

DENTAL INFECTION AND DERMATOLOGICAL DISEASES: ANALYSIS OF NINETY-TWO PATIENTS AND REVIEW OF THE LITERATURE

Vlaho Brailo¹, Danica Vidović Juras², Andrija Stanimirović³, Vanja Vučićević Boras^{1,2}, Dragana Gabrić⁴
and Danko Velimir Vrdoljak⁵

¹Department of Oral Medicine, School of Dental Medicine, University of Zagreb; ²Department of Oral Medicine, Zagreb University Hospital Center; ³Private Dermatology Practice; ⁴Department of Oral Surgery, School of Dental Medicine, University of Zagreb; ⁵Sestre milosrdnice University Hospital Center, Zagreb, Croatia

SUMMARY – Dental disease has long been proposed as a potential causative agent in certain dermatological diseases. However, literature data on this association are scarce. The aim of this retrospective study was to evaluate dental status in 92 patients with various dermatological diseases who were referred to our Department for elimination of dental disease and to assess the relationship between dental infection and dermatological diseases. Dermatological conditions due to which patients were referred were alopecia, urticaria, eczematoid dermatitis, psoriasis, edema, etc. Out of 92 patients, 42 (45.7%) patients were referred for further dental treatment, while the remaining 50 (54.3%) patients had no observable dental pathology. None of the patients reported improvement following dental treatment. Based on the results of this study, we might conclude that dental infection does not play any role in the development of dermatological disease.

Key words: *Tooth diseases – complications; Skin diseases*

Introduction

For a long time, it has been speculated that teeth might be the underlying cause of various distant systemic diseases. A dental focus is traditionally defined as localized chronic infection that under certain circumstances may result in local or systemic disease. The most frequently reported dental foci are periodontitis, periapical lesions, teeth with non-vital pulp, root tips and partially impacted molars¹. The proposed mechanism of action of dental foci is based on hematologic spread of bacteria and/or their toxins into the body.

Some authors implicated the role of diseased teeth in various dermatological diseases. Traditionally,

alopecia areata, psoriasis, acne, erythema nodosum, urticaria, palmoplantar pustulosis, Schamberg disease and facial edema with or without urticaria have been linked with dental infection²⁻⁶. However, the literature on this topic is scarce. So far, 18 patients in whom resolution of dermatological disease occurred after dental treatment have been reported, along with 28 patients with partial resolution of dermatological disease following dental treatment⁷⁻¹¹.

Since there are no studies on a larger sample of patients dealing with this issue, the aim of our study was to evaluate the correlation of dental infections and dermatological diseases in Croatian population.

Materials and Methods

Charts of patients referred by dermatologist for exclusion of dental foci during a six-year period were retrospectively reviewed. Demographic data on age,

Correspondence to: *Assist. Prof. Vlaho Brailo DMD, PhD*, Department of Oral Medicine, School of Dental Medicine, University of Zagreb, Gundulićeva 5, HR-10000 Zagreb, Croatia
E-mail: brailo@sfzg.hr

Received July 17, 2014, accepted December 27, 2014

sex, medical history and drugs were recorded. Clinical data like dermatological disease which was the reason for referral, duration of the disease, number of potential dental foci and results of provocation test were also recorded. Dermatological diseases were classified according to the International Classification of Diseases, 10th edition¹² and divided into seven groups (Disorders of Skin Appendages; Urticaria and Erythema; Dermatitis and Eczema; Papulosquamous Disorders; Infections of the Skin and Subcutaneous Tissue; Other Disorders of the Skin and Subcutaneous Tissue; and Edema not otherwise Specified).

All patients underwent clinical and radiological dental examination. Clinical examination was performed with a dental mirror and a probe. Periodontal examination was performed as well. Dental panoramic was done in all patients, while retroalveolar radiographs were performed in individual cases, when more detailed examination was required. Vitality was tested in all teeth that were not endodontically treated or restored with a crown. Cold spray and electric pulp tester were used. Any underlying dental pathology (unrestorable teeth, teeth with periapical radiolucencies, loss of pulp vitality and signs of active periodontal disease) was considered a potential dental focus. In straightforward cases, patients were referred to their dentists for treatment (either conservative or surgical depending on the condition). Due to the weak evidence for odontogenic etiology of dermatological diseases, in doubtful cases (teeth with insufficient endodontic filling but no periapical pathology) or in cases where dental treatment would require irreversible, invasive and/or extensive dental procedures (such as removal of a post or a crown for endodontic treatment or alveotomy of asymptomatic semi-impacted molars), provocation test was performed. The provocation test was performed as follows: patients had their erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) determined on the day of the test. Suspected tooth (or teeth) was stimulated by polishing rubber for 2 minutes. ESR and CRP were then determined 24 hours after the test. If there was at least a double increase in ESR and CRP level, the test was considered positive.

Patients that were referred to their dentists were contacted by telephone at minimum 6 months after dental treatment. The impact of dental treatment on their dermatological disease was recorded.

Data were organized in the MSExcel® spreadsheets and presented in descriptive manner. The χ^2 -test was used on comparison of nominal variables and t-test on comparison of numerical variables. The values of p lower than 0.05 ($p < 0.05$) were considered statistically significant.

Results

Clinical data were collected on 92 patients, 59 (64.1%) female and 33 (35.9%) male, mean age 42.5 ± 14.8 (females 44.1 ± 13.8 ; males 39.7 ± 16.3). There were no significant age differences between males and females ($p = 0.168$).

Dermatological disease due to which patients were referred included disorders of skin appendages 41; 44.6% (alopecia 38; acne 1; nail dystrophy 1; perioral dermatitis 1), urticaria and erythema 21; 22.8% (urticaria 13; erythema nodosum 3; facial erythema 5), dermatitis and eczema 15; 16.3% (dermatitis eczematoides 10; face or scalp pruritus 3, atopic dermatitis 2), papulosquamous disorders 6; 6.5% (psoriasis 5; lichenoid pityriasis 1), infections of the skin and subcutaneous tissue 1; 2.2% (carbunculosis), other disorders of the skin and subcutaneous tissue 2; 2.2% (skin hyalinosi 1; allergic leukocytoclastic vasculitis 1), and edema not otherwise specified 6; 6.5% (facial edema 3; labial edema 2; eyelid edema 1).

No significant differences in the prevalence of dermatological diseases were found between males and females ($p = 0.071$). Median disease duration was 6 (range 1-360) months.

Dental status

Sixty-seven (72.8%) patients, 47 (79.7%) females and 20 (60.6%) males, had one or more potential dental foci, while 25 (27.2%) patients [12 (20.3%) females and 13 (39.4%) males] had no observable dental disease. Significant differences between males and females were found, with females having more potential dental foci than males ($p = 0.049$). The number of potential dental foci *per* patient ranged from 1 to 12 teeth (mean 2.6 ± 2.7 ; females 3 ± 2.8 ; males 1.9 ± 2.2). No significant differences between males and females were found ($p = 0.05$), even though the non-significance was borderline. Forty-two (45.7%) patients, 32 (54.2%) females and 10 (30.3%) males, were referred

Table 1. Clinical characteristics of study patients

Sex, n (%)	
Female	59 (64.1%)
Male	33 (35.9%)
Age (yrs, mean \pm SD)	42.5 \pm 14.8
Dermatological disease	
Disorders of skin appendages	
Alopecia	38; (41.3%)
Acne	1; (1.1%)
Nail dystrophy	1; (1.1%)
Perioral dermatitis	1; (1.1%)
Urticaria and erythema	
Urticaria	13; (14.1%)
Facial erythema	5; (5.4%)
Erythema nodosum	3; (3.3%)
Dermatitis and eczema	
Eczematoid dermatitis	10; (10.8%)
Face or scalp pruritus	3; (3.3%)
Atopic dermatitis	2; (2.2%)
Papulosquamous disorders	
Psoriasis	5; (5.4%)
Lichenoid pityriasis	1; (1.1%)
Infections of the skin and subcutaneous tissue	
Carbunculosis	1; (1.1%)
Other disorders of the skin and subcutaneous tissue	
Skin hyalinosis	1; (1.1%)
Allergic leukocytoclastic vasculitis	1; (1.1%)

* 26 patients were successfully contacted

for dental treatment. Significantly more women than men were referred for dental treatment ($p=0.027$). Provocation test was performed in 28 (30.5%) patients, 17 (28.8%) females and 11 (33.3%) males. No significant differences between males and females were found ($p=0.438$). Test results were negative in 26 (92.9%) patients and positive in two (1.1%) female patients.

Edema not otherwise specified	
Facial edema	3; (3.3%)
Labial edema	2; (2.2%)
Eyelid edema	1; (1.1%)
Duration (months)	
Median \pm SEM	6 \pm 10.9
Range	1 - 360
Dental status	
Dental pathology present n (%)	67 (72.8%)
Dental pathology absent n (%)	25 (27.2%)
No. of suspect teeth/potential foci <i>per</i> patient (mean \pm SD)	2.6 \pm 2.7
Provocation test	
Performed	28 (30.5%)
Not performed	64 (69.5%)
Provocation test results	
Positive	2 (7.1%)
Negative	26 (92.9%)
Referred for dental treatment n (%)	
Yes	42 (45.7%)
No	50 (54.3%)
Outcome*	
Not improved after dental treatment	26 (100%)
Improved after dental treatment	0 (0%)

Outcome

Out of 42 patients, 32 (76.2%) females and 10 (23.8%) males, referred for dental treatment, we succeeded to contact 26 (61.9%) patients, 18 (56.3%) females and eight (80%) males. None of the patients reported improvement following dental treatment, including two female patients with positive provocation test.

Discussion

To our knowledge, this is the first report of a larger series of patients, which explores the putative relationship between dermatological and dental diseases. Most of the patients were referred to our Department due to partial hair loss, alopecia areata (AA). The etiopathogenetic factors in AA are multiple. Numerous authors have reported that autoimmune diseases, especially thyroid disease, and emotional stress might be triggering factors in AA. The role of dental infection in patients with AA has been described; however, there are no systematic data¹³. AA of dental origin is generally located on the scalp but occasionally affects the beard and more exceptionally the eyebrows. It is generally agreed that the affected areas appear on the same side as the affected tooth⁶. Gil Montoya *et al.*¹⁰ and Živkovic⁷ report on two cases of AA with no apparent cause that was effectively resolved by eliminating dental infection *via* endodontic treatment. In this sense, the authors recommend that all patients with AA should be subjected to careful examination of oral cavity to eliminate the possible dental infections. Romoli and Cudia⁸ report a case of AA and homolateral headache due to an impacted superior wisdom tooth. After the tooth extraction, the headache resolved, the hair regrew in the affected area and in 4 months completely covered the whole area. Lesclous and Maman¹¹ report on a 35-year-old male who presented with diffused, dull and bilateral retromandibular pains. Extraoral examination revealed two symmetric bilateral labiomental areas of beard loss approximately 3 cm in diameter. After both impacted molars had been extracted, pain completely disappeared and the beard regrew two months later. Recently, Nezafati *et al.*¹⁴ have reported a case of unilateral loss of eyelashes, which resolved after root canal therapy of the upper right third molar.

There are three case reports in the literature on complete resolution of urticaria following dental treatment¹⁵⁻¹⁷. Liutu *et al.*¹⁸ evaluated 107 patients that suffered from chronic urticaria and report that eight patients had tooth infection. In four of these patients, after dental treatment the urticaria symptoms became milder. Their findings indicate that hidden infections may play a role in some urticaria patients. Büchtea *et al.*² investigated 66 patients suffering from acute or chronic urticaria and 65 age- and sex-matched healthy

subjects as a control group. Dental status was determined by total dental index (TDI), which primarily reflected caries, periodontitis, periapical lesions, non-vital and missing teeth. The TDI of the urticaria patients was slightly lower ($n=66$; 2.6 ± 1.98) compared to the control group ($n=65$, $TDI=3.3\pm 1.86$). Based on their data, the authors conclude that chronic dental infection is not associated with an increased risk of urticaria².

Pryszmont *et al.*¹⁹ report on a woman with apical abscess of the tooth 16, extraction of which led to spectacular clinical improvement, accompanied by healing of erythema nodosum. Sistig *et al.*³ also report a case of a patient who suffered from erythema nodosum, which cleared after extraction of the tooth that was asymptomatic but had periapical lesion.

Kirch and Dührsen²⁰ report on four women who developed erythema nodosum either following dental treatment associated with gingival bleeding or due to infectious dental foci. In these cases, tooth extraction, removal of dental calculus, insufficient root canal treatment, apical periodontitis, or non-extracted root was identified as a cause of erythema nodosum. Boyd and King²¹ report on a middle-aged man with acne that was recalcitrant to numerous medications, including three courses of isotretinoin. His condition cleared after an infected tooth was removed and recurred with another tooth infection.

Fadel *et al.*⁴ report no differences in profiles of caries and periodontal disease between individuals with and without psoriasis. Fewer remaining teeth were observed in patients with psoriasis; however, the exact reason for tooth loss could not be identified.

Igawa *et al.*⁵ report that dental infection was considered to be an important precipitating factor in palmoplantar pustulosis and psoriasis, as well as in Henoch-Schönlein purpura. Tanaka *et al.*²² report that odontogenic infections were probably the cause of nummular eczema in 11 out of 13 study patients and that skin lesions partially or completely improved after dental treatment. Igawa *et al.*⁶ also suggested that dental infection might have had influence on the patients' atopic dermatitis (AD), as they found dental infection in 13 out of 43 patients with AD. Moreover, adequate dental treatment improved patients' skin condition. Ishihara *et al.*²³ suggest that IgG responses to heat shock proteins of oral bacteria may be related

to the onset of pustulosis palmaris et plantaris in some patients.

Cekic-Arambasin *et al.*²⁴ report on AD improvement after elimination of dental infection. Satoh *et al.*²⁵ report five cases of chronic pigmented purpura (Schamberg disease) that improved after dental treatment. The authors conclude that skin lesions appeared to have been provoked by remote bacterial infection. Satoh *et al.*²⁶ also report a case of chronic pigmented purpura associated with dental infection.

All patients that we contacted at minimum 6 months after dental treatment reported no improvement of their dermatological disease. Therefore, our results do not support the previously mentioned literature data. However, if one analyzes available literature on this topic, one can notice that the level of evidence for the association of dental infection and dermatological disease is not high since the majority of published papers are case reports. Furthermore, no more than 10 cases of disease resolution are reported for each group of dermatological diseases (according to ICD-10). Bearing in mind the prevalence of these diseases in the global population, we can conclude that the association between dental infection and these conditions is exceptionally weak. However, we need to emphasize that the information on improvement was based on the patients' subjective report rather than on objective evaluation by a dermatologist. Involving dermatologist in the follow up of these patients and setting up objective criteria for monitoring and assessment of their skin condition would enable gathering more objective and sound data²⁷.

Based on the results obtained, we can conclude that dental infection does not play a role in the development of dermatological disease and that there is no need for comprehensive dental treatment of these patients, especially if the treatment requires invasive, irreversible and/or extensive procedures.

References

- Jansma J, Vissink A. Dental foci. Role, treatment and prophylaxis in patients at risk. *Ned Tijdschr Tandheelkd.* 1998;105(2):52-6.
- Büchtea A, Kruse-Lösler B, Joos U, Kleinheinz J. Odontogenic foci – possible etiology of urticaria? *Mund Kiefer Gesichtschr.* 2003;7(6):335-8.
- Sistig S, Jukic S, Vucicevic-Boras V. Erythema nodosum of dental origin. *Eur J Med Res.* 1999;4(5):208-10.
- Fadel HT, Flyström I, Calander AM, Bergbrant IM, Heijl L, Birkhed D. Profiles of dental caries and periodontal disease in individuals with or without psoriasis. *J Periodontol.* 2013;84(4):477-85.
- Igawa K, Satoh T, Yokozeki H. Possible association of Henoch-Schönlein purpura in adults with odontogenic focal infection. *Int J Dermatol.* 2011;50(3):277-9.
- Igawa K, Nishioka K, Yokozeki H. Odontogenic focal infection could be partly involved in the pathogenesis of atopic dermatitis as exacerbating factor. *Int J Dermatol.* 2007;46(4):376-9.
- Živković S. Endodontic treatment in the therapy of alopecia areata. *Stomatol Glas Srb.* 1990;37(3):299-305.
- Romoli M, Cudia G. Alopecia areata and homolateral headache due to an impacted superior wisdom tooth. *Int J Oral Maxillofac Surg.* 1987;16(4):477-9.
- Neceva Lj, Lazareva B. Focal effect of diseased deciduous teeth in alopecia areata. *Acta Stomatol Croat.* 1970;5(2):110-4.
- Gil Montoya JA, Cutando Soriano A, Jimenez Prat J. Alopecia areata of dental origin. *Med Oral.* 2002;7(4):303-8.
- Lesclous P, Maman L. An unusual case of alopecia areata of dental origin. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1997;84(3):290-2.
- International Classification of Diseases and Related Health Problems, 10th edn. [Internet] Geneva: World Health Organization; 2010 [cited 2014 Sep 12] Available from: http://www.who.int/classifications/icd/ICD10Volume2_en_2010.pdf
- Alkhalifah A. Alopecia areata update. *Dermatol Clin.* 2013;31(1):93-108.
- Nezafati S, Rahimi S, Mohseni H. Temporary eyelash loss following dental treatment. *Int J Oral Maxillofac Surg.* 2010;39(11):1142-4.
- Thyagarajan K, Kamalam A. Chronic urticaria due to abscessed teeth roots. *Int J Dermatol.* 1982;21(10):606.
- Sonoda T, Anan T, Ono K, Yanagisawa S. Chronic urticaria associated with dental infection. *Br J Dermatol.* 2001;145(3):516-8.
- Shelley WB. Urticaria of nine year's duration cleared following dental extraction. A case report. *Arch Dermatol.* 1969;100(3):324-5.
- Liutu M, Kalimo K, Uksila J, Kalimo H. Etiologic aspects of chronic urticaria. *Int J Dermatol.* 1998;37(7):515-9.
- Pryszmont J, Grygorczuk S, Kondrusik M, Pancewicz S, Zajkowska J. Severe form of odontogenic sepsis – a case report. *Pol Merkur Lekarski.* 2005;18(105):314-6.
- Kirch W, Dührsen U. Erythema nodosum of dental origin. *Clin Investig.* 1992;70(12):1073-8.
- Boyd AS, King LE Jr. Recalcitrant acne vulgaris secondary to a dental abscess. *Cutis.* 1999;64(2):116-8.
- Tanaka T, Satoh T, Yokozeki H. Dental infection associated with nummular eczema as an overlooked focal infection. *J Dermatol.* 2009;36(8):462-5.

23. Ishihara K, Ando T, Kosugi M, Kato T, Morimoto M, Yamane G, *et al.* Relationships between the onset of pustulosis palmaris et plantaris, periodontitis and bacterial heat shock proteins. *Oral Microbiol Immunol.* 2000;15(4):232-7.
24. Cekić Arambašin A, Sistig S, Vučićević Boras V. Connection between the course of neurodermitis and oral focus finding. *Acta Stomatol Croat.* 2000;34(1):89-94.
25. Satoh T, Takayama K, Sawada Y, Yokozeki H, Nishioka K. Chronic nodular prurigo associated with nummular eczema: possible involvement of odontogenic infection. *Acta Derm Venereol.* 2003;83(5):376-7.
26. Satoh T, Yokozeki H, Nishioka K. Chronic pigmented purpura associated with odontogenic infection. *J Am Acad Dermatol.* 2002;46(6):942-4.
27. Lugović-Mihić L, Ljubešić L, Mihić J, Vuković-Cvetković V, Troškot N, Šitum M. Psychoneuroimmunologic aspects of skin diseases. *Acta Clin Croat.* 2013;52(3):337-45.

Sažetak

BOLESTI ZUBA I KOŽNE BOLESTI: ANALIZA DEVEDESET DVOJE BOLESNIKA I PREGLED LITERATURE

V. Brailo, D. Vidović Juras, A. Stanimirović, V. Vučićević Boras, D. Gabrić, i D. Vrdoljak

Bolesti zuba se dugo vremena navode kao potencijalni uzročni čimbenik nekih kožnih bolesti. Međutim, literaturni podaci o toj temi su oskudni. Cilj ove retrospektivne studije bio je pregledati zubni status 92 bolesnika s različitim kožnim bolestima koji su bili upućeni na stomatološki pregled na našem Zavodu i procijeniti povezanost između bolesti zuba i kožnih bolesti. Kožne bolesti zbog kojih su bolesnici bili upućeni bile su alopecija, urtikarija, ekcematoidni dermatitis, psorijaza, edem itd. Od 92 bolesnika njih 42 (45,7%) je bilo upućeno na daljnje stomatološko liječenje, dok ostalih 50 (54,3%) nije imalo vidljivu odontogenu patologiju. Nitko od bolesnika nije naveo poboljšanje nakon stomatološkog liječenja. S obzirom na rezultate ove studije može se zaključiti da bolest zuba ne igra ulogu u razvoju kožnih bolesti.

Ključne riječi: *Zubne bolesti – komplikacije; Kožne bolesti*