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Original research

## A retrospective multi-institutional study on the clinical categorization and diagnosis of oral lichen planus

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### ABSTRACT

**Objective:** Oral lichen planus (OLP) displays various and complicated clinical presentations which often make their differential diagnosis challenging, and thus helpful clinical practice guidelines for the diagnosis and treatment of OLP have been long awaited.

**Methods:** The Japanese OLP Working Group (OLP-WG) has collected and analyzed a total of 393 OLP cases provided by 48 institutions nationwide from 2009 to 2011 toward the establishment of valuable clinical practice guidelines for OLP. Collected samples were classified according to their original diagnoses into three groups: bilateral reticular (Group 1); bilateral atrophic/erosive (Group 2); and unilateral (Group 3) buccal lesions. Ten OLP-WG members used intraoral pictures to categorize the cases into Andreasen's six types, and then examined the biopsy specimens to make pathological and comprehensive diagnoses.

**Results:** When Andreasen's reticular, plaque, and papular types were sorted into white (W) type, and when atrophic, erosive, and bullous types were sorted into red (R) type, they formed six clusters based on the number of the members' judgments: W1 (W dominant), W/R (W-R competing), R1 (R dominant), UD (undeterminable dominant), W2 (boundary), and R2 (boundary). Both in the bilateral and unilateral lesion groups, proportions of cases which were comprehensively diagnosed as OLP were significantly higher in cluster W1 than those in cluster R1 ( $p < 0.01$ ). A considerable percentage of lesions likely judged as R were diagnosed as OLL or other than OLP.

**Conclusions:** These results indicated that the simple W or R classification would be a better substitute for Andreasen's in the clinical categorization of OLP.

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### 1. Introduction

Most oral mucosal diseases appear as red, white, or a mixture of the two with various texture patterns. Oral lichen planus (OLP) is a common chronic inflammatory mucosal disorder of unknown cause. It typically appears as a reticular type of mixed red and white patches, symmetrical in the bilateral buccal mucosa [1–4]. However, it sometimes involves other oral mucosal sites and exhibits more or less non-typical complicated presentation, which often makes its clinical diagnosis very confusing and difficult. It is

often a problem in differential diagnosis that some types of oral mucosal premalignancies, bullous lesions, candida infections, and viral stomatitis display clinical patterns very similar to those of OLP.

The Japanese OLP Working Group (OLP-WG) was founded in 2008 for the nationwide survey for OLP diagnostic conditions in this country to get basic understandings before an establishment of clinical practice guidelines for OLP. The group, which is cooperatively organized by the Japanese Society of Oral Medicine (JSOM) and the Japanese Society of Oral Pathology (JSOP), consists of ten members, five each recommended by the two societies, because of their expertise in oral mucosal diseases. OLP-WG has collected clinical data, pathology specimens, and intraoral images of patients clinically diagnosed as OLP at the 48 institutions which agreed to the initial proposal for multi-institutional study.

A number of classifications have been proposed to express the clinical appearance of OLP and to ensure its initial diagnosis. Among of them, Andreasen's six-type (reticular, plaque, papular, atrophic, erosive, and bullous) classification [5] has been most commonly used because it covers most of the representative clinical varieties of OLP. However, we have noticed that its inter-examiner reliability is not high enough, and thus, we have sought a simpler classification to link the clinical forms more directly to the histopathological diagnosis, treatment strategies, and follow-up plan.

Thus, the aim of this study is to investigate whether or not our simplified two-type classification works in the clinical typing of OLP as a good substitute for Andreasen's.

## 2. Patients and methods

### 2.1. Cases

A total of 393 patients who were clinically diagnosed as having OLP at 48 hospitals with oral medicine, oral & maxillofacial surgery, and/or dental clinics were the subjects of this study. These institutions had members of JSOM or JSOP and voluntarily responded to participate in the present study. The abstract of patients' clinical records (age, sex, and past medical history, medication), lesion information (location, size, shape, color, Andreasen's clinical types, and histopathological diagnoses), intraoral color images of jpeg format, and hematoxylin/eosin-stained biopsy specimens were provided by the hospitals. The following different groups were collected independently in three years: bilateral reticular (Group 1); bilateral atrophic/erosive (Group 2); and unilateral (Group 3) types affecting the buccal mucosa, according to their original diagnoses.

### 2.2. Reviewing in OLP-WG

The collected samples were all reviewed independently by the ten OLP-WG members. Before reviewing the samples OLP-WG made the original evaluation sheet for assessing the sample in both clinical features and histopathological findings. All OLP-WG members are in expertise with diagnosis of OLP, and the diagnosis of each sample was judged by each member according to the evaluation sheet as shown in Fig. 1. Clinical types of the lesions were initially judged through the provided intraoral images according to the Andreasen's classification. Then, the Andreasen's reticular, plaque, and papular types were sorted into white (W) type, and the atrophic, erosive, and bullous types were sorted into red (R) type. Lesions which could not be determined to fall within one of Andreasen's six types were grouped into "not determined (ND)" type.

Pathology specimens were also reviewed, and histopathological findings were checked on the evaluation sheets, and pathological diagnoses were made individually by the members. The reviewed

**Table 1**  
Patient characteristics.

	Group 1 Bilateral reticular	Group 2 Bilateral atrophic/erosive	Group 3 Unilateral any types	Total
Patients, n	154	124	115	393
Male, n (%)	41 (26.6)	37 (29.8)	37 (32.2)	
Female, n (%)	113 (73.4)	87 (70.2)	78 (67.8)	
Male:Female ratio	1:2.76	1:2.35	1:2.12	
Median age, y (range)	59 (23–84)	65 (27–90)	63 (28–88)	
Clinical samples, n	160	135	117	
Specimens, n	160	135	119	414
Institutions, n	34	28	31	48

pathological diagnoses were scored as 1 = OLP, 2 = OLP-compatible (OLP-comp), and 3 = others or ND.

Comprehensive diagnoses referring to the clinical and pathological findings were also made and scored as 1 = OLP, 2 = oral lichenoid lesion (OLL), and 3 = others or ND.

The means of the scores by the ten members were given as the lesions' pathological or comprehensive scores.

### 2.3. Statistics

Data were analyzed by using the Mann–Whitney *U*-test or  $\chi^2$  test, and differences at  $p < 0.05$  were considered to be significant. Coefficients of regression and determination ( $R^2$ ) of the scatter plots were calculated using Microsoft Excel<sup>®</sup> 2013 software (Seattle, USA).

### 2.4. Ethics

The present study was performed according to the ethical guidelines concerning clinical study directed by the Ministry of Health, Labor and Welfare of the Japanese Government. This retrospective clinical review study was approved by local ethics board of each university where each OLP-WG member belongs and also according to local ethical rules of the participating institutions.

## 3. Results

### 3.1. Clustering of the lesions on distribution charts

The patients' characteristics for Groups 1–3 are shown in Table 1. A total of 412 OLP lesions from 393 patients were retrospectively investigated in this study. Patients' median age was around 60 and the male-to-female ratios ranged between 1:2.12 and 1:2.76 in these three groups, corresponding to previous reports [2–5]. Group 1 was the group of bilateral buccal reticular lesions, the most common form of OLP, and it had the largest patient and lesion numbers (154 and 160, respectively) among the three groups. Group 2 and 3 were smaller, but the numbers of patients and lesions seemed to be sufficient to compare with Group 1: 124 patients and 135 lesions in Group 2, and 115 patients and 117 lesions in Group 3.

The clinical type judgments were unanimous among the all members for some lesions, but divided for most lesions. It seemed improper to determine the lesions' clinical types simply by the majority rule because such a determination does not reflect the ratios of the judgments and masks the lesions' clinical characteristics. We thus made distribution charts of the lesions according to the W and R judgment numbers. Fig. 2A–C show the distribution by the W and R judgments (horizontal plane) and the lesion number (vertical axis).

The lesions could be divided into six clusters on the distribution charts (Fig. 2A–C). White 1 (W1) cluster consisted of the lesions which were judged as W by seven or more members. Similarly,

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