Dermoscopy of Oral Mucosal Lesions: Experience from a Tertiary Care Center in North India and Review of Literature

Abstract

**Background:** Patients with mucosal lesions form a significant number of routine outpatients presenting to the dermatology department where diagnostic confirmation using histopathological examination of mucosal biopsy is neither feasible nor warranted in every patient. **Objective:** To study the dermoscopic features of various mucosal lesions affecting the oral cavity and to assess the reliability of mucoscopy vis-a-vis clinico-laboratory findings. **Materials and Methods:** An observational, cross-sectional, hospital-based study was conducted over a period of 2 years from March 2019 to February 2021 in the dermatology outpatient department. Patients presenting with oral mucosal lesions, with or without associated cutaneous involvement, were recruited for mucoscopy evaluation after taking an informed written consent. A detailed history and clinical examination, with emphasis on mucocutaneous examination, was performed and findings were recorded on a standard predesigned proforma. Mucoscopy of oral mucosa was carried out using a handheld dermoscope as well as Universal Serial Bus connected video-dermoscope in both nonpolarized and polarized modes. The different mucoscopic features were seen at these sites, compared with each other, analyzed and findings were recorded. A diagnosis was made on the basis of mucoscopic findings and correlated with clinical diagnosis. The data was analyzed using appropriate statistical tests.

**Results:** The mean age of patients was 34.3 years and the mean lesional duration was 68.2 weeks. Oral lichen planus (18.66%) was the most common disorder studied, followed by recurrent aphtous stomatitis (16.00%), pigmentedary lesions (12.66%), vascular disorders (12.00%), mucocele (5.33%), pemphigus vulgaris (4.66%), and discoid lupus erythematosus (4.66%). **Conclusion:** Dermoscopy in oral lesions facilitates the visualization of the mucosal surface and provides quick confirmation of diagnosis in various mucosal disorders with advanced diagnostic accuracy. Mucoscopy was found helpful in differentiating the oral ulcers, which are a presenting feature of various serious mucocutaneous disorders. Mucoscopy could be a helpful aid in diagnosing pigmented skin lesions and alleviating the apprehension regarding oral melanoma and serve as a screening tool in case of squamous cell carcinoma lips. **Limitations:** Confirmatory histopathological analysis and correlation with mucoscopic findings could not be established in our study.

**Keywords:** Mucocele, mucoscopy, oral mucosa, oral ulcers, pigmentary disorders, squamous cell carcinoma, vascular lesions

Introduction

Dermoscopy, also known as epiluminescence microscopy, is a noninvasive technique used for assessment of skin disorders, performed using a handheld instrument known as dermoscope. The immense potential of dermoscopy in diagnosing pigmented lesions of skin and skin cancers has been adequately tapped. It has also found great use in diagnosis of a wide range of disorders including benign and malignant, pigmented and nonpigmented skin tumors, as well as inflammatory and infectious skin diseases. In the hands of a trained and experienced dermatologist, dermoscope can serve as a noninvasive modality, which aids diagnosis through interpretation of several clues including the vascular pattern, the colors and follicular changes in several inflammatory, infectious, and neoplastic skin conditions.

Dermoscopy provides a magnified image of the lesion under examination and also allows visualization of deeper subepidermal structures, improving the diagnostic accuracy between 5%–30% over visual inspection, depending on the type of lesion and experience of the dermatologist. Mucoscopy refers to the use of dermoscope for evaluation of mucosal...
Rather, et al.: Dermoscopy of oral mucosal lesions

This dimension of dermoscopy has not been fully explored yet. Patients with mucosal lesions form a significant number of routine outpatients presenting to the dermatology department and diagnostic confirmation using histopathological examination of mucosal biopsy is neither feasible nor warranted in every patient. Besides, invasive procedures like mucosal biopsy can be challenging to perform in the oral mucosa due to excessive bleeding and difficulty in maneuvering of operating equipment. The need for performing this invasive procedure can be minimized, if not obviated, with a proper mucoscopic examination performed by an expert.

There is a paucity of literature regarding the dermoscopic features of oral mucosal lesions as most of the studies conducted so far have been based on single or few disorders. Thus, the present study was designed to offer a novel look into the dermoscopic features of dermatological diseases involving oral mucosa with emphasis on the presentation of characteristic mucoscopic features encountered.

Material and Methods

This study was an observational, cross-sectional, hospital-based study conducted over a period of 2 years from March 2019 to February 2021 in the dermatology outpatient department of a tertiary care hospital. All patients, irrespective of age and gender, presenting with lesions of oral mucosa with or without associated cutaneous involvement, were recruited for mucoscopic evaluation. Institutional ethical clearance was obtained prior to the study and written informed consent was taken from each participant or their parent/guardian in case of minors. Patients who did not give consent for the study, uncooperative children, and patients who had an active secondary bacterial infection at the site of involvement were excluded.

A detailed history and clinical examination, with emphasis on oral mucosal examination, including lips up to vermilion border was performed in all patients and findings were recorded on a standard predesigned proforma. Relevant laboratory investigations such as Tzanck smear, Giemsa staining, Gram staining, and biopsy for histopathological examination were carried out in selected patients where a confident clinical diagnosis could not be clinched. Direct immunofluorescence (DIF) was ordered where relevant. In all cases, mucoscopy of oral mucosa was carried out using a handheld dermoscope (Dermlite DL4; 3 Gen, Inc, San Juan Capistrano, CA), with a magnification of 10×. Mucoscopy using a universal serial bus connected video dermoscope (AM7515MZT Dino-Lite Edge, 220×) in both nonpolarized and polarized modes at magnification ranging from 20× to 220× was performed, wherever deemed necessary. Images were recorded directly by the digital camera of the dermoscope with an attachment for iPhone 8 plus. Both nonpolarized and polarized modes were used to study the characteristic features of various mucosal disorders. Modifications of using dermoscope for oral mucosal lesions like application of chalazion clamp for mucoscopic assessment were done wherever deemed necessary.[6‑8]

Various parameters on mucoscopic characterization of a lesion that were taken into consideration included:

- Background of a lesion: color (brown, black, blue, gray, red, purple, and white) and number of colors present in the lesion.
- Homogeneity of the lesion.
- Vasculature: absent/present, distribution, morphology, focused/unfocused.
- Additional vascular structures like lacunae (lagoons): variant (red and/or dark) and their distribution within the lesion.
- Veil: present/absent, and its color: white, bluish-white
- Melanocytic criteria: presence/absence of a particular pattern of pigmentary network such as a pattern of dots, globules or clods, circles, and lines (reticular, parallel, and curved lines).
- Additional/specific dermoscopic feature(s) (if present), for example: structureless areas, ulceration, white streaks.

The different mucoscopic features were seen at these sites, analyzed and findings were recorded. The presence of vessels in mucosal lesions was considered significant only if there was a relative abundance in comparison to adjacent normal mucosa.

Photographs and videos of the different mucoscopic features were taken with the video dermoscope in all patients. A diagnosis was made on the basis of mucoscopic findings and correlated with clinical diagnosis. In case of discordance between the two diagnoses, the patient was labeled as “difficult case” and a biopsy was performed to confirm the diagnosis.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean ± SD and categorical variables were summarized as frequencies and percentages. A Chi-square test was employed for comparing the prevalence of various parameters. A P value of less than 0.05 was considered statistically significant.

Results

A total of 150 patients (54 males and 96 females, ratio of 1:1.7) were enrolled for the mucoscopic evaluation of oral cavity disorders over a span of 2 years. The mean age of patients was 34.3 years and the mean lesional duration was 17.2 months. Various disorders affecting the oral mucosa found in study population are shown in Table 1.
Table 1: Clinical profile of patients presenting with oral mucosal disorders (n=150)

| Disease                        | Patient number | Mean duration (months) | Anatomic sites involved                                      |
|--------------------------------|----------------|------------------------|-------------------------------------------------------------|
| Lichen planus                  | 28             | 14                     | Buccal mucosa > lips > tongue > gingival                    |
| Recurrent apthous stomatitis   | 24             | <1 (2.5 weeks)         | Dorsum of tongue > labial mucosa > floor of mouth > gingival mucosa > buccal mucosa |
| Pigmentary disorders           | 19             | 9                      | Dorsum of tongue > buccal mucosa > lips > gingival mucosa   |
| Mucocele                       | 8              | 8                      | Lower labial mucosa                                        |
| Pemphigus vulgaris             | 7              | 8.5                    | Buccal mucosa > labial mucosa > palate > floor of mouth > gingival |
| Disseminated lupus erythematous | 7              | 9                      | Palate > labial mucosa > vermilion border of lips           |
| Venous lake                    | 11             | 17                     | Lower lip                                                  |
| Sublingual varicosities        | 3              | 3                      | Sublingual area                                             |
| Pyogenic granuloma             | 3              | 1.5                    | Lower lip                                                  |
| Median rhomboidal glossitis    | 2              | 2.5                    | Mid-dorsum of tongue                                       |
| Black hairy tongue             | 3              | 3.5                    | Dorsum and lateral borders of tongue                       |
| Squamous cell carcinoma        | 2              | 7                      | Lower lip                                                  |
| Cheilitis                      | 7              | 15                     | Lower lip > upper lip                                      |
| Migratory glossitis            | 1              | 24                     | Dorsum of tongue                                           |
| Hypertrophied lingual papillae | 3              | 2                      | Dorsum of tongue                                           |
| Granular cell tumor            | 1              | 8                      | Lateral border of tongue                                   |
| Port–Wine stain                | 1              | 168                    | Lower lip, adjacent skin                                   |
| Fixed drug eruption            | 3              | <1 (4-14 days)         | Lips > tip of tongue                                       |
| Fordyce spots                  | 4              | 9                      | Vermilion border of upper and lower lips                   |
| Verruca                        | 3              | 2                      | Tip of tongue, upper lip, lower lip                        |
| Oral candidiasis               | 9              | <1 (2-3 weeks)         | Dorsum of tongue > gingiva > buccal mucosa                  |
| Molluscum contagiosum          | 1              | 1                      | Lower lip                                                  |
| Total                          | 150            | 17.2                   | Oral mucosa                                                |

**Oral Lichen Planus**

Oral lichen planus (LP) was the most common disorder observed in 28 (18.66%) patients. The most common sites of involvement were buccal mucosa (21), followed by lips (14) and dorsum of tongue (11). The morphological types observed were reticular-plaque type (16 cases), erythematous atrophic (3), and erosive-ulcerative (3). Isolated lip involvement was seen in the form of cheilitis-like presentation (1), typical violaceous papules on lip (1), and pigmented LP of lips (2). Isolated circumscribed white plaques on dorsum of tongue were seen in 4 cases. Dermoscopy was found to be helpful in improving the diagnosis over naked eye examination in 7 patients of oral LP [Table 2, [Figure 1a-i].

**Recurrent apthous stomatitis**

Another common inflammatory painful ulcerative condition of the oral mucosa was seen in 24 patients (16.00%). The major aphthae were seen in 15, minor in 8, and herpetiform in 1 patient. The diagnosis was based solely on clinical examination. Four (16.66%) patients were diagnosed with Behcet's disease (BD) based on positive skin pathergy test (PT). Mucoscopy revealed central yellowish-white structureless area (SLA) in all (100%), surrounding red structureless collarette (75%), purple structureless collarette (25%), polymorphous blood vessels comprising of dots (100%), linear (79.16%), serpentine (37.5%), looped (29.16%), coiled (25%), and curved vessels (25%), with a predominantly peripheral distribution in 100% and central distribution in 16.66% cases. Crusting was observed in 8.33%. PT site revealed central brown dot/hemorrhagic crust, yellow clod, pink to purple SLA but no vessels [Figure 2a-h].

**Hyperpigmented lesions**

Pigmented fungiform papillae of the tongue (PFPT) was the most common pigmentary condition observed in 14 (73.68%) patients. Family history of similar lesions was present in two, associated hyperpigmentation of nail in two, and gums in 3 patients. No case of oral melanomas was found. Mucoscopy findings of various pigmentary disorders are given in Table 3 [Figure 3a-h].

**Mucocele**

Lesions in all (5.33%) cases were dome-shaped, soft to firm nodules, localized on the lower lip mucosa. Surface was smooth in 6 (88%) and lobular in 2 (11%). The average diameter was 6.28 ± 2.44 mm. Dermoscopy revealed purplish-gray background, polymorphous vascular structures comprising of dot vessels (87.5%), hairpin-like vessels (75.0%), reticular-branching vessels (50%), and comma-like vessels (12.5%) all in a predominantly central distribution. Among the nonvascular structures, white hyperkeratotic areas were observed in 5 (62.5%), yellowish-orange areas in 2 (25%), and starburst pattern in 1 (2.5%) patient [Figure 4a-h].
Out of 7 (4.66%) cases, three were fresh cases not on any treatment. Erosions in the oral cavity were predominant lesions clinically. Intact vesicles were present in 3 cases only. Diagnosis was confirmed on histopathology and direct immunofluorescence (DIF) in all.

Dermoscopy revealed different shades of lacunae varying from grayish-pink to translucent lacunae surrounded by a bright red structureless collarate, red and black lacunae, all representing intact vesico-bullous lesions. Mucoscopy was also helpful in picking up intact vesicles in the apparently normal mucosa. Other findings included red SLA representing erosions, active bleeding (85.71%), dirty brown crust (57.14%), extensive and focused vascular structures comprising of linear tortuous (100%), serpentine and arborizing (100%), dots and comma shaped (85.71%), and hairpin vessels (28.57%), distributed both in the periphery (100%) and center (57.14%) of lesions. Overall prominence of vasculature both in the lesional and adjacent nonlesional mucosae was seen [Figure 5a-l]. White SLA representing...
healed lichenoid plaques in pemphigus vulgaris showed absence of Wickham’s striae (WS) on mucoscopy typically seen in oral LP.

**Discoid lupus erythematosus (DLE)**

Seven (4.66%) patients with mucosal lesions at the time of diagnosis were subjected to mucoscopy. None fulfilled the criteria for systemic LE. Clinically, lesions were observed as discoid ulcers on palate (4), and diffuse cheilitis-like to typical cutaneous DLE plaques affecting the vermilion surface on lips (3). Mucoscopy of discoid lesions on palate revealed central erythema (75%), white SLAs surrounding the central erythema (100%), prominent radiating peripheral telangiectasia (100%), and dull pink SLA surrounding the vessels (75%). All 3 patients with cheilitis-like presentation showed pink background, whitish-yellow scales, white SLA, bleeding spots, erosions, irregular vessels (hairpin and linear radiating pattern), grayish-black dots or brown pigment spots [Figure 6a-f].

**Squamous cell carcinoma (SCC)**

Two (1.33%) elderly females presented with indurated plaque, centrally placed, keratotic surface and areas of ulceration and crusts, on lower lip surface in conjunction with a blurred vermilion-skin junction. Mucoscopy served as a screening tool and revealed a milky-white to pink background with well-defined borders, vascular polymorphism (telangiectatic, branching, hairpin, serpiginous, truncated and dotted blood vessels), white and brown SLAs, and blood spots on thick scales in both cases. Fiber sign and white circles were seen in one case each, whereas ulceration, crust, and active bleeding were observed in both the cases. Histopathological examination (HPE) in both was consistent with well-differentiated SCC [Figure 7a-d].

**Candidiasis/oral thrush**

Mucoscopy revealed white, yellow-white, or gray-white interrupted SLA, white projections corresponding to swollen and expanded, or hypertrophied lingual papillae, bright red areas with loss of papillae and vasculature exposed at their base representing erosions and dotted blood vessels mainly and few linear vessels were also seen.

**Mucosal verruca**

Dermoscopy of a papule with rough surface on lower lip revealed projecting globules upwards that are white colored at base and yellowish-brown in upper half, with vessels branching from the base and few centrally distributed dotted vessels, also centered by linear vessels following the path of filiform extension to the top giving a hairpin-vessel appearance.

Lesion on labial surface showed pinkish background, halos representing papillae and red dots. Lesion on tip of tongue revealed dull pink background with white globules and lack of vascularity. Dermoscopy of a white papule on lower lip revealed roundish white-to-yellow SLA with peripheral crown vessels suggestive of molluscum contagiosum [Figure 8a-d].
Vascular disorders

Dermoscopy of pyogenic granuloma revealed reddish SLA, white rail lines and white collarate scale (100%), golden-brown crust and purple area representing thrombosis (33.3%), and dots and hairpin vessels (66.66%). Venous lake showed red (44.5%), blue (38.9%) or purple (78.6%) globules or clods, corresponding to the dilated vascular spaces on histopathology with whitish structureless veil, or a structureless pattern. In early smaller lesions, only red clods are seen. Veil is less prominent appearing as linear white septa separating reddish clods. Sublingual varicosities showed multiple loosely scattered red lacunae with bluish-white veil, dark-blue lacunae suggesting thrombosis, surrounded and interspersed with fine arborizing vessels and focal white/shiny SLAs. Port–Wine stain on lip revealed red, rounded, globluar vessels representing vertically oriented capillaries. Grayish-white veil was seen at places.

Besides, mucoscopy was found to enhance the diagnostic accuracy over naked eye examination in a number of miscellaneous disorders affecting oral mucosa [Table 4], [Figures 9a-h, 10a-f, 11a-f].

Discussion

LP was the most commonly encountered mucosal disorder. The demonstration of WS, vascular patterns and pigment patterns on dermoscopy are diagnostic of LP. WS appear as pearly, whitish, and glowing structures and correspond to compact orthokeratosis overlying zone of wedge-shaped hypergranulosis on histopathology. Blue white veins observed at the periphery of WS are secondary to the presence of melanophages in the dermis, whereas veil-like SLA, seen on tongue in association with WS, are believed to result from dermal spongiosis and degeneration of basal layer.[9]

Drogoszewsk et al.[10] described the typical “direct microscopic” picture of erosive oral LP as bicolored
consisting of planar to minimally elevated, dull white, hyperkeratotic lesions/leukoplakia-like areas (LLA), and well-demarcated, bright red, and glossy erosions with a smooth moist surface, present adjacent to the LLA. Contrastingly, Sonthalia et al. described a tricolor pattern consisting of white, brown, and reddish...
Rather, et al.: Dermoscopy of oral mucosal lesions

Rather, et al.: Dermoscopy of oral mucosal lesions

353

Indian Dermatology Online Journal | Volume 13 | Issue 3 | May-June 2022

areas; not appreciated in our study. Mucoscopic findings in our study were similar to those described in literature.[11,12] The role of mucoscopy in monitoring for the development of any premalignant or malignant
Rather, et al.: Dermoscopy of oral mucosal lesions

Recurrent aphthous stomatitis (RAS)
The clinico-demographic profile observed was in concurrence with previous studies. Mucoscopy can serve as a potential aid in diagnosing RAS as well as differentiating it from ulcerative lesions of LP and pemphigus vulgaris. Our findings are similar to those described recently in a study involving 56 patients of BD. Only 4 patients fulfilled the criteria for BD in our study, compared to 34 patients in a previous study. Dermoscopic findings of PT site were consistent with the findings of Scherrer et al. who assessed dermatoscopic and histologic characteristics of PT in 23 patients.

Hyperpigmented lesions
The cobblestone and rose petal pattern of papilla observed on mucoscopy in cases of pigmented fungiform papillae...
of the tongue (PFPT) are consistent with the findings reported in literature.\textsuperscript{[16,17]} The activation of subepithelial melanosomes without associated histological evidence of inflammation is implicated in the hyperpigmentation of papillae.\textsuperscript{[17]} PFPT has also been reported as a part of the Laugier–Hunziker syndrome, and dermoscopy can be a valuable tool to differentiate between the two conditions with a regular brown network with parallel furrow pattern or brown and blue gray granules seen in this syndrome.\textsuperscript{[18]}

Melanotic macules and benign pigmented macules, studied widely on dermoscopy, are both thought to be disorders of melanocyte transfer to the epidermal keratinocytes and characterized by increased basal layer pigmentation.\textsuperscript{[19]} The main concern in oral pigmented lesions is to rule out malignant lesions and to decide whether a biopsy is needed; both of these can be achieved through mucoscopy. Additionally, the origin of these lesions, whether melanocytic or nonmelanocytic, can also be determined in certain cases. No case of oral malignant melanoma (OMM) was detected in our study. Blum et al.\textsuperscript{[10]} found OMM in 0.3% of cases while studying patients with pigmentary disorders affecting oral mucosa. A multivariate pattern and presence of multiple colors (blue, gray, or white color) on mucoscopy were described to be the strongest clue to differentiate malignant from benign mucosal lesions, especially with the presence of SLAs.\textsuperscript{[19,20]} Although dermoscopy alleviates the apprehension regarding oral malignancy/melanoma, biopsy of a doubtful mucosal lesion remains the gold standard at present.

**Mucocele**

Modification of videodermoscopy using chalazion speculum devised by Jha et al.\textsuperscript{[21]} is quite useful in studying mucosal lesion. Our findings were concordant with those described by Ayhan et al.\textsuperscript{[22]} and Kaur et al.\textsuperscript{[23]} However, we were not able to classify the lesions into various types based on the subtle differences on dermoscopy as has been done in an earlier study.

**Discoid lupus erythematosus**

Dermoscopic features of DLE involving lips and palate observed were similar to those described in literature.\textsuperscript{[24,25]} On dermoscopic-histopathological correlation, grayish-black to brown pigment dots represent pigment incontinence, yellowish-whitish scales correlate with hyperparakeratosis, white SLA correspond to fibrosis, and pink background and dilated vessels represent the prominent inflammatory infiltrate.\textsuperscript{[24]} Although histology remains the gold standard for differentiating DLE from its nearest differentials such as SCC of lip and actinic LP, a preliminary dermoscopic evaluation can give useful clues.

Prominent “storiform telangiectasia” on lips seen in patients progressing to SLE has been suggested as a new noninvasive, diagnostic dermoscopic sign. However, it was not seen in any of our patients.\textsuperscript{[24]}

**Pemphigus vulgaris**

There is paucity of literature regarding dermoscopic findings of mucosal lesions in pemphigus.\textsuperscript{[25]} The predominant finding on mucoscopy was bright red SLA with sharp jagged margins corresponding to mucosal erosions while as grayish-pink to grayish-white translucent
SLA/lacunae were seen in areas with intact vesicles. Mucoscopy is helpful to differentiate the oral ulcers in pemphigus vulgaris from RAS and erosive LP. RAS has a deeper pathology and ulcers have a more whitish base, and blood vessels are seen predominantly around the ulcers in a characteristic/peculiar pattern. A complex reticular and branching vasculature is seen in pemphigus lesions.

**Squamous cell carcinoma**

Rosendahl et al. [26] was first to describe the dermoscopic features of SCC. White circles were reported in 87% cases and correspond to acanthosis and hypogranulosis of infundibular epidermis. The classical dermoscopic features of SCC involving lips such as white circles, blood spots, ulcerative areas, white structureless zone, dilated infundibulum filled with keratin plug and a prominent course of polymorphous blood vessels as described by Elmas et al. [27] and Benati et al. [28] were all seen in our patients. In our study, white circles were present in one patient only (50%). Histopathologic confirmation of SCC is mandated in all cases but mucoscopy could serve as a screening tool.

**Cheilitis**

Cheilitis demonstrates dotted vessels in patchy distribution, white-yellow scale and white-pink structureless lines on mucoscopy. Similar findings have been described by Kumar Jha et al. [29] However, the sticky-fiber sign associated with erosions/ulcerations on mucoscopy reported by Kumar Jha
Rather, et al.: Dermoscopy of oral mucosal lesions

et al. was not observed. In our study, few white projections and few linear blood vessels were seen on mucoscopy.

Mucoscopic findings of chronic granulomatous inflammation of lips are similar to other granulomatous cutaneous diseases causing swelling of lips. However, mucoscopy can be beneficial in differentiating nongranulomatous disorders like amyloidosis, hereditary angioedema, or contact cheilitis.

**Pyogenic granuloma**

Zaballos et al. described mucoscopic findings in 2 patients with red-whitish structureless/homogenous area corresponding to proliferating vessels, white collarette at the periphery representing hyperplastic epithelium, and white lines (double rail lines) corresponding to fibrous septa intersecting the lobules. However, in one of our patients, reddish homogenous area was the predominant finding probably due to more vascularity of lesions. The dotted and hairpin vessels reported by Zaballos et al. were observed in two of our patients.

**Venous lakes (VL)**

Dermoscopic findings observed in our study are similar to those reported by Jha et al. and Lee and Mun. VL on lips can be confused with labial melanotic macule (LMM) or oral malignant melanoma (OMM). Lee and Mun concluded that structureless patterns or purple, red, and blue colored globules/clods seen in VL correspond to the spaces filled with erythrocytes, and sometimes thrombi and helps differentiate VL from LMM. Furthermore, the

---

Figure 10: (a-f) Black hairy tongue (a): Uniform, dirty brown or tan to black discoloration of tongue. Numerous brownish hair-like elongation of filiform papillae (black arrows) covering over whitish lingual papillae (red arrows). Median rhomboid glossitis (b): Dull red, erythematous, sharply circumscribed area on the dorsal midline of the tongue, surrounded by white area of tongue. Dermoscopy revealed loss of lingual papillae in the midline area (red stars), exposing underlying vasculature, in the form of red circumscribed dots/globules (blue circles). Few looped and reticular branching vessels are seen (blue and yellow arrows). Normal papillae in the surrounding areas (green stars). Migratory glossitis (c, d): Multiple, circinate, smooth, irregular erythematous patches, covering almost entire surface of tongue, bound by a slightly raised creamy-whitish circinate borders, with irregular margins surrounded by erythematous halo/groove around it. Mucoscopy showing smooth areas with loss of filiform and lingual papillae (red stars) and red depapillated erythematous areas with multiple dots and linear blood vessels (yellow arrows). 1 to 3 mm wide, serpiginous to arcuate white lines/tract, which surrounds an erythematous depapillated atrophic area. Within the raised white border, filiform papillae appear to be prominent/expanded and shiny while glowing septate-like giving the border a segmented appearance (green arrow). On one side of border is a bright red colored groove with multiple dots in it (blue and green circles). At places, whitish veil like area enclosed within the border can be seen (black arrows). Fordyce’s spot (e, f): Yellow-colored papules coalescing into a single plaque present on the lip margins. Mucoscopy revealed slightly raised yellowish papules, appearing as discrete ovoid to dome-shaped whitish-yellow structures/globules with milky white center (red arrows). Coalescing lesions appear as yellow SLA or display cobblestone-like projections, with a central dot and overlying opacities (red arrows). Linear and branching/and nonarborizing vessels are seen in the intervening areas (black arrows) (Dermlite DL4, Polarized, 10×).
presence of more than 2 colors particularly brown and gray, a multicomponent pattern (presence of 3 or more patterns in the same lesion), atypical vessels, and asymmetry of overall structures are pointers toward OMM.

**Port–Wine stain (PWS)**

Dermoscopy helped in clinching the diagnosis in a 16-year-old female, who presented with a red macule on lower lip and adjacent skin in our study. Mucoscopy revealed red, rounded, globular vessels representing vertically oriented capillaries, which were suggestive of superficial or papillary form of PWS. Mucoscopy may help in deciding treatment and prognosis as superficial, papillary PWS responds best to laser therapy.

**Lingual varicosities (Caviar tongue, sublingual varices, SLV)**

A 19-year-old female presenting to us with recurrent oral bleeding was diagnosed on mucoscopy to have SLV. While the diagnosis of caviar tongues is a nearly always clinical, differentials including hemangioma, lymphangioma, Kaposi sarcoma, and mucosal melanoma may be a source of diagnostic dilemma necessitating the use of mucoscopy. On dermoscopy, red lacunae in a linear distribution with white shiny SLAs were seen in our patient. Dark-blue lacunae suggesting thrombosis with whitish veil at few places were also seen, similar to the finding reported by Jha et al. The so-called “hypopyon” of the eye, a metaphoric term has been used to describe this peculiar feature as half-and-half lacuna, was not observed in our patients. Whitish veins are also a finding in pyogenic granuloma as described by Zaballos et al., but they lack the red-blue lacunae. Lack of melanocytic structures and rainbow pattern should help to differentiate the condition from close differentials like mucosal melanoma and Kaposi sarcoma.

**Fixed drug eruption (FDE) and Fordyce spots**

Mucoscopy revealed the presence of brownish-black, gray, and steel blue dots conforming to the study by Kumar Jha et al. In the ulcerative stage, no characteristic dermoscopic findings were found. Dermoscopic findings of Fordyce spots were similar to those described by Jakhar et al. Mucoscopy can help in quick confirmation of diagnosis and preclude the need for more invasive procedures.
Black hairy tongue, median rhomboid glossitis (MRG), migratory glossitis (MG), granular cell tumor (GCT)

Three patients presenting with brownish-black discoloration of the tongue associated with hypertrophy of filiform papillae were diagnosed to have black hairy tongue. Mucoscopic findings were in line with the report by Kobayashi et al. Two patients in our study were substance users and culture on SDA revealed growth of Candida glabrata in one. Mucoscopic observations in MRG include atrophic filiform papillae in the affected area similar to the findings documented by Kumar Jha et al. Loss of filiform papillae in reddish patches and prominent broad papillae in whitish lines, demarcating affected from unaffected regions, were observed in two cases of MG consistent with previous reports. Mucoscopy of GCT of tongue showed central white-yellowish SLAs and peripheral polymorphic vessel in concordance to the reports in literature. The dotted and linear vessels seen in the center of lesion have not been reported before. Molluscum contagiosum of lower lip and mucosal warts observed on dorsum of tongue revealed the mucoscopic findings that were consistent with earlier reports.

Limitations

Confirmatory histopathological analysis and correlation with mucoscopic findings could not be performed in our patients. The sample size was relatively small.

Conclusion

Our study presents characteristic dermoscopic features of various disorders affecting oral mucosa as a group. Dermoscopy facilitates the visualization of the mucosal surface but the modality is currently under-utilized. There is a need for more studies with a larger sample to better characterize dermoscopic clues in mucosal disorders and develop an algorithm for the diagnosis of the same. Many modifications of video dermoscopy have been employed for studying mucosal lesions. However, there is still scope for better and more innovative methods to provide a more comprehensive assessment of mucosal lesions.

Future applications

• Mucoscopic findings with clinical and histopathological correlation may help with diagnostic accuracy, predicts the course of the disease, and minimizes the need for biopsies.
• If a biopsy is mandatory, mucoscopy can aid in assessing the sites with increased disease activity.
• Dermoscopic images with clinical correlation can be used as a monitoring tool and can also help increase patient compliance to treatment.
• Moreover, it can also be used as a screening tool for oral cancers, especially during current times where an increased prevalence of oral cancers is seen.
• Eventually, patient education and demonstration preexamination can be helpful to obtain better images in less time.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Kittler H. Dermatoscopy: Introduction of a new algorithmic method based on pattern analysis for diagnosis of pigmented skin lesions. Dermatol Pract Concept 2007;13:3.
2. Lallas A, Zalaudek I, Argenziano G, Longo C, Moscarella E, Di Lernia V, et al. Dermoscopy in general dermatology. Dermatol Clin 2013;31:679-94.
3. Zalaudek I, Lallas A, Moscarella E, Longo C, Soyer HP, Argenziano G. The dermatologist’s stethoscope-traditional and new applications of dermoscopy. Dermatol Pract Concept 2013;3:67-71.
4. Ayhan E, Öztürk M, An I, Araç E. Dermoscopy of oral labial mucosa according to age and sex in healthy adults: First observational dermoscopic study. Turk J Dermatol 2019;13:135-9.
5. Okamoto T, Sasaki R, Kataoka T, Kumasaka A, Kaibuchi N, Naganawa T, et al. Dermoscopy imaging findings in the normal oral mucosa. Oral Oncol 2015;51:e69–70.
6. Ashique KT, Kaliyadan F. Reinventing the Chalazion clamp: Modification of the instrument for the procedural dermatologist. J Am Acad Dermatol 2016;75:e193-4.
7. Jha AK, Pathak J. Using a chalazion clamp to enhance dermoscopy of oral mucosal lesions. J Am Acad Dermatol 2017;76:e91-2.
8. Jakhar D, Grover C. Innovative modification of the USB dermatoscope for mucoscopy. J Am Acad Dermatol 2018;78:e3-4.
9. Sonthalia S, Varma S, Jha AK, Jakhar D, Kaliyadan F. Case report: Dermoscopic features of oral lichen planus—The evolution of mucoscopy. F1000Res 2018;7:284.
10. Drodzowska B, Chomik P, Poleyn A, Michci A. Clinical diagnosis of oral erosive lichen planus by direct oral microscopy. Postepy Dermatol Alergol 2014;31:222-8.
11. Yeo IK, Kim HK, Kim DH, Park KY, Li K, Kim BJ, et al. Oral lichen planus for whom dermoscopy was used as an adjuvant diagnostic tool. Korean J Dermatol 2012;50:167-70.
12. Neema S, Sandhu S, Kashif AW, Sinha P, Kothari R, Radhakrishnan S. Dermoscopy of lip lichen planus—A descriptive study. Dermatol Pract Concept 2020;10:e200076.
13. Ghodsi SZ, Bahrololoumi Bafraee N, Chams Davatchi C, Rosendahl C, Akay BN, Davatchi F, et al. Dermatoscopic and mucoscopy features of lesions in patients with Behcet’s disease. Acta Reumatol Port 2019;44:225-31.
14. Scherrer MA, de Castro LP, Rocha VB, Pacheco L. The dermatoscopy in the skin pathology testing: Case series in patients with suspected Behcet’s disease. Rev Bras Reumatol
15. Antonieta Rios Scherrer M, Porto Fonseca de Castro L, Barreto Rocha V, Pacheco L. The dermoscopy in the skin pathergy testing: Case series in patients with suspected Behçet’s Disease. Rev Bras Reumatol 2014;54:494-8.

16. Olszewska M, Banka A, Gorska R, Warszawik O. Dermoscopy of pigmented oral lesions. J Dermatol Case Rep 2008;2:43-8.

17. Chessa MA, Patrizi A, Sechi A, Virdi A, Leuzzi M, Neri I. Pigmented fungiform lingual papillae: Dermoscopic and clinical features. J Eur Acad Dermatol Venereol 2018;32:935-9.

18. Kaçar N, Yildiz CC, Demirkan N. Dermoscopic features of conjunctival, mucosal, and nail pigmentations in a case of Laugier-Hunziker syndrome. Dermatol Pract Concept 2016;6:23-4.

19. Blum A, Simionescu O, Argenziano G, Braun R, Cabo H, Eichhorn A, et al. Dermoscopy of pigmented lesions of the mucosa and the mucocutaneous junction: Results of a multicenter study by the International Dermoscopy Society (IDS). Arch Dermatol 2011;147:1181-7.

20. Lin J, Koga H, Takata M, Saida T. Dermoscopy of pigmented lesions on mucocutaneous junction and mucous membrane. Br J Dermatol 2009;161:1255-61.

21. Ayhan E, Toprak SF, Kaya Ş, Akkaynak Ş. Dermoscopy of oral mucocele: Three types of extravasation mucoceles. Turk J Med Sci 2020;50:96-102.

22. Kaur I, Jakhar D, Anand P. Mucoscopy of mucocoele. Indian Dermatol Online J 2019;10:358-9.

23. Chandela M, Misri R, Jakhar D. Mucoscopy of discoid lupus erythematosus on lower lip. Indian Dermatol Online 2020;11:296-7.

24. Salah E. Clinical and dermoscopic spectrum of discoid lupus erythematosus: Novel observations from lips and oral mucosa. Int J Dermatol 2018;57:830-6.

25. Shamim T, Varghese VI, Shameena PM, Sudha S. Oral pemphigus vulgaris: Clinicopathologic study of 20 cases. Indian J Pathol Microbiol 2007;50:498–501.

26. Rosendahl C, Cameron A, Argenziano G, Zalaudek I, Tschantl K, Kitler H. Dermoscopy of squamous cell carcinoma and keratoacanthoma. Arch Dermatol 2012;148:1386-92.

27. Elmas ÖF, Metin MS, Kılıççi A. Dermoscopic features of lower lip squamous cell carcinoma: A descriptive study. Indian Dermatol Online J 2019;10:536-41.

28. Benati E, Persechino F, Piana S, Argenziano G, Lallas A, Moscarella E, et al. Dermoscopic features of squamous cell carcinoma on the lips. Br J Dermatol 2017;177:41-3.

29. Kumar Jha A, Vinay K, Sławińska M, Sonthalia S, Sobjanek M, Kamińska-Winciorek G, et al. Application of mucous membrane dermoscopy (mucoscopy) in diagnostics of benign oral lesions - Literature review and preliminary observations from International Dermoscopy Society study. Dermatol Ther 2021;34:e14478.

30. Chauhan P, Adya KA. Dermatoscopy of cutaneous granulomatous disorders. Indian Dermatol Online J 2021;12:34-44.

31. Zaballos P, Llambrich A, Cuéllar F, Puig S, Malvéhy J. Dermoscopic findings in pyogenic granuloma. Br J Dermatol 2006;154:1108–11.

32. Oizo N, Kawada A. Dermoscopy of pyogenic granuloma on the lip: The differing appearances of vascular structures with and without pressure. Eur J Dermatol 2011;21:441.

33. Jha AK, Pathak J. Mucoscopy of a venous lake. Dermatol Pract Concept 2019;9:20-1.

34. Lee JS, Mun JH. Dermoscopy of venous lake on the lips: A comparative study with labial melanotic macule. PLoS One 2018;13:e0206768.

35. Vázquez-López F, Coto-Segura P, Fueyo-Casado A, Pérez-Oliva N. Dermoscopy of port-wine stains. Arch Dermatol 2007;143:962.

36. Jha AK, Zeeshan MD, Jha Amar AK. Mucoscopy in lingual varicosities. Dermatol Pract Concept 2018;8:54–5.

37. Jakhar D, Kaur I. Mucoscopy of Fordyce’s spots on lips. Indian Dermatol Online J 2019;10:498-9.

38. Kobayashi K, Takei Y, Sawada M, Ishizaki S, Ito H, Tanaka M. Dermoscopic features of a black hairy tongue in 2 Japanese patients. Dermatol Res Pract 2010;2010:145878.

39. Mejía H, Rubiano MFO, Osorio VLD, González MI. S100 negative granular cell tumor of the oral cavity: Dermoscopy and surgical approach. An Bras Dermatol 2019;94:79-81.

40. Sorrell J, Lauren CT. Use of transparent film dressing for dermoscopy of mucosal lesions. Pediatr Dermatol 2016;33:107-8.