# Oral Lichen Planus and Dental Implants – A Retrospective Study

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## ABSTRACT

*Objectives:* To examine whether oral lichen planus (OLP) affects the success rate of dental implants and if the manifestations of OLP are altered by implant-borne prostheses.

*Materials and Methods:* OLP patients, treated in the oral medicine department, with (the study group) and without (control group) dental implants were included. Pocket depth, mobility, bleeding on probing, erythema, pain and radiolucency around the implants, as well as clinical findings and OLP symptoms were recorded. Follow-up ranged from 12–24 months. Ordinal variables and visual analog scale score were compared using the Mann–Whitney test. The significance of the trend within each of the groups was assed using the Friedman test. Categorical variables were compared using Pearson chi-squared test and Fisher's exact test.

*Results:* Fourteen patients in the study group with 1–15 implants per patient and 15 in the control group were included. No implant failures were recorded. Comparison between the clinical manifestations of OLP in both groups did not reveal any significant differences.

*Conclusions:* Success of implant rehabilitation among treated OLP patients does not seem to be different from the success rate in the general population. Nor does implant placement influence the disease manifestations.

KEY WORDS: dental implants, lichenoid reaction, oral lichen planus, oral mucosa, peri-implantitis, periodontium

## INTRODUCTION

The use of dental implants has become routine in the rehabilitation of both partly and fully edentulous patients. Although the success rate is high, there are failures. The risk factors that have been associated with failure include local anatomy of the remaining alveolar bone, as well as its quantity,[1,2] quality,[3] systemic diseases,[4–7] and environmental factors such as smoking.[8–10]

Little attention has been given to the influence of oral mucosal diseases, other than periodontal disease, on the prognosis of dental implants. One of the most common oral mucosal diseases of the adult population is oral lichen planus (OLP). The reported prevalence is 0.5–2.2%. OLP usually presents between the ages of 30 and 60 years with a mean age of onset at around 50 years.[11] OLP has a number of common features with autoimmune diseases including immune system involvement, chronicity, and a positive reaction to steroid therapy. It involves the oral mucosa and the gingivae, usually with bilateral, distribution.[12] It may present as white reticular or plaque-like lesions, erythomatous areas or ulcerations. OLP is a chronic T-cell–mediated disease, and some variants of the disorder, termed oral lichenoid contact lesions, are the result of direct exposure to dental restorative materials, mainly amalgam.[13]

Implants penetrate the oral mucosa into the alveolar bone to which they osseointergrate. The epithelial attachment forms the barrier that separates the infected oral environment from the internal tissues. It has been postulated that OLP may directly alter the nature of the barrier affect, jeopardizing the long-term success of the

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implants. To date, there are no clear guidelines regarding the placement of implants in patients suffering from oral mucosal diseases such as OLP. In the literature, there are two clinical reports of a total of five cases of patients with OLP, and dental implants.[14,15] Although both groups of authors mention that in the past, OLP has been considered a contraindication for the placement of implants, they report that the implants where all successfully osseointegrated and that the manifestations of OLP did not worsen. On the contrary, two of the cases[14] showed significant improvement in clinical symptoms and patient satisfaction.

The purpose of our study was to examine the clinical interrelationship between OLP and implant survival in a case series of patients suffering from OLP and rehabilitated with dental implants.

## MATERIALS AND METHODS

### Patients

OLP patients diagnosed and treated in the Department of Oral Medicine at The Hebrew University – Hadassah School of Dental Medicine, Jerusalem, Israel during the years 2000–2005 were included in the study. All patients were diagnosed as suffering from OLP based on a thorough clinical examination and the histopathology of the lesions. Of 140 OLP files examined, only patients with a follow–up of at least 12 months were included. Of these, a total of 14 OLP patients had dental implants and served as the study group while 15 age-matched OLP patients without dental implants served as the control group. Demographic and medical data including age, gender, medication, medical history, habits (smoking and alcohol consumption) were recorded according to availability. The patients were examined at least twice a year and the findings (lichen planus type, number of oral sites involved, patient's complaints, visual analog scale (VAS) for pain or discomfort, clinician's evaluation of change from the previous visit and treatment provided) recorded as described in Table 1. In the case of multiple visits within the 6 months period the highest score (clinically severest) was recorded.

### Dental Implants

To avoid possible exacerbation because of the implantation procedures and associated stress, which are known to exacerbate the disease,[16] only patients with dental

**TABLE 1 Scoring System for Oral Lichen Planus Evaluation**

| Clinical Parameters | Score* | Description |
|---|---|---|
| Lichen planus type | 1 | Reticular |
| | 2 | Erythematous/Atrophic |
| | 3 | Erosive |
| Number of oral sites involved† | 1–7 | Sites included: Buccal mucosa/dorsal tongue/ventral tongue/floor of the mouth/gingiva/lip/palate |
| Patient's complaints | 0 | The patient did not complain |
| | 1 | The patient complained about the lesion |
| Visual analog scale | 0–10 | 0 – no pain/comfortable |
| | | 10 – severest pain/uncomfortable |
| Clinician's evaluation | 1 | Improvement |
| | 2 | No change |
| | 3 | Deterioration |
| Treatment‡ | 0 | No treatment |
| | 1 | Antifungal |
| | 2 | Retinoids 0.05/0.025% |
| | 3 | Triamcinolone 0.1% |
| | 4 | Clobetasol propionate 0.05% |
| | 5 | Dexametason 0.4%/Triamcinolone 8 mg |

*In case of multiple visits within 6 months the highest (clinically severest) score was recorded.
†In case of multiple lesions at the same site a score of one was attributed for that site.
‡The recommended treatment was tailored according to the patient's signs and symptoms.

implants inserted at least 6 months before the commencement of the clinical recordings were included in the study. Data regarding the implant manufacturers, implant surface characteristics and the prosthetic parts were not available

### Clinical Analysis

Dental implant evaluation, using a periodontal probe (UNC 15, Hu-Friedy, Chicago, IL, USA), included the recording of probing pocket depths (PPD), the presence of bleeding on probing (BOP) plaque (plaque score) and peri-implant erythema at six sites per implant (mesiobucal, buccal, distobucal, mesiolingual, lingual, distolingual). In addition, mobility[17] was measured.

### Radiographic Analysis

Radiolucency around the implants was assessed by a standardized parallel technique using the rinn device (Dentsply International Inc., Elgin, IL, USA).[18]

### Statistical Analysis

The differences between the ordinal variables of the two study groups (number of oral sites involved, clinician's evaluation of changes from the previous visit as well as the VAS of the two study groups were compared using the Mann–Whitney nonparametric test. The significance of the trend within each group was assessed using the Friedman test. The differences between the nominal variables (OLP type, patient's complaint and treatment) within the two study groups were compared using the Pearson chi-squared test and Fisher's exact test. All the tests were two-tailed and a $p$ value of $\leq .05$ was considered statistically significant.

The study has approved by the ethical board of the Hadassah Medical Center.

## RESULTS

A total of 14 patients were included in the study group, and 15 patients in the control group. The male to female ratio was 3:11 and 4:11, respectively. The average age of the patients in both groups was 59. The number of patients in both groups who smoked and/or drank alcohol was low (Table 2).

The diagnosis of OLP was recorded prior to implant placement in 67% of the patients in 13% of the patients the diagnosis of OLP was made after implant placement and in the remaining 20% this information unknown to the patient.

**TABLE 2 Patient Profiles at Commencement of the Study**

| | Study Group | | Control Group | |
|---|---|---|---|---|
| | *N* | % | *N* | % |
| Gender | | | | |
| Male | 3 | 21 | 4 | 27 |
| Female | 11 | 79 | 11 | 73 |
| Smokers | | | | |
| (+) | 2 | 14 | 2 | 13 |
| (−) | 12 | 86 | 13 | 87 |
| Alcohol consumers | | | | |
| (+) | 1 | 7 | 1 | 7 |
| (−) | 13 | 93 | 14 | 93 |
| Diabetes mellitus | | | | |
| (+) | 2 | 14 | 0 | 0 |
| (−) | 12 | 86 | 15 | 100 |
| Number of medication/day | | | | |
| Under 5 | 9 | 64 | 11 | 73 |
| Above 5 | 5 | 36 | 4 | 27 |
| Average age | 59.5 | | 59.1 | |

The number of patients seen during the last time period decreased to eight and 10 in the study and control group, respectively. This decrease was due to the extension of the recall periods because of improvement in the clinical condition or patients dropout.

## CLINICAL FINDINGS

One patient showed OLP isolated to the tissue surrounding the implants (Figure 1). Six patients had OLP lesions associated with the tissue surrounding the implants as well as with other oral sites (Figure 2). Seven patients had OLP lesions only at sites distant from the implants (Figure 3).

### Lichen Planus Type

In both groups there were patients with all three subtypes (reticular, erythematous, and erosive) with the erosive type (ELP) predominating at the first visit (over 40%). During the follow-up, the prevalence of ELP decreased in both groups, while the reticular type increased in prevalence (Figure 4). In the last follow-up period, an increase in the ELP was seen, with a parallel decrease in the reticular type.

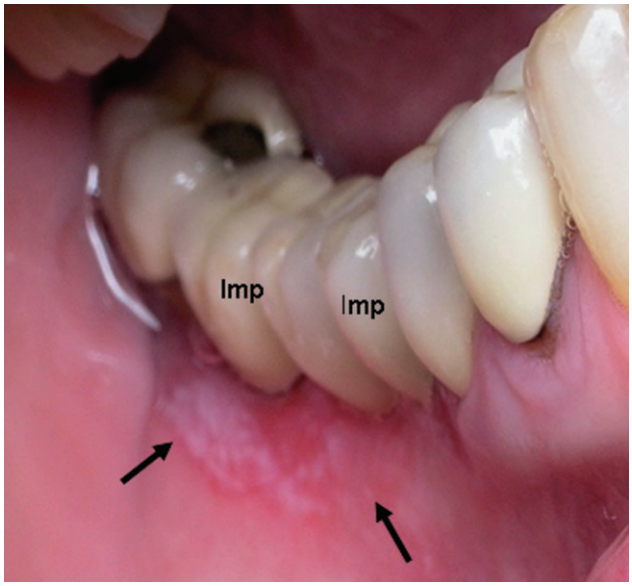


**Figure 1** The only patient presenting with oral lichen planus lesions associated exclusively with the peri-implant tissues. Arrows show white lesions on erythematous background adjacent to the implants in the molar region.

A comparison of the OLP type in all four periods, using thee Pearson chi-squared test, showed that the differences in OLP type between the groups were not statistically significant.

### Lesions Distribution

There was an average of two sites per patient in both groups and at all time periods. The gingival and buccal mucosa was the most common sites involved (data not shown).

## PATIENT-REPORTED PARAMETERS

### VAS

The mean levels ranged between 1.89 and 3.36 for all time periods. In both groups there was a slight increase during the third period (months 12–18; Figure 5). There were no statistically significant differences between the two groups at any time point (*t*-test). Analysis of the

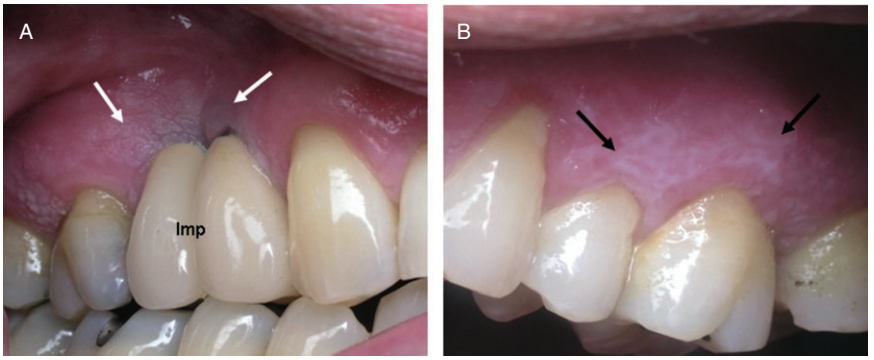


**Figure 2** Example of patient with oral lichen planus lesions (arrows) associated with the peri-implant tissues (A) and natural dentition (B).

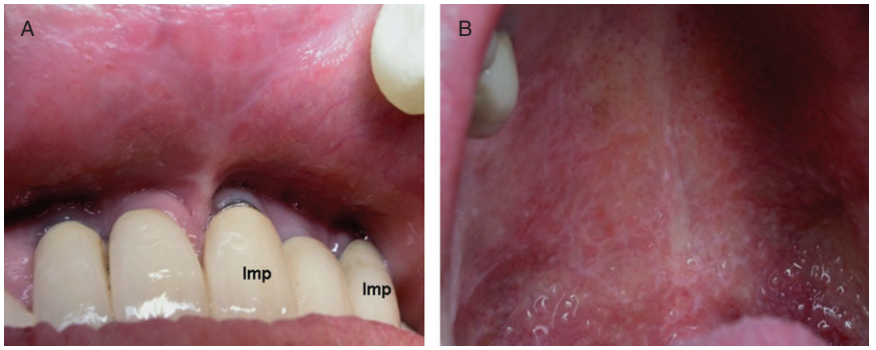


**Figure 3** Oral lichen planus affecting the labial mucosa (A) and the palatal mucosa (B). The peri-implant tissue is oral lichen planus free.

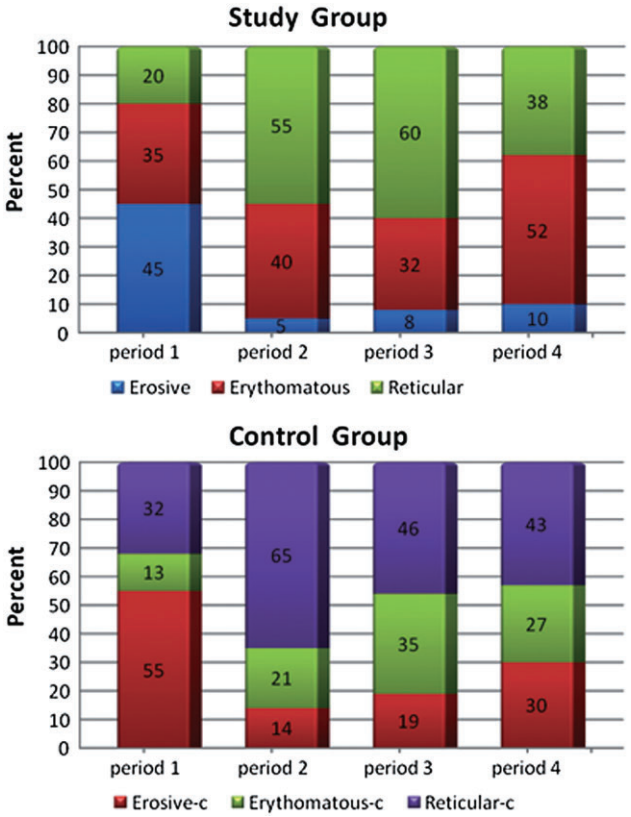


**Figure 4** The percentage of patients showing the three oral lichen planus types at the four different examination periods.

trend in each group over the first three periods showed no significant change (Friedman test).

### Patients' Complaints

During the first three periods of follow-up there was a decrease in the number of patients with complaints in both groups with a slight, but insignificant, increase over the last period. The Fisher's exact test did not show any statistical differences between the two groups.

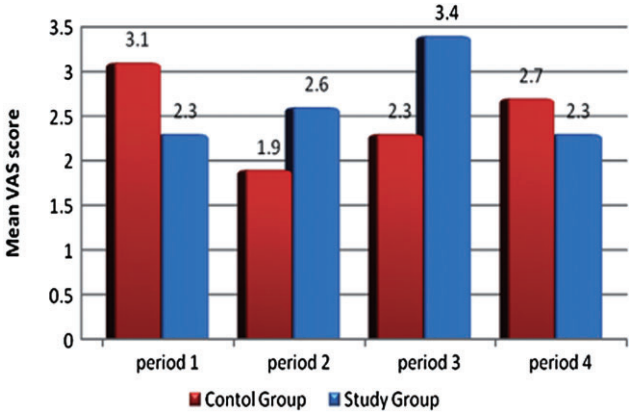


**Figure 5** Pain/discomfort as measured using the visual analog scale (VAS) at each of the four time periods.

## EXAMINER'S EVALUATION

### Clinician's Evaluation

In both groups, the majority of cases showed either improvement or no change over the study period. The percentage of patients in whom the lesions were judged to be deteriorating was less than 25% in both groups.

The Mann–Whitney test failed to show any statistical difference between the groups in any of the time periods.

### Treatment

In both groups, the initial treatment consisted of potent topical steroids (Dexametason 0.4%/Triamcinolone 8 mg or Clobetasol propionate ointment 0.05% applied once or twice daily for not more than 2 weeks).

During the follow-ups, the treatment was changed to less-potent steroids or to nonsteroid drugs when with symptoms improvement (retinoids for white lesions), accompanied by antifungal drugs, when necessary.

Mann–Whitney test showed a statistical difference in the treatment protocols between the groups at Period 1 ($p = .047$), with the control group having more cases treated with the higher-potency steroids.

## DENTAL IMPLANT EVALUATION

Patients included in the study underwent various types of dental implant rehabilitation. The implantation procedure took place 6 months to 10 years prior to our first examination. Each implant was assessed according to pocket depth, mobility, BOP, and erythema. The 14 subjects had a total of 54 dental implants placed (ranging between 1–6 implants per patient; one patient had 15 implants).

No PPD of >3 mm and no mobility was recorded. BOP and inflammation were noted around nine implants in three patients. The presence of plaque was noted in five of the patients (plaque score = 17–50%). None of the implants were associated with peri-implant radiolucencies (Table 3).

## DISCUSSION

Owing to a lack of studies on the relationship between dental implants and OLP, the dilemma of placing implants in patients with OLP remains current. With the

**TABLE 3 Clinical Evaluation of Implants Showing Bleeding on Probing Erythema or the Presence of Plaque**

| Patient # (Implant #) | Implant Site | Bleeding on Probing +/– | Erythema +/– | Plaque Score % |
|---|---|---|---|---|
| 1 (3) | 42 | + | + | 50 |
| | 32 | + | + | 50 |
| | 33 | + | + | 50 |
| 2 (3) | 44 | – | – | 50 |
| | 41 | – | – | 50 |
| | 16 | – | – | 50 |
| 6 (2) | 36 | + | + | 33 |
| | 37 | + | + | 33 |
| 11 (4) | 12 | – | – | 17 |
| | 13 | – | – | 17 |
| | 15 | – | – | 17 |
| | 16 | – | – | 17 |
| 13 (2) | 46 | – | – | 17 |
| | 47 | – | – | 17 |
| 7 (4) | 14 | + | + | 0 |
| | 16 | + | + | 0 |
| | 24 | + | + | 0 |
| | 26 | + | + | 0 |

increasing awareness of OLP among practitioners and the increasing acceptance of dental implants this dilemma is becoming more pressing. A result of this dilemma is that many clinicians prefer to avoid placing implants in patients with OLP.

The current study examined the reciprocal relationship between the success of implant rehabilitation and the clinical presentation of chronic OLP disease over a 12–24-month time period. The potential risk to dental implant placement in OLP patients was suggested by Lindhe et al.[19] to be greater than in healthy patients. They hypothesized that this increased risk was due to the altered/limited capability of the epithelium to adhere to the implant surface.

OLP is an inflammatory disease of the oral mucosa with pathognomonic changes seen both in the epithelium and the subepithelial layer of connective tissue.

These changes could possibly affect the mucosal-titanium interface and impair the barrier function of the implant/epithelial junction allowing for easier bacterial access to the peri-implant tissues. In addition to the impaired attachment, Langerhans cells and keratinocytes, in the OLP lesions up-regulate the pro-inflammatory response by increasing interleukin-2 and interferon-γ secretion.[20,21] These cytokines have an important role in local bone resorption[22] and may lead to alveolar bone loss around the implants.

In this study, the implant types and the experience of the clinician placing the implants were not recorded. If OLP is a risk factor for dental implant success, an increased failure rate would have been expected irrespective of the implant type or the clinician's experience.

The results indicated a reasonable standard of oral hygiene among the participants and only a small group of patients suffered from BOP and inflammation. Probing pocket depth did not exceed 3 mm. The radiological examination did not show any evidence of radiolucencies around any of the implants. These data indicate a 100% success rate for the 54 implants during the 12–24-month follow-up period and up to 120 months post-implant insertion. The long-term success of dental implants in the treated OLP patients did not seem to differ from the success rate in the general population.[23,24] The high success rate could be explained by the fact that early implant failures were not included in the present study because of the study design. No data was available regarding the quality and the frequency of the supportive periodontal treatment received by these patients, other than the routine check-ups performed in the department of oral medicine. As a retrospective study, some of the clinical recordings were missing at the follow-ups. Nevertheless, this study shows that implant survival among OLP patients is essentially the same as that reported in the literature (95%).[23,24]

OLP is a result of a cell-mediated (positive CD4- and CD8- T cells) immune response to epithelial-associated antigen. Some of the OLP cases might actually be a lichenoid reaction (LR), which is the result of a close contact between dental materials, usually metals,[13,21] and oral epithelium in allergic individuals. The close contact between the oral epithelium and the implant raises the question whether the titanium triggered the OLP. Implant material biocompatability supports the assumption that there is a minimal chance of a lichenoid reaction to the implant materials. In the current study proximity of the OLP lesions to the implants was seen in only one patient. The most common OLP sites in both groups were, similarly, the buccal mucosa and gingiva. These findings strongly suggest that dental implants have no influence on OLP distribution.

We also compared the clinical severity of the OLP in both groups. As there is no agreed scale for measuring OLP manifestation, evaluation of the disease was based on a combination of clinical and patient-based parameters. OLP manifestations are variable and include reticular, atrophic, erythomatous, plaque-like, desquamative or ulcerative lesions (erosive type), or a mixture of a types.[25] Both groups had a high percentage of the erosive and erythematous type at their first visit, probably because these types were accompanied by discomfort or pain and the patients sought help. In both groups there was a decrease in this type during the first period, usually the result of treatment. With less frequent treatment visits, a slight increase in the percentage of patients with ELP was observed with an opposite trend for the reticular form – reflecting the transformation of the ELP to the reticular type after treatment. The differences between the two groups were not statistically significant. Thus, the presence of dental implants did not influence the severity of the OLP (type) manifestations.

In addition to the OLP type, more parameters were included in order to asses the disease changes: The VAS is a tool for evaluating the patient's pain or discomfort. The trend of its changes shows worsening or a relief of symptoms. Any other symptoms were represented by "patient's complaints" and, the clinician's evaluation is a summary of all the signs and symptoms, some of which can not be measured. Both groups showed an increase in the VAS scores and in the percentage of complaints in the third period, in association with the increase in the ELP type. The lack of statistical difference in both parameters between the groups during the follow-ups shows that subjectively, patients treated with dental implant rehabilitation did not feel worse, were not more sensitive, or were at a higher risk of increased severity of the disease than the control patients. The examiner's clinical evaluation in both groups showed a stable situation or improvement during treatment without differences in any of the periods between the study and the control groups. The significantly higher use of topical steroids in the control group at the first examination was probably due to the higher incidence of the erosive type at that time period.

In the current study, patients were treated for short periods. According to the literature, the use of low-dose topical steroids does not result in adrenal suppression and adverse systemic effect are not expected.[26,27] An exception was the use of an aqueous solution (mouth wash) of clobetasole propionate three times a day for 2–6 weeks. In 85% of these patients, hypothalamus–pituitary–adrenal inhibition occurred at the end of the treatment regimens.[27,28] In severe, nonresponsive OLP or severe cutaneous disease, short courses of systemic steroids are indicated.[25] Long-term systemic use of steroids inhibits the hypothalamus–pituitary–adrenal axis, resulting in numerous side effects including capillary fragility, osteoporosis, water and salt retention (with increased arterial pressure), diabetes, and propensity for infections. Research on the effect that the local or systemic use of steroids has on implant osseointegration is very limited and controversial.[29] Studies using animal models have shown that steroid administration does not affect the biomechanical stability of osseointergrated implants, although histologically impaired mineralization and decreased bone to implant contact were found.[30,31] Chronic intake of steroids used to be considered a contraindication for dental implant placement;[32,33] however, it has recently been reported that steroid treatment is not among the causes of implant failures.[34] Thus, although the recommended protocols for OLP are based on the short-term use of topical steroid application and rarely the use of systemic steroids, the clinician should be aware of the possible side effects that may occur and the patients should be carefully monitored during the treatment of OLP

In summary, a comparison of OLP signs and symptoms between patients with and without dental implant rehabilitation during a period of 12–24 months showed that there were no statistical differences in OLP manifestations between the two groups.

This study is the first, to the best of our knowledge, to examine the correlation between OLP and dental implants among a group of patients over a 12–24-month follow-up. The results indicate that there appears to be no contraindication to placing implants in patients suffering from OLP. As more OLP patients choose to increase their quality of life by dental implant rehabilitation, a larger group of patient with OLP and implants will become available. Large, well-designed prospective randomized clinical trials should be carried out to clarify the questions raised in this study.

In conclusion among well-treated OLP patients, the combination of the disease and implant rehabilitation did not have a negative influence during a 12–24 months follow-up. More studies addressing the issue of OLP and

dental implants are needed to determine the relationship between OLP and dental implants.

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## CONFLICT OF INTEREST AND SOURCE OF FUNDING STATEMENT

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