

Reverse Koebnerization in a linear oral lichenoid lesion: A case report

Prashanth Panta,¹
Archana Andhavarapu,²
Sachin C. Sarode,³ Gargi Sarode,³
Shankargouda Patil⁴

¹Department of Oral Medicine and Radiology, MNR Dental College and Hospital, Sangareddy, Telangana, India;

²Department of Pulmonary Medicine, Malla Reddy Medical College for Women, Suraram, Quthbullapur, Hyderabad, Telangana, India;

³Department of Oral Pathology and Microbiology, Dr. D. Y. Patil Dental College and Hospital, Dr. D.Y. Patil Vidyapeeth, Sant-Tukarnagar, Pimpri, Pune, Maharashtra, India;

⁴Department of Maxillofacial Surgery and Diagnostic Sciences, Division of Oral Pathology, College of Dentistry, Jazan University, Jazan, Saudi Arabia

Abstract

The spectacle of Koebner's phenomenon (KP) is interesting in that trauma precipitates a subset of pathologically distinct conditions, indicating the subtle interplay between sensitization and dermato-mucosal integrity. KP is interesting because, if factors initiating it are controlled, then it may be possible to prevent these debilitating conditions through induction of reverse Koebnerization. Herein, we present a report of a patient with an erosive lesion, localized to the occlusal plane on buccal and lingual mucosa, that interestingly subsided following 1 week after a dental scaling procedure. This report analytically describes the role of dental calculus and cuspal trauma as important triggers surrounding the genesis of oral lichenoid lesion and oral lichen planus. An engaging discussion on these closely related enigmatic entities forms the central theme of this report.

Introduction

Koebner's phenomenon (KP) was first identified by Heinrich Koebner in 1877. It can be defined as *mechanical irritation precipitating a skin or mucosal eruption* in a patient without pre-existing dermatosis.¹ KP is often associated with lichen planus, psoriasis, and vitiligo,¹ and can be triggered

through simple irritation from ECG electrode placement,² trauma caused from tattoos and acupuncture procedures,³ and surgical procedures like biopsy. Subtle sources of irritation in oral lichen planus (OLP) and oral lichenoid lesion (OLL) include: dental plaque and calculus,⁴⁻¹¹ and low-grade trauma caused by dental cusps.^{12,13} In a review focused on oral lichenoid lesions, dental calculus/tarter was classified as *other factor* besides restorations, drug and medication use, and graft versus host reaction.¹⁴ From available literature, both OLP and OLL have dental calculus and cuspal trauma as triggers in the disease process.

Mechanical trauma caused by dental cusps, explains the bilateral, mirror image pattern of lesions in OLP, that preferably involve the buccal mucosa and lateral border of tongue. Furthermore, gingival involvement in OLP is common, and noticed in patients with poor oral hygiene.⁴⁻⁸ Although KP is a well-known in OLP and OLL, the development of linear, unilateral lesions along the occlusal plane is a unique and rare finding.¹⁵ Our report highlights one such presentation, which showed rapid regression (<1 week) following a dental scaling procedure.

Case Report

A 42-year-old female patient reported to the Oral Medicine Clinic (Department of Oral Medicine and Radiology, MNR Dental College and Hospital, Sangareddy, Telangana, India) with a 6-month history of burning sensation and occasional oral bleeding on the right side of mouth. On intraoral examination halitosis was notable, dental calculus was significant, and diffuse erosive areas were seen in relation to the right buccal mucosa (Figure 1) and lateral border of tongue along the line-of-occlusion (Figure 2). Surrounding the lingual eruptions, slender white lines were present, indicative of Wickham's striae (WS) (Figure 2). The gingiva and labial mucosa were also involved predominantly on the right side, in close proximity with *dental calculus* (Figure 3). Patient was not under any systemic medication or oral ointment, is not a tobacco/betel-quid chewer, did not change toothpaste recently, and had no dental restorations or prosthesis in the oral cavity. Furthermore, she was in good general health, and displayed no signs-of-anxiety during examination. She denied other sources of life stress such as loss-of-job, loss-of-loved ones or close family members in the recent past, excluding likelihood of psychosomatic origins. Also, all other dermato-mucosal sites like skin, nails, esopha-

Correspondence: Prashanth Panta, Department of Oral Medicine and Radiology, MNR Dental College and Hospital, Narsapur Road, Sangareddy 502294, Telangana, India. Tel.: 9701806830.

E-mail: maithreya.prashanth@gmail.com

Key words: Oral lichenoid lesion; Oral lichen planus; Koebner phenomena; Dental calculus; Reverse Koebnerization.

Contributions: PP, diagnosis, clinical management and periodic follow-up, recognizing novelty in case presentation, conceptualization and preparation of original manuscript; AA, recognizing novelty in case presentation, conceptualization and preparation of original manuscript; SC, GS, SP, critical comments, review, and editing of manuscript. All the authors: final approval of the version to be published.

Conflict of interest: the authors declare no potential conflict of interest.

Funding: none.

Ethical statement: informed consent was obtained from the patient.

Received for publication: 25 February 2019.

Revision received: 19 May 2019.

Accepted for publication: 19 June 2019.

This work is licensed under a Creative Commons Attribution NonCommercial 4.0 License (CC BY-NC 4.0).

©Copyright P. Panta et al., 2019

Licensee PAGEPress, Italy

Clinics and Practice 2019; 9:1144

doi:10.4081/cp.2019.1144

gus, genitals, and ocular tissues were completely spared. These clinical findings are compatible for the diagnosis of oral lichenoid lesion. All blood investigations were within normal limits except for low hemoglobin (8.3 mg/dL). The close proximity between dental calculus and oral lesion distribution compelled us to advise dental scaling, and no topical corticosteroids were recommended during that visit. She was recalled a week later for review and a significant regression of lesions was noticed (Figures 4 and 5). She is under follow-up, and has not developed any symptoms during the last 6 months.

Discussion

Many local factors have been implicated in the potential development of OLL and OLP. They range from mechanical trauma caused by restorative materials,¹² prolonged

denture wear, chronic cheek and lip biting,¹⁶ and contact sensitization from dental calculus.¹⁰⁻¹³ Herein, we add additional insight into cuspal trauma and dental calculus as potential triggering factors.

Interestingly, a number of immune-mediated, oral mucosal disorders (e.g., pemphigus) occur first along the buccal mucosa and tongue, indicating the possible role of persistent, low-grade trauma caused by dental cusps, during rest and chewing process. These, disorders thus serve as an in-direct proof pointing at the subtle workings of low-grade mucosal trauma. Low-grade trauma/irritation can at times trigger and/or exacerbate a number of OLP and OLL presentations, and deserve due consideration by clinicians.

OLL occurs chiefly due to galvanic phenomenon associated with metallic restorations, contact sensitization to resin based restorations and prosthesis, systemic drugs,¹² and tobacco and betel-quinid use.¹⁷ OLL are often noticed in the vicinity of these local factors. However, in the present case, the trigger is dental calculus. In both OLP and OLL, a reticular mesh like pattern (WS) is notable, that is distinct from the diverging sunray/brush border pattern in oral discoid lupus, a differential for OLL.^{12,18} *Leukoplakia* is a flat keratotic plaque, that frequently involves the buccal mucosa, at the site of tobacco placement.^{12,18} *Erythro-leukoplakia* is a fitting differential for some erosive OLLs, but can be easily excluded in the absence of tobacco habit. Another important differential for unilateral oral erosive lesions is *erythematous candidiasis*.¹⁸ Additionally, some candida *sps* are also associated with OLP, and it is recommended to institute anti-mycotic therapy before advising treatment for doubtful OLP cases.¹⁹ *Frictional keratosis* is another common condition caused by direct mechanical trauma. It is a relatively small, focal lesion, seen on the buccal mucosa coinciding with sharp dental cusps or edges of molar teeth. Other dermatomucosal pathology like *pemphigus* and *pemphigoid* present as discrete lesions involving larger portions of buccal mucosa, tongue and gingiva. Iron deficiency anemia, can lead to atrophic glossitis and angular cheilitis, which were missing in our patient. *As a general rule, the presence of reticular elements, typically unilateral presentation, and obvious local triggers like dental restorations or less obvious triggers like dental calculus, is suggestive of OLL.*

In the present case, all dermato-mucosal sites were completely spared. In one of the largest studies on OLP, skin lesions occurred in 93 (16%) of 584 cases, and genital lesions occurred in 77 (19%) of

399 female patients.²⁰ The absence of systemic involvement in our patient, was highly suggestive of a local reactive process like OLL. Also, there is some literature available on unilateral OLP, which compels a brief discussion. Oliveira Alves *et al.* reported unilateral OLP in 7 of 90 reticular OLP of cheek mucosa, and 2 of 46 erosive OLP of cheek mucosa.²¹ In another large study by Eisen *et al.* on 723 biopsy proven OLP patients, unilateral lesions were noted in 9 patients (1.2%) on buccal mucosa, in 4 (0.6%) on dorsal tongue, and in 62 (8.6%) on gingiva.¹⁶ Unilateral lesions were reported by Andreasen in 6 of 115 OLP cases.²² The linear OLL restricted to the buccal and lingual mucosa, reported in the present report closely mimics the unilateral OLP report of Hartl *et al.*¹⁵ However, some authors emphasize that unilateral OLP were in fact OLL misdiagnosed as OLP.²³ We favor this argument and unilateral presentations must be generally considered for an OLL diagnosis, especially when a local trig-

ger is discernible.²⁴ In several studies, plaque control resulted in regression of OLP⁴⁻⁷ and OLL.¹⁰ So far, there has been only little emphasis about the role of calculus in the genesis of OLL. Detailed case reports such as this provide direct-proof for the subtle interaction between calculus and disease inception and progression. From this standpoint, it is essential that all patients with OLL and OLP are motivated



Figure 3. Severe dental plaque and calculus notable in lower teeth on right and left side. Erosive lesions are however typically seen on right gingiva (interdental and free gingiva) and labial mucosa, in close proximity with plaque and calculus. Milder form of erosion is seen on left gingiva.



Figure 1. A linear erosive lesion is seen on the right buccal mucosa, along the line-of-occlusion, extending from molar region to right commissure area. Severe calculus is notable around several teeth, even on the occlusal surfaces. No prosthesis or dental fillings are present.



Figure 4. Regression of buccal lesion following 7 days after a dental scaling procedure.

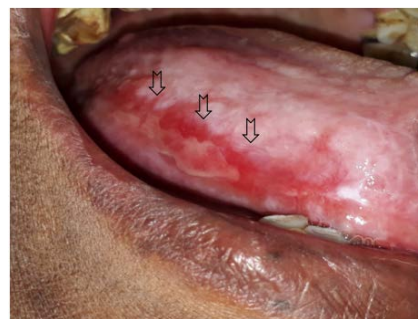


Figure 2. A similar linear erosive lesion is notable along the right lateral border of tongue, along the line-of-occlusion, in close proximity with the dental cusps of posterior teeth and incisal edges of anterior teeth. Surrounding this lesion, faint whitish lines can be seen.



Figure 5. Lesion regression on right side of lateral tongue, following 7 days after a scaling procedure. In the background, faint white lines are clearly visible on tongue dorsum.

and counseled to maintain good oral hygiene, and patients with severe calculus must be offered a scaling procedure before providing any further treatment.^{8,9} Furthermore, the frequent involvement of gingiva in OLP, indicates the role of periodontal pathogens in accumulated plaque and calculus, causing long-term contact sensitization.²⁵

OLL are interesting and have been noticed in the region of calculus deposition similar to OLP.⁴⁻⁸ In a study by Katsoulas *et al.* on 24 lichenoid lesions of lower lip, calculus deposition was noticed in 16 cases, and 6 cases presented with resin/composite restorations.¹¹ Backman *et al.* reported that of the 22 patients with lichenoid lesions, 18 (80%) achieved improvement and complete relief with chlorhexidine, suggesting a microbial component in OLL.¹⁰ Literature is pointing at the role of microbial irritation in the development of both OLP and OLL, emphasizing their nearness.^{8-10,25} Important precipitating factors like poor oral hygiene/heavy calculus can cause low-grade irritation precipitating and/or exacerbating OLL and OLP.

Furthermore, OLP is a chronic condition, and has little tendency for rapid regression following brief treatment.²⁶ In the study by Stone *et al.* at 20-week follow-up, 89% of intervention group showed improvement from baseline, and in control group only 53% patients showed improvement.⁵ Similarly, the study by Holmstrup *et al.* showed regression after 12 months.⁶

Some studies were also focused on healing/regression of OLLs. In a study on 44 white lesions, removal of dental fillings caused regression only in OLL, and no regression occurred in OLP.²⁷ In another study on 24 OLL cases, 63% healing was noticed within 3 months.²⁸ These references are pointing at the superior healing potential of OLL over OLP, following elimination of triggering factor. However, in the present case, the trigger was calculus and regression time was extremely short (<1 week), suggesting the diagnosis of a local reactive process like OLL. *Based on direct topographic relationship between clinical lesions and calculus, rapid regression following removal of calculus, unilateral presentation, and complete lack of systemic involvement, the reported case bends towards OLL over (unilateral) OLP.*²⁹

OLL and OLP are known to undergo reverse Koebnerization. Deeper understanding of this process can serve potential benefits, as these stimuli if controlled, might serve as a therapy for numerous patients with these conditions and a range of other muco-cutaneous conditions. One such therapy is the use of low-grade electric

stimulation which recently showed desirable effect in the management of OLP.³⁰ It is therefore important that investigators design potential therapies that can evoke curative dermal and mucosal responses.

Persisting low-grade irritation can also trigger proliferative benign tumors (*e.g.*, fibroma, pyogenic granuloma), and at times even malignancies like squamous cell carcinoma.³¹ The intimacy between mechanical and microbial irritation (plaque and calculus) with OLL and OLP is substantial, and can be linked with exacerbations in clinical disease. Eliminating triggering factors like dental plaque and calculus, and sharp cusps not only reduces clinical symptoms in OLP and OLL, but also reduces risky carcinogenic events in normal patients.³¹

Conclusions

Based on the findings of present case, it is highly recommended to thoroughly screen OLL and OLP for underestimated sources of irritation like dental calculus, sharp cusps/incisal edges, and pointed edges of restorations/prosthesis. Recommending dental scaling procedure might solely trigger reverse Koebnerization, and subside severity of lesions, as occurred in the present case. If dental restorations are associated with OLL, they should be exchanged with other compatible restorative materials, and followed-up for management. KP and reverse Koebnerization are subtle biological events that highlight dermal and mucosal sensitization as an important factor governing overall dermato-mucosal health and integrity.

References

1. Diani M, Cozzi C, Altomare G. Heinrich Koebner and his phenomenon. *JAMA Dermatol* 2016;152:919.
2. Streit E, Vogelgsang LE. ECG-induced Koebner phenomenon. *N Engl J Med* 2017;377:2180.
3. Wu JJ, Caperton C. Images in clinical medicine. Psoriasis flare from Koebner's phenomenon after acupuncture. *N Engl J Med* 2013;368:1635.
4. Salgado DS, Jeremias F, Capela MV, et al. Plaque control improves the painful symptoms of oral lichen planus gingival lesions. A short-term study. *J Oral Pathol Med* 2013;42:728-32.
5. Stone SJ, McCracken GI, Heasman PA, et al. Cost-effectiveness of personalized plaque control for managing the gingival manifestations of oral lichen planus:

- a randomized controlled study. *J Clin Periodontol* 2013;40:859-67.
6. Holmstrup P, Schiøtz AW, Westergaard J. Effect of dental plaque control on gingival lichen planus. *Oral Surg Oral Med Oral Pathol* 1990;69:585-90.
7. Ramón-Fluixá C, Bagán-Sebastián J, Milián-Masanet M, et al. Periodontal status in patients with oral lichen planus: a study of 90 cases. *Oral Dis* 1999;5:303-6.
8. López-Jornet P, Camacho-Alonso F. Application of a motivation-behavioral skills protocol in gingival lichen planus: a short-term study. *J Periodontol* 2010;81:1449-54.
9. Guiglia R, Di Liberto C, Pizzo G, et al. A combined treatment regimen for desquamative gingivitis in patients with oral lichen planus. *J Oral Pathol Med* 2007;36:110-6.
10. Bäckman K, Jontell M. Microbial-associated oral lichenoid reactions. *Oral Dis* 2007;13:402-6.
11. Katsoulas N, Tosios K, Sklavounou-Andrikopoulou A. Lichenoid lesions of the upper lip: A retrospective study of 24 cases. *Med Oral Patol Oral Cir Bucal* 2018;23:e302-7.
12. Xue JL, Fan MW, Wang SZ, et al. A clinical study of 674 patients with oral lichen planus in China. *J Oral Pathol Med* 2005;34:467-72.
13. Sugerman PB, Savage NW, Walsh LJ, et al. The pathogenesis of oral lichen planus. *Crit Rev Oral Biol Med* 2002;13:350-65.
14. Kamath VV, Setlur K, Yerlagudha K. Oral lichenoid lesions - a review and update. *Indian J Dermatol* 2015;60:102.
15. Hartl C, Steen KH, Wegner H, et al. Unilateral linear lichen planus with mucous membrane involvement. *Acta Derm Venereol* 1999;79:145-6.
16. Eisen D. The clinical features, malignant potential, and systemic associations of oral lichen planus: a study of 723 patients. *J Am Acad Dermatol* 2002;46:207-14.
17. Panta P, Yaga US. Oral lichenoid reaction to tobacco. *Pan Afr Med J* 2016;24:330.
18. Panta P, Andreadis D. Introduction to oral cancer. In: Panta P, ed. *Oral cancer detection*. Cham: Springer; 2019. pp 1-27.
19. Sugerman PB, Savage NW. Oral lichen planus: causes, diagnosis and management. *Aust Dent J* 2002;47:290-7.
20. Eisen D. The evaluation of cutaneous, genital, scalp, nail, esophageal, and ocular involvement in patients with oral lichen planus. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1999;88:431-

- 6.
21. Oliveira Alves MG, Almeida JD, Balducci I, et al. Oral lichen planus: A retrospective study of 110 Brazilian patients. *BMC Res Notes* 2010;3:157.
22. Andreasen JO. Oral lichen planus. 1. A clinical evaluation of 115 cases. *Oral Surg Oral Med Oral Pathol* 1968;25:31-42.
23. Raj AT, Patil S. Diagnostic flaws in oral lichen planus and related lesions. *Oral Oncol* 2017;74:190-1.
24. van der Meij EH, van der Waal I. Lack of clinicpathologic correlation in the diagnosis of oral lichen planus based on the presently available diagnostic criteria and suggestions for modifications. *J Oral Pathol Med* 2003;32:507-12.
25. Choi YS, Kim Y, Yoon HJ, et al. The presence of bacteria within tissue provides insights into the pathogenesis of oral lichen planus. *Sci Rep* 2016; 6:29186.
26. Kaplan I, Ventura-Sharabi Y, Gal G, et al. The dynamics of oral lichen planus: a retrospective clinicopathological study. *Head Neck Pathol* 2011;6:178-83.
27. Mårell L, Tillberg A, Widman L, et al. Regression of oral lichenoid lesions after replacement of dental restorations. *J Oral Rehabil* 2014;41:381-91.
28. Karatasli B, Karatasli G, Mete O, et al. Healing of oral lichenoid lesions following replacement of dental amalgam restorations with feldspathic ceramic inlay-onlay restorations: clinical results of a follow-up period varied from three months up to five years. *Biomed Res Int* 2018;2018:7918781.
29. Al-Hashimi I, Schifter M, Lockhart PB, et al. Oral lichenplanus and oral lichenoid lesions: diagnostic and therapeutic considerations. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007;103:e1-12.
30. Waked I, Ibrahim Z, Elgohary HMI. Does transcutaneous electrical nerve stimulation have an antipruritic effect in lichen planus? A randomized clinical trial. *Clin Exp Dermatol* 2019;44:252-6.
31. Panta P, Sarode SC, Sarode GS, et al. 'Chronic traumatic ulcer of lateral tongue' - An underestimated 'oral potentially malignant disorder'? *Oral Oncol* 2018;85:101-2.