

Summary

Abstract

Background: The optical coherence tomography (OCT) is a non-invasive imaging technique used to obtain 2D or 3D pictures of biological structures. This study aimed to assess the potential use of OCT in detecting the ultrastructural patterns of oral lichen planus (OLP) and leucoplakia (OL) to compare its findings with histopathological results. Particularly, we verified the correspondence between the thickness of the epithelium and the lamina propria by OCT *ex vivo* scans and histopathological evaluation to establish a unified interpretative framework to validate OCT as a non-invasive diagnostic adjunct, aiding clinicians in identifying lesions that require a biopsy and distinguishing potentially malignant lesions (OPMDs) without or with dysplasia from low-risk ones.

Material and Methods: From November 2021 to October 2024, we recruited 40 patients who, during their first visit, presented with oral lesions attributable to OPMDs. Specifically, the study focused on two of the most widespread oral pathologies worldwide: OLP (1.43% prevalence in Europe) and OL (4.11% prevalence worldwide). 22 patients with reticular white OLP were recruited for our study, and 18 patients with OL were recruited. An incisional biopsy was performed on each patient, followed by a histopathological examination to confirm the diagnosis and to include the patient in a follow-up protocol at the Department of Pathology and Oral Medicine of the Dental School in Turin. Each sample was scanned, after performing the biopsy, using a Thorlabs SD-OCT System Telesto 220 to obtain *ex vivo* scans of each sample. Later, a single examiner compared the histological images with those obtained with the OCT system.

Results: The difference in the comparison between the OCT measurements and histology in the patients with OLP and OL disease were statistically significant (p -value <0.05). In patients with OL mild or moderate degree of dysplasia presented a thicker epithelium layer and a well-represented hyperkeratosis layer in the surface of the epithelium. Additionally, the measurement of the lamina propria by OCT is hardly readable compare to the histological ones, and we can appreciate some sort of dark “digitations” in the thickness of the lamina propria (which does not occur in the healthy), a sign of tissue disruption.

Conclusions: The OCT allowed us to observe acceptable correspondence between scanning and histological measurements for OLP and OL without dysplasia. However, its ability to differentiate between normal and dysplastic tissues remains an area for improvement.

