of peru	25% pet
Paraben mix	16% pet
Potassium dichromate	0.5% pet
Thiuram mix	1% pet
Venice turpentine	10% pet
Wool alcohols	30% pet
Bis-diethyldithiocarbamato-zinc	1% pet
Dental screening	
Ammonium tetrachloroplatinate	0.25% pet
Amalgam (non-gamma 2)	5% pet
Amalgam alloy metals	20% pet
Bisphenol A	1% pet
BIS-GMA	2% pet
Bisphenol-a-dimethacrylate	2% pet
Copper sulphate	1% aq
Diurethane-dimethacryilate	2% pet
Eugenol	1% pet
Ethyleneglycol-dimethacrylate	2% pet
2-hydroxyethyl-methacrylate	1% pet
Methyl-methacrylate	2% pet
Ammoniated mercury	1% pet
Potassium dicyanoaurate	0.002% pet
Palladium chloride	1% pet
Triethyleneglycol-dimethacrylate	2% pet
1,3-butandiol dimethacrylate	2% pet
Benzoyl peroxide	1% pet
N-n-dimethyl-p-toluidine	2% pet
2-hydroxy-ethylacrylate	0.1% pet
2-hydroxypropyl-methacrylate	2% pet
Sodium thiosulfoaurate	0.25% pet
Tetracaine-HCL	1% pet
Tin chloride	0.5% pet
*Pet: petrolatum, **aq: Aquaous humor, water	

scalp involvement in any case. As a result of histopathologic evaluation OLP was diagnosed in 14 (42.4%) patents.

In the patient group the allergens that frequently cause a positive reaction in the dental series were palladium chloride (n=4, 12.12%) and benzoyl peroxide (n=2, 6.06%). On the other hand the allergens that frequently caused a positive patch test in the standard series were nickel sulfate (n=4, 12.12%) and fragrance mix 1 (n=2, 6.06%). Table 2 summarizes the allergens to which a positive reaction was elucidated in the OLL patients.

The control group in the study included 30 (19 female) healthy subjects with a mean age of 44.80±15.97 (18-70) years. There were no statistically significant difference among the control group and the patients in terms of age and gender distribution (p>0.05). Table 3 summarizes the allergens to which a positive reaction was elucidated in the control group.

Standard and dental series patch tests were simultaneously applied to the back region of the patient and control groups and removed following 48 hours. Evaluation of the skin reactions were performed on the 48th and 72nd hours. Table 2 and 3 summarizes the the positive test results in patient and control groups. OLL patient group and the control group were compared in terms of standard and dental series patch test separately. Among the thirty three patients with OLL 8 showed a positive reaction against standard series and 8 showed a positive reaction against dental series patch tests (for one or more allergens). On the other hand in the control group; 5 patients showed a positive reaction for dental series and 12 patients showed a positive reaction for the standard series patch test. There were no statistically significant difference in terms of rate of reaction in the dental and standard series patch tests among the patient and the control groups (p>0.05).

The information regarding patients with positive reactions that were advised to have their dental fillings and restoration material removed are summarized in Table 4. In the OLL group five patient in the standard series and 5 in the dental series showed reaction against at least one allergen. On the other hand three patients showed reaction against at least one allergen in both patch tests. Ten patients in OLL group were advised to have their filling and/or prosthesis changed according to the results of the patch tests. In one patient after removal of all the amalgam fillings and in another patient with the replacement of all amalgam fillings resulted in complete recovery of the symptoms of the patients. On the other hand; despite removal or replacement of dental fillings or prosthesis of two patients in the OLL group there were no recovery in their symptoms. One patient had asymptotic

Table 2. Positive patch test results in patient group	
Dental series	**Standard series**
Allergen, patient number (n)	**Allergen, patient number (n)**
Palladium chloride, (n=4) Benzoyl peroxide, (n=2) N-n-dimethyl-p-toluidine, (n=1) Amalgam (non-gamma 2), (n=1) Ammoniated mercury, (n=1) Copper sulphate, (n=1) Triethyleneglycol-dimethacrylate, (n=1) 2-hydroxypropyl-methacrylate, (n=1)	Nickel sulfate, (n=4) Fragrance mix, (n=2) Balsam of peru, (n=1) Paraben mix, (n=1) Colophony, (n=1) N-isopropyl-n-phenyl-p-phenylenediamine, (n=1) Lyral, (n=1) Sesquiterpene-lactone-mix, (n=1) Epoxy resin, (n=1) Bufexamac, (n=1)

lesions and therefore refused to change the prosthesis and another refused to change the amalgam dental fillings and therefore did not have a change in the symptoms. Furthermore; three patients that were advised to have their fillings removed were lost to follow up.

Discussion

Reactions against dental restoration materials can reveal it self in different ways. In patients that admit with symptoms pain in oral mucosa, stomatitis, cheilitis, lichenoid lesions can be observed in buccal, palatal and lip mucosa[9]. Some authors consider this as the intolerance syndrome and require dental patch test positivity and the regression of the symptoms and findings following removal of the dental restoration material for criteria of diagnosis of the disease[10].

Dental amalgam is a dental filling material that contains equal amounts of elements such as mercury, silver, copper and tin. Elemental mercury (amalgam) is the most frequently used dental filling material that is used world wide due to its properties such as durability and low price[11]. Amalgam related allergic reaction are usually due to mercury and mercury containing restoration material and very rarely other elements are responsible for the allergic reactions. In time amalgam in the oral cavity is damaged, ions are released and causes hypersensitivity which is followed by type IV hypersensitivity reactions[12]. Mercury is reported to be the most frequent allergen in OLL; however copper, chrome, nickel, palladium are also reported as possible etiologic agents[9].

Hosoki et al reported nickel, palladium, chrome and cobalt as the most frequently encountered allergens as a result of the patch tests[13]. In the present study nickel (n=4) and palladium chloride (n=4) were the most frequently observed allergens in the patch test. Reaction against mercury and amalgam was observed in one patient. In the control most frequent allergens were palladium chloride (n=3) in the dental series and propolis (n=6) in the standard series. Pang et al.[14] analyzed 303 control subjects and showed that 4.6% of the patients showed positive reaction against mercury. In another study; mercury allergy was detected in 1-4% of the population[15]. In our study mercury allergy was not detected in the control group.

Holmstrup reported 3 distinct reactions including type 4 hypersensitivity, toxic reaction and acute or generalized hypersensitivity related with amalgam[11,16]. Most frequently encountered reaction related with amalgam was OLL adjacent to the amalgam fillings. This hypersensitivity related with amalgam; was frequently due to mercury and rarely due copper, silver or tin[17]. Amalgam related toxic reactions were found to be due to contact of the amalgam material and contents to the oral mucosa for a long duration. It is also frequently seen in the dental fillings rich in zinc. Clinically; these lesions cannot be distinguished from

Table 3. Positive patch test results in control group

Dental series	Standard series
Allergen, patient number (n)	**Allergen, patient number (n)**
Palladium chloride, (n=3) 2-hydroxypropyl-methacrylate, (n=1) Benzoyl peroxide, (n=1)	Propolis, (n=6) Cetylstearyl alcohol, (n=3) Cobalt chloride hexahydrate, (n=2) Mercapto mix, (n=1) 5-chloro-2-methyl-4-isothiazolin-3-one, (n=1) Nickel sulfate, (n=1)

Table 4. Characteristics of patients to whom dental restoration material removal or replacement was recommended

Number of patients	Gender/age	Type of lesion	Anatomic location	Type of dental materials	Positive patch test reactions	Follow up
1	F/26	Reticular patch	Bilateral buccal mucosa	Prosthesis	N-n-dimethyl-p-toluidine	Persistant asymptomatic lesions
16	F/46	Erythematous atrophic patch	Right buccal mucosa	Amalgam filling	Nickel sulfate	Improvement following amalgam removal
20	F/26	Reticular patch	Bilateral buccal mucosa	4 amalgam fillings	Nickel sulfate	Improvement following amalgam replacement
21	F/41	Reticular patch and erosion	Bilateral buccal mucosa	Prosthesis and 4 amalgam fillings	Amalgam, ammoniated mercury, fragrance mix, IPPD	No change after amalgam removal
24	F/25	Reticular patches	Bilateral buccal mucosa	3 amalgam fillings	Palladium chloride	Persistant symptoms in a patient who failed to remove the fillings
26	F/58	Reticular patches and erythematous area	Bilateral buccal mucosa	Prosthesis	Copper sulphate, palladium chloride	Improvement following prosthesis replacement
29	F/48	Erosion	Bilateral buccal mucosa	Prosthesis and amalgam filling	Palladium chloride, benzoyl peroxide	Persistant symptoms following prosthesis and amalgam filling replacement

F: Female

type 4 hypersensitivity reaction associated OLL. Negative dental patch test can be used for diagnosis[15]. In patients with negative dental patch test; OLL can be assumed to have developed due to toxic reaction.

There was a clinical improvement in 90% of the cases where the dental fillings were changed in accordance with the positive dental patch test. Furthermore; there was also a clinical improvement in 68% of the cases with a negative patch test when the dental fillings were changed. This phenomenon suggest that in cases with negative dental patch test the pathogenesis is still related to the amalgam filling material. Therefore it is suggested dental restoration materials or fillings should be removed or changed in situations where the oral lesions are in direct contact with these materials[18,19]. In the present study we did not observe any reaction in patch test in 18 patients. In 11 patients the lesions were bilateral and extensive in the buccal mucosa. However in the present study; the dental restoration or filling materials were not advised to be removed in patients with negative patch test.

On the contrary to OLP, OLL tend to be in close proximity to dental restoration materials, unilateral and asymmetrical. OLL are frequently localized in the buccal and lingual mucosa and very rarely are localized in places that is far from the dental restoration material such as the palate, gingiva, oral cavity floor. Contrary to OLP, OLL are not associated with cutaneous lesions[15]. In the present study three patients had cutaneous lesions, 3 had nail involvement and one had genital and oral mucosa involvement. In none of these patients the standard series and dental series patch tests were positive and the lesions did not have an anatomic proximity to any dental restoration material. In these patients the oral lesions are thought to be due to OLP and had no relations to the dental restoration material.

Raap et al.[6] analyzed patch test in 206 patients with lichen planus, stomatitis, periodontitis, cheilitis, recurrent apthosis , glossodynia and burning mouth/palate and found that 9 out of 49 patients with the diagnosis of OLP had positive patch test. Seven of the nine patients with positive patch test showed a strong correlation between the allergen and the dental restoration material. They also reported that in a patient with a positive patch test and stomatitis had a complete remission of the symptoms in two weeks without additional treatment following removal of the amalgam filling material. Furthermore; they found improvement in the lesions in patients with a positive patch test related with the dental filling material; following removal of the dental restoration material[6]. Previously in similar studies on patients with OLP mercury[20], and gold sodium thiosulfate[21] related contact dermatitis have been reported. Similar studies in literature are summarized in Table 5.

In the present study the lesions were not grouped according to the close proximity to the dental restoration material. Thirteen of the 33 patients with a patch test were applied had positive reaction to at least

Table 5. The reponse of the patients following removal of the dental restoration materail of the patients with oral lichen planus/ oral lichenoid lesions and the results of the dental patch test

	Patient number, (n)	Results of the patch test and follow up
Ditrichova et al.[4]	OLL, (n=25)	Positive patch test in 15 patients (60%), Dental material replacement/removal in 7 resulted in complete remission
Raap et al.[6]	OLP, stomatitis, periodontitis, cheilitis, recurrent apthosis, glossodynia, burning mouth/palate, (n=206)	At least one positive reaction to patch test in 28 patients; 14 patients have dental filling consistent with the patch test and complete recovery following change/ removal of the dental material
Thornhill et al.[19]	OLP/OLR, (n=81)	Among the 30 patients who had clinically amalgam filling related lesion; 21 (70%) had a positive reaction against mercury/amalgam. 30 patient had the filling removed and 20 (71.4%) had complete remission of the lesions.
Ostman et al.[22]	OLR, (n=49)	17 patients (35%) had positive reactions to mercury, 33 patients (69%) with total or partial filling change improvement in the lesions completely
Montebugnoli et al.[23]	OLL, (n=25) OLP, (n=39)	6 out of 25 OLL patients with positive patch test showed clinical improvement after fillings are changed in 5 patients (83%) OLP (n=39); patch test positive in 9 patients, clinical improvement after fillings are changed in 2 patients (22%)
Koch et al.[24]	OLL, (n=19) OLP, (n=25)	Following the removal of amalgam fillings change in 18 OLL patients; 13 patients showed (72.2%) improvement in lesions 2 (33.3%) out of 6 OLP patients showed improvement in lesions after the change of amalgam fillings
Yiannias et al.[25]	OLP, (n=46)	In 25 patients (54%) with positive patch test, clinical and symptomatic improvement in 5 patients after fillings were changed, a significant reduction in complaints in 7 patients
Laine et al.[26]	OLL, (n=25)	In 80 patients (67.8%) with a positive patch test, Total or partial dental fillings were changed in 77 patients and of the 62 patients (patch test +) 28 (45.2%) had improvement in the lesion; on the other hand of 15 patients (patch test -) 3 (20%) complete remission of the lesions
Dunsche et al. [27]	467 OLR, (n=134)	105 patients had the amalgam filling changed according to the dental patch test and 31 (29.5%) had complete remission of the lesions.
Şahin et al.*	OLP/OLL, (n=33)	13 patients had positive reaction in one of the patch test (39.3%); 10 had the dental restoration material removed and 3 patient achieved clinical improvement

OLL: Oral lichenoid lesions, OLP: Oral lichen planus, OLR: Oral lichenoid reaction *: This study

one allergen. Ten of these patients were advised to change the dental restoration material. Three patients [removal of all amalgam fillings (n=1), change of all amalgam fillings (n=1), change of the prosthetic material (n=1)] had complete remission of the symptoms. Symptoms of two patients [removal of the dental fillings (n=1), change of prosthesis and dental filling (n=1)] did not respond to the removal/change of dental restoration material. One patient had asymptomatic lesions and therefore refused to have the dental restoration material removed; on the other hand another patient refused to change or remove the dental filling material and for this reason there was no change in the symptoms.

In the present study two patient with positive nickel patch test was present and all showed a remission in the lesions following removal of the dental restoration material. Since amalgam dental fillings do not contain nickel remission of the lesions with removal of the dental restoration material was a low probability. In these patients late evaluation of the patch test in the 72. hours and first week had not been done and therefore it is probable that a hypersensitivity against amalgam dental fillings is overlooked in these patients. In that case positive reaction against Nickel can be thought as an accompanying condition. Another theory is that lesions that recover following removal of the amalgam dental filling can be due to underlying toxic/irritant mechanism for the lichenoid lesions.

Among the limitations of the study include the lesser number of the patients with respect to the control group. Furthermore; in the present study patch test was not re-evaluated in the late phase such as 96. hours and 1 week following application. In addition; necessary changes according to the dental patch test was not performed in all the patients and not all the patients have been reached during the follow up period. One of the limitations of the study was that patients groups were heterogenous in terms of OLP with nail, genital mucosal involvement. In the present study in the patient groups absence of positive dental patch test reactions supported the lichen planus pathogenesis for the oral lesions and dental restoration material were not the etiologic factor for the complaints of the patients. Therefore further studies involving increased patient number that involves patients with OLL are needed for further evaluation of this disease complex.

Routine use of dental patch test in lichen planus like lesions in the oral mucosa is not justified. However in situations where the treatment resistant lichen planus or mucositis exists, oral lesions in proximity to dental restoration material or asymmetric lesion stratification; use of dental patch test is a much correct approach strategy by some authors[17]. Anatomic proximity is the strongest marker that suggests OLL[7,17]. In 70% of the cases with positive reaction to amalgam have an oral lesion in close anatomic proximity to the dental filling material. Dental patch test is not 100% accurate; false positive results have been reported to be 3.2%[17].

The results of the dental patch test supports the idea that the OLL is the result of hypersensitivity reaction however the definitive conclusion is reached following removal of the dental restoration material and improvement of the lesions of the patient[15].

Conclusion

Dental patch test is required in a patient with oral mucosa lichenoid lesion and associated dental restoration material. If there is a reaction observed against an allergen related to dental material; the dental restoration material should be removed and/or changed. In patients without positive reaction; if the lesion is in anatomic proximity to the dental material and therefore the patient should be advised to change the dental restoration material. The role of toxic reaction in the development of the lesions should be considered in these patients. The lesions may be due to a toxic reaction mediated mechanism or may result from the mechanical trauma of the prosthesis/dental restoration material.

Ethics

Ethics Committee Approval: The study were approved by the Hacettepe University of Local Ethics Committee, Informed Consent: Consent form was filled out by all participants.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Emine Buket Şahin, Fatma Çetinözman, Nihal Avcu, Concept: Emine Buket Şahin, Fatma Çetinözman, Ayşen Karaduman, Design: Emine Buket Şahin, Fatma Çetinözman, Ayşen Karaduman, Data Collection or Processing: Emine Buket Şahin, Fatma Çetinözman, Nihal Avcu, Ayşen Karaduman, Analysis or Interpretation: Emine Buket Şahin, Fatma Çetinözman, Ayşen Karaduman, Literature Search: Emine Buket Şahin, Fatma Çetinözman, Writing: Emine Buket Şahin.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: Hacettepe University Scientific Research Projects unit.

References

1. Wong L, Freeman S: Oral lichenoid lesions (OLL) and mercury in amalgam fillings. Contact Dermatitis 2003;48:74-9.
2. Mravak-Stipetić M, Lončar-Brzak B, Bakale-Hodak I, et al: Clinicopathologic correlation of oral lichen planus and oral lichenoid lesions: a preliminary study. Scientific World Journal 2014;2014:746874.
3. Piboonniyom SO, Treister N, Pitiphat W, Woo SB: Scoring system for monitoring oral lichenoid lesions: a preliminary study. Oral Surg Oral Med Oral Pathol Oral Radio Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2005;99:696-703.
4. Ditrichova D, Kapralova S, Tichy M, et al: Oral lichenoid lesions and allergy to dental materials. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub 2007;151:333-9.
5. López-Jornet P, Camacho-Alonso F, Gomez-Garcia F, Bermejo Fenoll A: The clinicopathological characteristics of oral lichen planus and its relationship with dental materials. Contact Dermatitis 2004;51:210-1.
6. Raap U, Stiesch M, Reh H, Kapp A, Werfel T: Investigation of contact allergy to dental metals in 206 patients. Contact Dermatitis 2009;60:339-43.
7. Mansur AT: Oral Mucosal Disorders: Problems and Questions What are the Critical Points? Türkderm 2012;46(Suppl 2):140-6.
8. Wahlberg JE, Lindberg M: Patch testing, (Eds). In: Frosch P J, Menne T, Lepoittevin JP: Contact Dermatitis. 4th edition, Springer-Verlag, Berlin 2006:365-90.
9. Rai R, Dinakar D, Kurian SS, Bindoo YA: Investigation of contact allergy to dental materials by patch testing. Indian Dermatol Online J 2014;5:282-6.
10. Koch P, Bahmer FA: Oral lichenoid lesions, mercury hypersensitivity and combined hypersensitivity to mercury and other metals: histologically-proven reproduction of the reaction by patch testing with metal salts. Contact Dermatitis 1995;33:323-8.

11. McParland H, Warnakulasuriya S: Oral lichenoid contact lesions to mercury and dental amalgam a review. J Biomed Biotechnol 2012;2012:589569.
12. Laeijendecker R, Dekker SK, Burger PM, et al: Oral lichen planus and allergy to dental amalgam restorations. Arch Dermatol 2004;140:1434-8.
13. Hosoki M, Bando E, Asaoka K, Takeuchi H, Nishigawa K: Assessment of allergic hypersensitivity to dental materials. Biomed Mater Eng 2009;19:53-61.
14. Pang BK, Freeman S: Oral lichenoid lesions caused by allergy to mercury in amalgam fillings. Contact Dermatitis 1995;33:423-7.
15. Magnusson B, Blohm SG, Fregert S, et al: Routine patch testing. IV. Supplementary series of test substances for Scandinavian countries. Acta Derm Venereol 1968;48:110-4.
16. Holmstrup P: Reactions of the oral mucosa related to silver amalgam: a review. J Oral Pathol Med 1991;20:1-7.
17. Holmstrup P: Oral mucosa and skin reactions related to amalgam. Adv Dent Res 1992;6:120-4.
18. Cobos-Fuentes MJ, Martínez-Sahuquillo-Márquez A, Gallardo-Castillo I, et al: Oral lichenoid lesions related to contact with dental materials: a literature review. Med Oral Patol Oral Cir Bucal 2009;14:e514-20.
19. Thornhill MH, Pemberton MN, Simmons RK, Theaker ED: Amalgam-contact hypersensitivity lesions and oral lichen planus. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2003;95:291-9.
20. Khamaysi Z, Bergman R, Weltfriend S: Positive patch test reactions to allergens of the dental series and the relation to the clinical presentations. Contact Dermatitis 2006;55:216-8.
21. Athavale PN, Shum KW, Yeoman CM, Gawkrodger DJ. Oral lichenoid lesions and contact allergy to dental mercury and gold. Contact Dermatitis 2003;49:264-5.
22. Ostman PO, Anneroth G, Skoglund A: Amalgam-associated oral lichenoid reactions. Clinical and histologic changes after removal of amalgam fillings. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1996;81:459-65.
23. Montebugnoli L, Venturi M, Gissi DB, Cervellati F: Clinical and histologic healing of lichenoid oral lesions following amalgam removal: a prospective study. Oral Surg Oral Med Oral Pathol Oral Radiol 2012;113:766-72.
24. Koch P, Bahmer FA: Oral lesions and symptoms related to metals used in dental restorations: a clinical, allergological, and histologic study. J Am Acad Dermatol 1999;41:422-30.
25. Yiannias JA, el-Azhary RA, Hand JH, Pakzad SY, Rogers RS: Relevant contact sensitivities in patients with the diagnosis of oral lichen planus. J Am Acad Dermatol 2000;42:177-82.
26. Laine J, Kalimo K, Happonen RP: Contact allergy to dental restorative materials in patients with oral lichenoid lesions. Contact Dermatitis 1997;36:141-6.
27. Dunsche A, Kästel I, Terheyden H, et al: Oral lichenoid reactions associated with amalgam: improvement after amalgam removal. Br J Dermatol 2003;148:70-6.