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REVIEW

Implant rehabilitation in patients with oral lichen planus: an overview

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Abstract
Objectives Implant rehabilitation in oral lichen planus (OLP) is a major challenge for clinicians and patients. There is limited scientific evidence, primarily case reports and small case series. We conducted a literature review of data on the effectiveness and safety of implant rehabilitation in OLP patients.
Material and methods We searched MEDLINE, Embase and Cochrane databases for articles on implant placement in OLP patients (searches from 1980 to 2011).
Results Eight studies (41 OLP patients rehabilitated with 135 implants) met the inclusion criteria. Survival rate of implants was 94.8% over a mean follow-up of 56.5 months.
Conclusions There is very limited evidence on the safety and benefits of implant placement in OLP patients. Implant loss appears not to be directly related to OLP, but linked to factors such as parafunctions, poor bone quality and marginal mandibular resection. The benefits and harms of using implants in people with OLP require thorough evaluation in properly designed randomised, controlled studies.
Clinical relevance OLP is not an absolute contraindication for implant insertion and there is no increased risk of failure. Implants should be positioned only if mucosal signs and symptoms are in the remission phase. A careful oral hygiene and frequent follow-up are the main recommendations in OLP patients rehabilitated with implants.

Keywords Oral lichen · Implants · Local factors · Contraindication

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Introduction

Oral lichen planus (OLP) is a chronic autoimmune inflammatory disease affecting 1–2% of the general population [1]. Typically, lesions develop between the age of 40 and 70 years, more frequently in women than in men. Gingival involvement with discomfort, severe oral pain, or a burning sensation are observed in approximately one third of the patients [2], but desquamative gingivitis may well be the sole clinical manifestation of OLP [3] .

Unstable prostheses and unspecific traumatic events produce desquamation, bleeding and pain [4]. Injuries caused by prostheses may interfere with healing processes induced by the pharmacological treatment of OLP [5]. On these grounds, it has been hypothesised that implant-supported oral rehabilitation may reduce contact between affected oral mucosae and prosthetic materials, stabilise prostheses and avoid frictional force that develops between oral mucosa and dentures [6].

In the past, the use of dental implants in OLP subjects was not recommended due to potential risk of peri-implant mucositis, a determinant of implant failure [7]. In addition, Langerhans cells and keratinocytes in OLP lesions upregulate a proinflammatory response by increasing interleukin-2 and interferon-gamma secretion [8]. Transforming growth

factor-beta 1 expression in the peri-implant soft tissues is enhanced in patients with failing dental implants as compared to healthy subjects [9]. Overall, these cytokines are thought to play a major role in local bone resorption and may lead to alveolar bone loss around the implants [10].

To date, there are no specific and detailed guidelines on the benefits and harms of placement of implants in patients with autoimmune oral mucosal diseases, including OLP. Reports of treatment with dental implants in individuals with oral mucosal autoimmune diseases are limited and in most cases restricted to single case reports or small case series [11]. We performed a literature review and critical appraisal of existing literature on the benefits and harms of oral implant rehabilitation in people with OLP.

Materials and methods

We searched MEDLINE, Embase and Cochrane databases (1980 to August 2011) on clinical trials on implants in oral rehabilitation for OLP patients. In absence of clinical trials, lower levels of evidence were identified including cohort studies, case reports and case series.

Inclusion criteria

The following keywords were used to search databases: "Lichen and implant" and "Lichen and implants". The search was limited to English language studies conducted in humans. Studies were eligible whether the diagnosis of OLP was done before or after implant insertion.

Exclusion criteria

We excluded reviews and studies of extra-oral localization of lichen and studies conducted in patients with other oral mucosal diseases.

Reference lists of all retrieved articles were screened for additional studies that could be potentially eligible for meeting the inclusion criteria. If any were identified, these were included in our analysis.

Data were extracted on characteristics of the study population, intervention and outcome measures. Extraction of data was for the type of study, number of patients studied, patient's gender and age, OLP clinical type and mean duration, number of placed implants, follow-up duration, implant survival rate and type of prosthetic rehabilitation.

Results

Our search identified 13 citations for "Lichen and implant" and 14 citations for "Lichen and implants". Eight studies met the inclusion criteria [12–19] and their characteristics are detailed in Table 1.

There were four single case reports [12, 14, 16, 17], two case series [13, 15] and two small scale controlled studies (one prospective and one retrospective) [18, 19]. A total of 42 patients were described in these eight studies: 8 were men, 34 were women and mean age was 68.1 years. Thirty-three patients had an erosive form of OLP, six had the reticular type, and for two, there were no specific information on the clinical form of OLP. The mean duration of OLP signs and symptoms was 13.2 years (data from three studies); there was no data on the duration of OLP in the remaining studies. In 40 patients, diagnosis of OLP was made before implant insertion, and only in one case OLP developed 10 years after implant rehabilitation [15].

Table 2 reports detail information about implants placed in the included studies. A total of 135 implants were placed with a mean implant survival rate of 94.8% (range 0% to 100%). Implant manufacturer was unclear in most studies. Nobel implants (Nobel Biocare S.A., Gothenburg, Sweden), with different systems, were used at least in two studies [12, 18]. Eight ITI (Straumann, Waldenburg, Switzerland) implants were placed by Esposito and Ocazikir [13, 14] while Reichart reported the use of two HATI implants (Mathys Dental, Bettlach, Switzerland), one CamLog (Altatec, Germany) and one ZL Microdent (Breckerfeld, Germany), in two different patients [15]. In three studies, the implants were used to support overdenture rehabilitation [12, 13, 17]. In four studies, a fixed rehabilitation was used (screw or cement on implants) [14–16, 18]. Czerninski did not provide information on prosthetic rehabilitation employed in his trial [19]. The implant mean follow-up duration was 56.5 months.

Discussion

Several studies on the benefits and harms of dental implants selectively exclude people with OLP [20, 21]. Possible risks of dental implant placement in erosive OLP were originally suggested by Lekholm [22] who hypothesised an increased risk of failure due to the altered/limited capability of the epithelium to adhere to the implant surface. The assumption that subjects with OLP tend to have higher failure rates is not confirmed by this literature analysis.

Esposito et al. described a cohort of patients in which implant loss was observed and reported a case of OLP who was rehabilitated with two dental implants [12]. According to the authors, OLP only had a marginal role in the failure process, with other factors such as parafunctions and poor bone quality being the primary determinants. Three years later, Esposito et al. described two clinical cases of severe OLP successfully rehabilitated with implant retained

Table 1 Patients' demographic data and OLP clinical characteristics

Study	Type of study	Number of OLP patients	Patients' sex	Patients' age (years)	Clinical subtype of OLP	OLP mean duration (years)	Diagnosis of OLP before or after implant insertion
Esposito et al. [12]	Case report	1	Female	69	Erosive	Not available	Before
Esposito et al. [13]	Case series	2	Females	72 and 78	Erosive	16	Before
Oczakir et al. [14]	Case report	1	Female	74	Not available	Not available	Before
Reichart [15]	Case series	3	Females	63, 68 and 79	1 erosive 2 reticular	10, 12 and 20	1 after, 2 before
Czerninski et al. [16]	Case report	1	Female	52	Not available	8	Before
Gallego et al. [17]	Case report	1	Female	81	Reticular	Not available	Before
Hernandez et al. [18]	Prospective controlled study	18	14 females 4 males	53.7 (mean)	Erosive	Not available	Before
Czerninski et al. [19]	Retrospective controlled study	14	11 females 3 males	59.5 (mean)	11 erosive 3 reticular	Not available	Before
Total	4 single cases	41	34 females	68.1	33 erosive	13.2	
	2 case series		7 males		6 reticular		40 before
	2 controlled studies				2 Not available		1 after

overdentures. Two implants for each edentulous jaw were placed bilaterally in the canine region after 3 months healing time. The authors used ball attachments and existing mandibular complete dentures were relined with gold matrices processed in the prosthesis. Positive outcomes including patient satisfaction (aesthetics and functional amelioration), long-term osteointegration and a marked reduction of incidences of OLP erosive lesions were recorded [13]. Oczakir et al. described a case series of 24 patients with a variety of systemic diseases and congenital defects: one patient had OLP [14]. Four implants were placed in the mandible to support a fixed complete prosthesis with no complications recorded during the follow-up period (6 years). Also, Reichart described a successful fixed rehabilitation in three people with OLP: although they were older patients, affected by periodontits and gingival mucosa OLP involvement, they also reported satisfactory results [15]. One patient was followed up for 13 years, the longest timeframe ever described in OLP patients. In this patient, OLP lesions developed 10 years after placement of the first two implants. Czerninski et al. described two patients who developed oral squamous cell carcinoma (OSCC) around dental implants and noted the presence of OLP lesions in one of these cases [16]. Implant loss was caused by the marginal mandiblectomy secondary to OSCC surgical treatment. OLP lesion and/or early OSCC could be confused with a peri-implantitis: for this reason, the authors suggested performing a prompt biopsy in ambiguous cases, to avoid diagnostic delay. A similar case was described by Gallego et al. who reported on an OLP patient developing an OSCC adjacent to an implant in mandibular symphyseal region [17]. The marginal mandibular resection of such lesion caused concomitant implant removal. Also, the lesion described in this report was initially confused with peri-implantitis. Hernandez et al. first conducted a dedicated prospective controlled study in 18 patients affected by OLP who received implant treatment [18]. No implants were placed during the erosive stage of the disease. After implant placement and during the follow-up period, the recurrent erosive/ulcerative manifestations of the disease were treated using clobetasol propionate (0.05%) in an aqueous solution, which was administered three times daily until remission. The authors concluded that the presence of OLP is not associated with a higher prevalence of implant failure, peri-implant mucositis, peri-implantitis or immediate postsurgical complications (pain and wound healing) [18]. Czerninski et al. have recently concluded a retrospective controlled study on 14 OLP subjects who received 54 implants [19]. 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. Their results also indicated that there were no contraindications to placing implants in patients suffering from OLP since the implants survival is essentially the same as reported in non-OLP edentulous patients [19].

Based on existing published literature, it is not possible to consider OLP as a primary cause of implant failure; parafunctions, poor bone quality and mandibular resections due to OSCC are the key factors proven to cause implant removal. With caution due to the small sample sizes, short-term follow-up and level of evidence of the analysed studies, it maybe stated that OLP has not been recognised as the cause of implant loss in any of the analysed studies.

A comparison with existing knowledge about patients affected by oral mucositis (different from OLP) and implant rehabilitation is difficult due to only few existing studies: 16 patients with epidermolysis bullosa were rehabilitated with a

Table 2 Implant characteristics and main outcomes

Study	Number of implants	Implants' manufacturer	Follow-up period (months)	Implant survival rate (%)	Prosthetic rehabilitation	Main outcomes
Esposito et al. [12]	2	Branemark System (Nobel Biocare S.A., Gothenburg, Sweden)	32 and 60	0	Overdenture	Supracrestal peri-implant mucosa specimens showed intense chronic inflammatory infiltrate. OLP patients were affected by bruxism and poor bone quality
Esposito et al. [13]	4	ITI (Straumann, Waldenburg, Switzerland)	21	100	Overdenture	The incidences of erosive soft tissue eruptions were markedly reduced after prosthetic rehabilitation
Oczakir et al. [14]	4	ITI (Straumann, Waldenburg, Switzerland)	72	100	Fixed	No complications recorded
Reichart [15]	10	HATI (Mathys Dental, Bettlach, Switzerland) (2 implants), CamLog (Altatec, Germany) (1 implant), ZLMicrodent (Breckerfeld, Germany) (1 implant) N.A. (6 implants)	156 (4 implants) 36 (2 implant) N.A. (4 implants)	100	Fixed	No adverse effects were seen either on the gingiva or in the underlying alveolar bone. Patients with asymptomatic OLP also involving the gingiva may be treated with dental implants. A strict follow-up is recommended
Czerninski et al. [16]	3	N.A.	36	0	Fixed	Implants loss was caused by partial mandibular resection due to OSCC developed around one implant. Malignant transformation in patients with dental implants can resemble peri-implantitis both clinically and radiographically
Gallego et al. [17]	2	N.A.	36	0	Overdenture	Implants loss was caused by partial mandibular resection due to OSCC developed around one implant. Regular follow-up (every 3 months) and careful exploration of the mucoase to ensure early detection of suspicious lesions
Hernandez et al. [18]	56	TiUnite and Nobel Direct (Nobel Biocare S.A., Gothenburg, Sweden)	53.5	100	Fixed	No statistical significant difference in immediate postsurgical complications, peri-implant mucositis and peri-implantitis was noted between OLP patients and control group. OLP is not associated with a higher prevalence of implant failure
Czerninski et al. [19]	54	N.A.	63	100	N.A.	No PPD of >3 mm and no mobility was recorded. BOP and inflammation were noted around 9 implants in 3 patients. The presence of plaque was noted in 5 of the patients. None of the implants were associated with peri-implant radiolucencies

Total implants=135; mean implants follow-up=56.5 months; mean implant survival rate=94.8%

N.A not available

total of 92 implants with a reported implant survival rate of 75–100%. The follow-up period ranged from 12 to 108 months. Thirteen patients (86.7%) developed oral ulcerations in areas of friction with the prostheses. In no cases peri-implant mucosal alterations or blisters around the implants were reported [23–28]. Peñarrocha et al. [24] compared the degree of satisfaction among patients rehabilitated with fixed prostheses versus those rehabilitated with overdentures, recording a score of 9.6 and 8.8, respectively. All authors concluded that the use of dental implants in patients with epidermolysis bullosa is appropriate, offering adequate support for the prosthesis [23–28]. No data exist about implant rehabilitation in patients affected by oral pemphigus, oral mucous membrane pemphigoid and other chronic oral mucositis.

Evidence from existing studies shows that OLP pharmacological management and implant placement are strictly temporally connected; based on three different studies, implants should be positioned only if mucosal signs and symptoms are in the remission phase [15, 18, 19]. A careful oral hygiene, use of gingival trays in gingival lesions management and frequent follow-up are the main recommendations in OLP patients rehabilitated with implants [29]. Follow-up is essential due to two primary reasons: to control implant survival and monitor clinical evolution of OLP lesions [16, 17]. Although the risk of OSCC in OLP patients still remains an open question, it is appropriate to allow the WHO recommendations about the "potentially malignant disorders" also in OLP patients [30]. To date, there are not data that clarify if implants could modify the pattern of OSCC osseous invasion: a recent literature review reveals that only 24 dental implants were reported to be associated with OSCC, five of them are reported in this article [31]. Further large, well-designed prospective randomised clinical trials should be carried out to evaluate with robust levels of evidence the benefits and harms of implant rehabilitation in patients with OLP.

Conflict of interest The authors declare that they have no conflict of interest.

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