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Morphometric analysis of the dorsum linguae in patients with Oral Lichen Planus

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Abstract

Objective: Morphometric study of the dorsum linguae in patients with Oral Lichen Planus (OLP).

Material and Method: In 236 patients with a clinicopathologic diagnosis of OLP, 111 were found to have involvement of the dorsum linguae. For the purposes of the study, 41 of these cases were used, due to the availability of photographic records fulfilling quality conditions according to objective criteria. The experimental variable was defined as the proportion of affected dorsum linguae measured and calculated using the MIP4(R) computer software.

Results: In 236 patients with OLP, the mucosa of the dorsum linguae was affected in 47.6% of the cases (total 111). The proportion of affected area was studied in 41 of these cases, 8 men (19.5%) and 33 women (80.5%). In 73% of these cases, the affected area was less than 50% of the total surface of the dorsum linguae. There were no statistically significant differences (p=0.495) in relation to age and proportion of lingual surface affected. On the other hand, significant statistical differences were found between the period of disease evolution and area of lingual involvement (p=0.044).

Conclusion: Lingual involvement is frequent in patients with OLP, and manifests as de-papillate areas to the left and right of the median sulcus of tongue (occasionally linked by an isthmus) and having a certain " butterfly wing" symmetry.

Key words: *Oral lichen planus, tongue, photography, image.*

Introduction

Oral lichen planus (OLP) is an chronic mucocutaneous inflammatory disease of the skin, nails, hair and mucosae that evolves in bursts (1-4). It affects 0.2-1.9%, of the population, being more frequent in women. The age range in which the disease manifests is between 30 and 70 years, although cases have been described in children and the elderly (5-7). The etiology of this disease is unknown. Immunologic phenomena seem to be implied in the pathogenesis, the epithelium being attacked by cytotoxic CD8 lymphocytes (5).

Clinically, papular and reticular lesions are visible, usually alternating with erythremic and atrophic areas and possessing a certain dynamism. In the oral mucosa, lichen planus can adopt very varied clinical forms (4,8). Many clinical classifications of OLP have been proposed. Initially Andreasen (9) classified 6 clinical forms: reticular, papular, plaque-like, atrophic, erosive and blistered or bullosa. Later, Silverman et al. (10) proposed the classification as reticular, atrophic and erosive. Lastly, simplified by Bagán et al. (11) who cited 2 forms: a) exclusively white reticular lesions; b) ulcerative or atrophic lesions, with or without reticular lesions. These last forms have such symptoms as stinging or burning. Lichen lesions are usually multicentric and bilateral (12).

The most frequent location is the buccal mucosa (80 to 90% of cases) (1,13,14), followed by the tongue with a incidence that varies between 30 and 50%. The remaining locations, such as palate, floor of mouth and lip are less frequent.

Shklar et al. (8) in 100 cases of OLP found 65% with lingual involvement. Bagán et al (11) in 205 patients found the most common location to be the buccal mucosa (90%) followed by the tongue (50%), and the gingiva (27%); with a lower proportion in the vermillion border (17%), the palate (8%) and the floor of the mouth (3%).

OLP lesions have a 'dynamic' character. The lesions change, almost from one week to the next, and from one month to another, surely depending on the T lymphocyte - epithelial cell relationship of the basal strata. On the dorsum linguae this attack of cytotoxic cells will determine the atrophy of the epithelium (5) and de-papillate areas. In areas where the inflammatory activity has already occurred permanent de-papillation may remain as residual scar tissue.

The visual clinical diagnosis is fleeting. The interpretation is also subjective and its description can be inexact; photography is therefore a fundamental clinical tool, especially for tracking the evolution of the lesions. The development in information technology has been applied to multiple scientific fields. Medical science is not oblivious to these developments and their application in diagnostic imaging and computer analysis. The search for a means of evaluating the area of the dorsum linguae affected by OLP is the motivation for the present study. The objective of which is the morphometric clinical analysis of lesions of the dorsum linguae in patients with oral lichen planus.

Material and Methods

The study was undertaken between the years 2000 and 2002, and carried out at the Department of Oral Medicine, University of Murcia. A total of 236 serial patients with clinicopathologic diagnosis of OLP according to WHO criteria (15) were studied. Of these, 111 (47.6%) had lingual involvement. In order to homogenize and normalize the sample, 41 patients, 8 men (19.5%) and 33 women (80.5%) were selected who fulfilled the following criteria:

1º At least the anterior and mid thirds of the tongue had to appear in the photograph.

2º The entire lesion had to be included in the image. The patient positioned the tongue outside the mouth, flat and resting on the lower dental arcade.

Therefore, those cases in which the lingual frenum or any other problem impeded a good photographic record of the dorsum linguae were discarded.

The 41 patients were Caucasians and were all given information regarding the objective of the study. Data of age, sex and period of evolution of the disease were recorded for each patient.

The photographs registers of the dorsum linguae were always taken in the same way, in the same place and by the same investigator. A digital camera, Camedia C2500L, Olympus, Tokyo, Japan, of 2.5 megapixels, 3x200M was used, fitted with an Olympus lens of F ¼ 40 mm and 55mm diameter. The photographs were taken perpendicular to the dorsum linguae at a distance of 23 cm.

Images were analyzed using a dedicated package for image analysis MIP 4 advanced-Microm Spain, S.A.

The quantitative variable to evaluate the degree of dorsum linguae involvement was defined as the ratio R where:

$$R = \frac{\text{affected area (in mm}^2\text{)} \times 100}{\text{total area (in mm}^2\text{)}}$$

This non-dimensional variable R normalizes the absolute values of the affected area, making the results comparable between the different individuals whose anthropometric dimensions may vary widely. This variable also reduces the influence on the measurements of any possible differences in the way the tongue was presented by the patient when taking each picture, since any morphological variances will affect the two measured areas (affected and total) in approximately the same way.

The reliability of the experimental method was de-

termined in two phases. In the first the statistical dispersion produced by the different forms of presenting the tongue by the patient were evaluated, an arbitrary number of 10 consecutive pictures were taken, instructing the patient to stick the tongue out of the mouth each time. The variable R was calculated for each case and its mean value obtained with the standard deviation representing the variability of the patient dependent method.
In the second phase, the reliability of the experimental method in relation to the tracing of the areas by the same investigator and the subsequent data treatment was evaluated. In this case, 10 tracings of the same image were made on different days and at different times to avoid a possible memory effect. The same investigator carried out the whole process.

Statistical analysis

Data were analyzed by using the SPSS 12.0 statistical package (SPSS® Inc, Chicago, IL, USA). A descriptive study was made of each variable. The Kolmogorov-Smirnov normality test and Levene variance homogeneity tests were applied, and the data showed a skewed distribution, and analyzed using a non-parametric ranking test. We used the Kruskal-Wallis test (for more than two samples). Probability of $p \leq 0.05$ was accepted as significant.

Results

In 236 patients with OLP, 47.6% (111 cases) had lingual involvement. The mean age of the 41 patients selected for the study of the dorsum linguae lesion was 56.2 years, with a standard deviation 13.7 years and a range of 23-82 years. Of these 41 patients, 8 (19.5%) were men and 33 (80.5%) women.

The mean period of evolution of the disease was 4.9 years with a standard deviation of 7.4 years, finding 10 cases in the group (24.4% of the sample) with an evolution of less than 6 months, 11 cases (26.8%) between 6 months and 2 years, 7 cases (17.1%) between 3 and 5 years, 8 cases (19.5%) between 6 and 10 years, and 5 cases (12.2%) with more than 10 years evolution.

With respect to the reliability of the measurements for the photographic phase, the mean value of R was 36.27 with a standard deviation of 3.64. In relation to the reliability of the measurements for the second experimental phase (tracing of areas) the mean value of R was 35.06, with a standard deviation of 1.33.

The mean value of R for the selected sample was 36.94 with a standard deviation of 21.39.

The sample can be classified according to quantitative involvement criteria, obtaining the following groups:
$R \leq 25\%$:14patients (34.1%) ; $25\% < R \leq 50\%$:17 patients (41.5%), $50\% < R \leq 75\%$:8 patients (19.5%); $R > 75\%$ 2 patients (4.9%)

On analyzing R and patient age we find no statistically significant differences ($p=0.50$), whereas we do find statistically significant differences ($p=0.04$) regarding the period of evolution of the disease (Table 1).

Discussion

Photography is a traditional form of documentation in oral medicine, providing valuable and objective information on the involvement of the disease. Image analysis helps us to discriminate features in some subtle cases, allowing detection of changes that occur during the course of the disease. OLP is a chronic disease with frequent recurrences and relapses. Different scales have been proposed and used to evaluate the symptoms by means of visual analogue scales for pain (VAS), however no scales exist to appraise the signs of OLP. Chainani-Wu et al. (16) proposed using a modified mucositis index to measure the signs of lichen planus.

Our procedure allows us to obtain objective, quantitative information of the lesions and facilitates their topographic and morphometric analysis. The quantitative variable R proposed in this study, objectively reflects the intensity of one of the signs associated with the disease and its evolution.

Regarding the methodology used for the experimental determination of R, it is comfortable for the patient, non-invasive and presents no special difficulty or shortcoming.

Table 1. Relation between age and period of evolution with the proportion of dorsum linguae affected by OLP (The Kruskal-Wallis test).

	Age-period of evolution: n (%)	% affected area R	SD	*p-value*
Age	< 50 years: 9 (22.0%)	32.83	24.09	0.50
	50-60 years: 15 (36.6%)	34.87	22.54	
	> 60 years: 17 (41.5%)	40.94	19.46	
Period of evolution	< 6 months: 10 (24.4%)	29.01	13.47	0.04
	6 months -2 years: 11 (26.8%)	28.29	19.29	
	3-5 years: 7 (17.1%)	43.02	23.93	
	6-10 years: 8 (19.5%)	38.07	23.24	
	> 10 years: 5 (12.2%)	61.49	15.82	

On the other hand, the results indicating the reliability of the method showed that the values obtained are acceptably precise given that the standard deviations do not exceed 10% of the mean value of R.

Such imprecision is quite acceptable according to the criteria normally used in general anthropological studies and comparable with those obtained for all types of anthropometric sizes (17).

This system allows the evolution of the lesions to be followed. OLP can appear at any oral site of the mucosa, the tongue being the second most frequently involved location (11). In the tongue the lesions of LP produce greater discomfort. The possibility of malignant transformation of lichen planus has been described by various authors, particularly susceptible are the erosive and atrophic lichens, especially of lingual localization (18,19). For some authors, certain doubts exist about the possibility of malignancy. The risk of malignant transformation has been described as between 0.4 and 5% over observation periods that vary from 0.5 to 20 years, and appears to be independent of the clinical type and of the treatment used (6).

Of the 236 patients with OLP, involvement of the dorsum linguae was found in 47.6% (1,13,14), a figure that agrees with most authors who find between 30 and 50% lingual involvement in these patients. In the patients studied, de-papillate areas appear, generally bilateral, to the right and left of the median sulcus of tongue having a certain symmetry. On occasions, the lesions on both sides appear linked by an isthmus, a narrower area, also re-papillate, as can be seen in (fig.1). The figure as a whole resembles a butterfly with the wings extended as seen from above, thus this type of lesion can be described as a 'butterfly wing lesion'. These de-papillate areas may be the consequence of both the inflammatory activity of the lichen, and residual scar tissue, where the inflammatory activity has already occurred but leaving atrophic de-papillate epithelium. White striae may be found in both types. These two types of lesions are often difficult to distinguish from the macroscopic point of view.

These aspects are of interest when deciding in which area of the dorsum linguae to take the biopsy of an LP lesion. The biopsy may not be conclusive if taken by an inexperienced professional who may select atrophic, de-papillate areas, but without inflammatory activity.

Although our findings show no concordance between the value R of affected area and patient age, a relationship does exist, as would seem logical, with the period of evolution of the disease.

We are aware of the limitations of this study. The tongue is difficult to maintain at rest due to its complex neuromuscular system, and it is therefore difficult to find the ideal method of photographing the dorsum. We have used the ratio R between the affected area and the total area, which normalizes the measurements allowing comparison among different individuals and eliminating in many cases the possible morphological changes when taking each photograph.

As to whether or not a 'butterfly wing lesion' is a pathognomonic sign of lichen planus, we believe it is premature to say so. Large series will need to be studied, comparing with lesions in the same location originated by other diseases such as syphilis or leukoplakia. For the moment, we can say that a 'butterfly wing lesion' is very suggestive of OLP, allowing a presumptive clinical judgment, while waiting for the results of corresponding complementary examinations.

Fig. 1. Image of the affected dorsum linguae in characteristic 'butterfly wing' formation in a patient with OLP.

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