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A Comprehensive Guide to Diagnosing Oral Mucosal Lesions: Part I. Patient Assessment and Oral Examination

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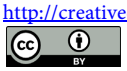

Abstract

The oral mucosa can present with a variety of lesions, including squamous cell carcinoma, immune-mediated diseases, pigmented lesions, and viral infections like herpes. Prevalence varies among populations, with higher rates in smokers, children, and pregnant women. Accurate diagnosis requires a thorough patient assessment, including medical, dental, social history, and a detailed clinical examination (extraoral and intraoral). It is necessary to carefully examine, palpate, document, and classify lesions into primary and secondary types. Imaging, lab tests, and biopsies are examples of adjunctive diagnostic tools that improve diagnostic accuracy. Effective treatment and improved outcomes for patients depend on clinicians' prompt recognition and management of the condition.

Subject Areas

Dentistry

Keywords

Oral Medicine, Oral Diagnosis, Oral Lesions, Dentistry

1. Introduction

The oral mucosa is frequently affected by a variety of conditions, including dermatoses, pigmented lesions, and viral infections. Viral infections, whether caused by oncogenic or non-oncogenic viruses, can lead to numerous lesions in the oral mucosa [1]. For instance, the herpesviruses cause an initial infection and then remain dormant in the host's cells for life. Leading to either symptomatic or asymptomatic recurrent infections, with the most common form Herpes labialis that

affects the lips and the perioral skin [2]. Additionally, immune-mediated vesiculobullous diseases, such as lichen planus, are also commonly found in the oral mucosa and can potentially become malignant. Pigmented lesions in the oral mucosa can arise from various sources: they may be iatrogenic, like amalgam tattoos; congenital, such as ethnic pigmentation; or neoplastic, including nevus and melanoma [1] [3]

On another hand, the range of oral mucosal lesions (OML) can vary across different population groups. These lesions can include benign conditions like fibrous hyperplasias, pyogenic granulomas, and mucoceles, as well as less common, more aggressive pathologies with a poor prognosis, such as neoplasms like squamous cell carcinoma, sarcomas, and metastatic lesions [4] [5].

In fact, a study conducted by Duarte da Silva *et al.* on pregnant women, showed that 16.5% of them would develop an OML [6]. As per Majorana *et al.*, 28.9% of children would present an OML [7]. As for tobacco users, according to Sujatha *et al.*, 60% of them had at least one OML [8].

A wide variety of OML can occur, either as isolated oral issues or alongside dermatologic conditions. And many of these lesions can appear quite similar; making it crucial for clinicians to be well-versed in the normal anatomy of the oral cavity and understand the clinical significance of any abnormal findings [9] [10]. Identifiying the unique characteristics of OML while also considering the general health condition of the patient is key to making diagnosis hypothesis' and establish a proper treatment plan.

The aim of this article is to provide clinicians with the knowledge and techniques needed to identify, diagnose and manage most common OMLs confidently and effectively through a comprehensive step-by-step guide.

2. Diagnosis Approach

2.1. Initial Patient Assessment

The purpose of initial assessment is to gather comprehensive information about the patient, it also serves to identify the reasons for their visit, including any concerns they may have or specific treatments they are seeking [11]. This assessment consists mainly of:

Patient identification:

- The date and time of the visit
- The name, date of birth, gender, ethnicity, occupation
- Contact information of a primary care provider (physician, dentist…), Referral source

Reason for patient attendance:

The primary reason the patient is seeking care or consultation, along with the duration of their symptoms, should be documented using the patient's own words.

- Pain: location, type (radiating or pulsating, burning sensation), date of occurrence, circumstances, intensity

- Functional/Esthetic: (Ex. Mucosal mass interfering with function or in an esthetic sector…)
- Restoration of the oral cavity
- Referred by a colleague

Medical history:

- General medical history: general health status, any surgical procedures (including the date, reason, and outcome); medications (both prescribed and over-the-counter, as well as supplements); home remedies; and allergies.

Understanding the patient's general state of health helps detect any relative or absolute contraindications to surgical intervention, and to identify the precautions taken before any medical or surgical procedures regarding hemorrhagic, infectious and other risks. Medical history can also help expect certain clinical manifestations in the case of some diseases.

Dental history:

The ability and confidence to chew foods comfortably; previous restorative procedures involving fixed and removable prostheses; Orthodontic treatment; endodontic treatment; Previous periodontal conditions or treatments; Oral surgery procedures; Oral hygiene regime (tooth brushing, oral hygiene aids, mouthwash); Changes that the patient has noticed within their own oral cavity…

Personal and social history:

Occupation; habits (tobacco/alcohol/recreational drug use); religion (if it may have an impact on therapy); sexual history if relevant to complaint; eating habits…

Illness history:

The purpose of this section is to obtain details about the course of the illness the patient is visiting for, through his own words. The illness history must bring about the following major information:

- Symptom onset time
- Circumstances of appearance: stress period, menstruation, physical effort, sun exposure, ingestion of allergenic foods…
- Pattern of lesion evolution:
- Rapid/slow evolution
- sudden appearance/Flare-up
- acute/chronic
- Improving/worsening
- Functional signs:
- Spontaneous or provoked bleeding (either by touch/alimentation/brushing…)
- Dysphagia, dysgeusia
- Limited tongue mobility
- General signs:
- Alteration of general condition
- Hyperthermia
- Asthenia

- Weight loss
- Aggravating symptom factors: acidic/sour/hot/spicy foods, dentures, stress…
- Relieving factors: cold, medications…
- Oral parafunctions: Onychophagia, pencil biting…

2.2. Clinical Examination

Clinical examination is the key to diagnosis. After gathering information about the patient's medical and illness history, the clinician gets to start with:

1) Extra oral examination

An initial head and neck examination should be performed and involves a comprehensive inspection and palpation of the exposed surface structures of the neck and face [12].

Inspection:

- Any significant facial asymmetries.
- Skin: erythema, cyanosis, angiodysplasia, facial hemangioma…
- Eyes: Examining the eyes can provide the dentist with valuable clues about potential systemic conditions the patient may have.

Palpation:

- Neck: Identification of any lumps/adenopathy:
  - Site: anterior or posterior triangle of the neck (submental, submandibular, pre-auricular, post auricular, occipital, cervical chain, supraclavicular); tissue layer: skin (sebaceous cyst), fat (lipoma), bone (osteoma).
  - Number: isolated or multiple lumps, uni or bilateral
  - Size: width/height/depth
  - Shape: well-defined/irregular
  - Surface: erythema/ulceration/punctum.
  - Consistency: smooth/rubbery/hard/nodular/irregular.
  - Compressibility (vascular lesion), fluctuance (fluid filled lesion—cyst), pulsatility (vascular origin).
  - Transillumination: suggests mass is fluid filled.
  - Temperature: inflammatory/infective cause
  - Relation to underlying/overlying tissue: tethering/mobility
  - Chronic or acute evolution
  - Painful (infection)/painless (malignant tumor, hematological etiology) [13].

2) Intra oral examination

General oral examination:

Using a good light source, tongue depressors, examination gloves, and 2x2 gauze sponges to dry the mucosa and hold tissue structures for a thorough examination; is essential to ensure all areas are clearly visible for a general inspection of the oral cavity (including the lips, cheeks, gums, tongue, floor of the mouth, and palate) [14].

Starting off with extra and intra oral lip examination, the clinician should be

alert of any sign or lesion on the lips; with the lower lip being the most common site for lip cancer, with smoking and prolonged sun exposure being key risk factors.

Then, the buccal mucosa is to be assessed (inner cheek) on both sides. In patients who use chewing tobacco, the clinician should check for potentially premalignant lesions on the lower aspect of the buccal mucosa as the most common site.

With the tongue depressed, visual inspection of the oropharynx, tonsils and palate should be conducted.

The tongue should then be grasped with a gauze and inspected in its dorsal and lateral surfaces, followed by palpation of the base. the ventral surface and the floor of the mouth should be examined as well [15].

Lesion specific examination:

Through this examination, the clinician should be able to identify normal landmarks and distinguish subtle abnormalities in size, shape, consistency and color of the tissues [15].

Failure to describe and identify a lesion can make it difficult to make a diagnosis; which is why, a profound and thorough OML examination should include the following steps:

Inspection:

During inspection, 8 major details should be noted:

- Site: keratinized (gingiva/hard palate) or non-keratinized (buccal mucosa, soft palate).
- Size: length, width, and height.
- Number: single, multiple.
- Shape: oval, round, regular or irregular outlines.
- Surface: smooth, granular, verrucous, papillomatous, pebbly, cobblestone.
- Base: pedunculated, sessile, nodular, dome-shaped).
- Color: red, pink, white, red-white combined, blue, purple, gray, yellow, black, or brown.
- Symmetry: Compare bilateral structures to assess symmetry [16].

Palpation:

- Consistency and texture: soft/smooth, hard/rough, cheesy, firm, rubbery, lumpy, and vegetative.
- Pain or tenderness: focal or diffused.
- Bleeding: provoked or spontaneous [16].

Function examination:

Oral functions, including chewing, swallowing, speech, or jaw movement should be evaluated and the lesion impact should be assessed. Additionally, any associated symptoms such as numbness, tingling, or altered sensation should be looked for, as these may suggest nerve involvement.

Documentation:

Photography and medical records are the principal tools for the documentation of OML and should be included in patient records as well as any associated

symptom; to keep track of the course of the illness and note any changes over time.

3. Observed Elementary Lesions

In dermatology, elementary lesions are categorized into two types: primary lesions and secondary lesions. Primary lesions, refer to the initial appearance of a lesion. Secondary lesions, on the other hand, develop from changes to primary lesions, either due to the natural progression of the condition or as a result of external factors like manipulation or treatment, as seen with scars [16].

3.1. Elementary Lesions

Flat pigmented lesions:

- **Macule:** A circumscribed, flat area of discoloration that is less than 10 mm in diameter. This term can be used for amalgam tattoos, ephelis, freckles, focal argyrosis, etc [16]-[18] (**Figure 1**).
- **Patch:** A non-elevated nor palpable lesion. Circumscribed, flat area of discoloration that is greater than 10 mm in diameter. Slight scale may or may not be present [16] [18].
- **Erythema:** a red macule that fades with vitropressure, caused by congestion of superficial dermal vessels. **Active erythema** is the most common type, characterized by bright red discoloration due to arteriolar-capillary vasodilation (**Figure 2**).

Raised lesions:

- **Papule:** A circumscribed, elevated, solid lesion that is less than 10 mm in diameter. Maybe of any color [17] [18] (**Figure 3**).
- **Plaque:** A circumscribed, slightly raised, solid lesion that is greater than 5 or 10 mm in diameter and is usually broader than it is thick. Papules can merge to form plaques. While plaques are generally considered superficial, they may extend deeper into the dermis compared to papules. However, they are typically of epidermal origin. In the oral cavity, conditions like lichen planus, leukoplakia, or melanoma may initially present as plaques [17] [18] (**Figure 4**).
- **Nodule:** A solid, raised lump or mass of tissue characterized by its depth. Similar to a papule, a nodule is less than 10 mm in diameter, but it penetrates deeper into the dermis or mucosa. Nodules can be identified through palpation, and the overlying tissue is typically non-adherent, allowing it to move freely over the lesion. Nodules may be asymptomatic or painful and generally have a slow growth rate [16] [18] (**Figure 5**).
- **Tumor:** A deep and solid lesion with a diameter exceeding 10 mm (or 20 mm) and can be above, level with, or beneath the dermal or mucosal surface. Also known as a mass. They may be of any color and may be located in any intraoral or extra-oral soft or hard tissue. Tumors are classified as benign, in situ, or malignant neoplasms [17] [18] (**Figure 6**, **Figure 7**).
- **Vegetation:** Thread-like, digitate or lobulated "cauliflower" outgrowth [19] (**Figure 8**).

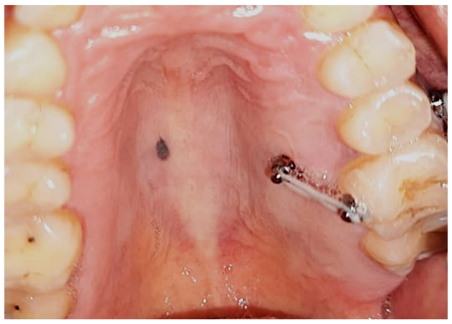

Figure 1. A Circumscribed Macule on the hard palate gingiva.

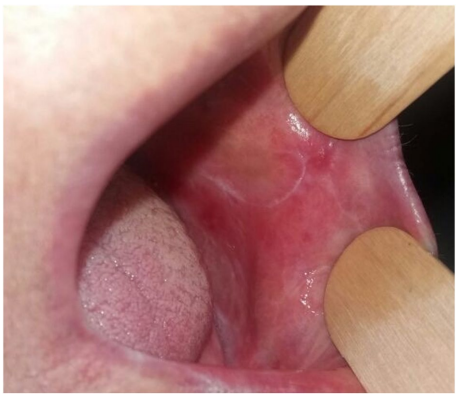

Figure 2. Erythema on the jugal mucosa.

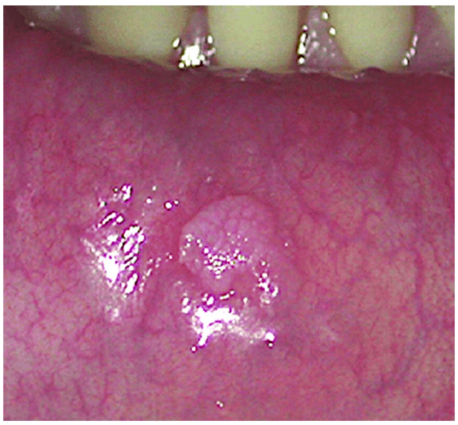

Figure 3. Papule on the inner mucosa of the lip.

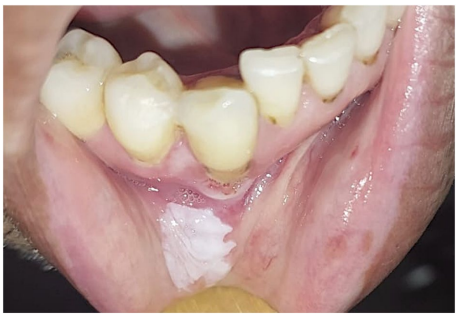

Figure 4. Homogenous white plaque on the inner mucosa of the lip as leukoplakia.

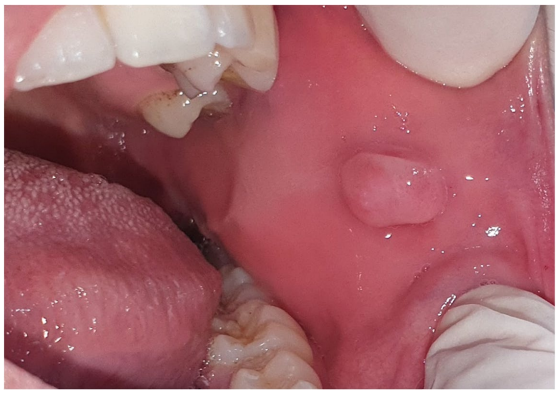

Figure 5. Nodule in the jugal mucosa as a trauma fibroma.

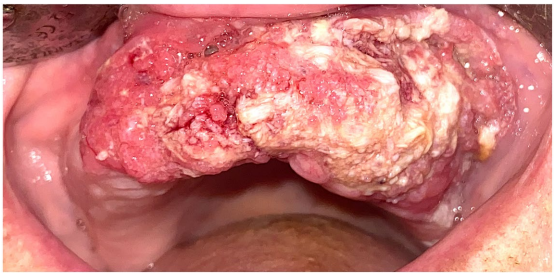

Figure 6. A malignant tumor localized on the maxillary alveolar ridge diagnosed as squamous cell carcinoma.

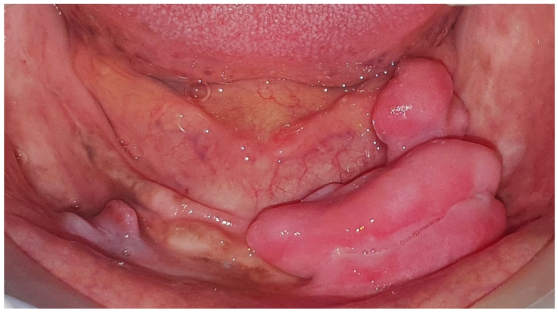

Figure 7. Epulis fissuratum as a benign tumor localized in the buccal mucosa.

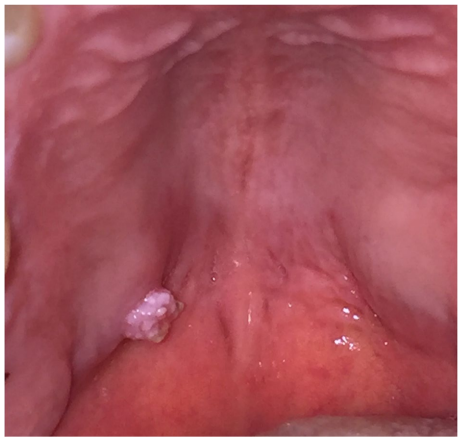

Figure 8. Vegetative papillomatous lesion in the posterior region of the hard palate.

Fluid-filled lesions:

- **Vesicle:** A small, superficial blister less than 10 mm in diameter, filled with fluid that may be clear, serous, hemorrhagic or purulent. It often occurs as a result of allergic reactions or inflammation caused by viral infections such as herpes simplex, herpes zoster, chickenpox or smallpox [17] [18] (**Figure 9**).
- **Bulla:** a large, raised, well-defined blister, over 10 mm in diameter, filled with fluid that may be clear, serous, hemorrhagic or purulent. The surface is smooth and dome shaped and easily ruptured by the slightest trauma [18]. Bullae can be seen in pemphigus vulgaris, pemphigoid, and Stevens-Johnson syndrome [16] (**Figure 10**).
- **Pustule:** Defined as a small purulent vesicle, less than 10 mm. Pustules are filled with neutrophils and may be creamy white, yellow or green. Hence, they are not always infected [16] [17].
- **Cyst:** A closed cavity or sac filled with liquid or semisolid fluid and can be pink to blue or yellow to creamy in color, ranging from few millimeters to centimeters. A cyst may have an epithelial or endothelial lining. It also may be level with, or below the mucosa, detected by palpation [16] [17] (**Figure 11**).

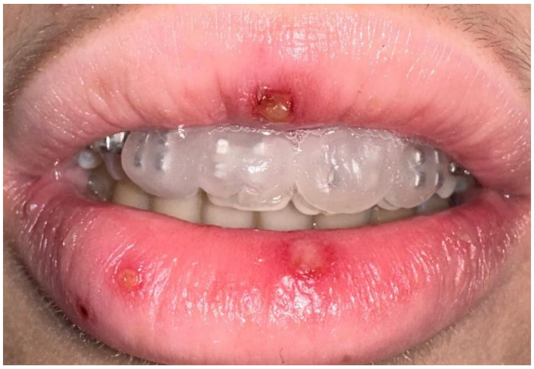

Figure 9. Vesicles on inferior lip due to Herpes simplex virus (HSV) infection.

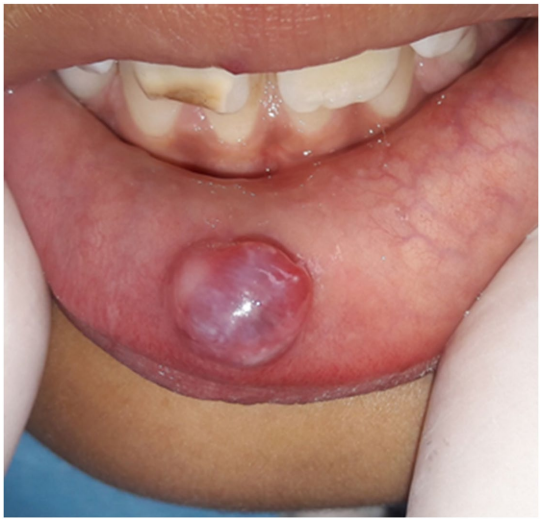

Figure 10. Mucocele as a bulla on the interior mucosa of the lower lip.

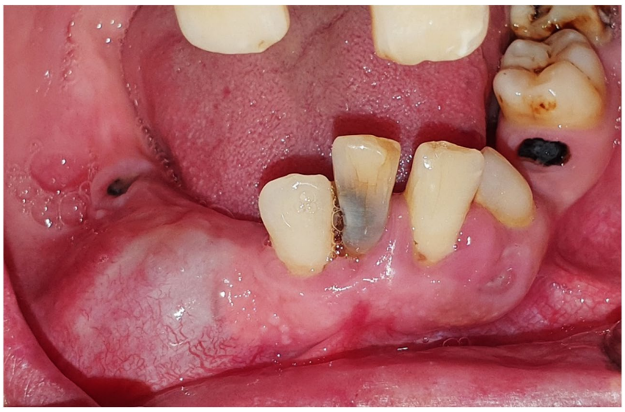

Figure 11. Residual inflammatory cyst in the mandibular lateral ridge.

Vascular lesions:

- **Hematoma:** A localized collection of extravasated blood. The blood is typically clotted or partially clotted, and its organization and color may vary depending on the duration since its formation (Figure 12).
- **Purpura:** A discoloration of the skin/mucosa that changes appearance over time and does not blanch under pressure. It includes both petechiae and ecchymoses.
  - Petechia: Tiny, 1- to 2-mm (pinpoint to pinhead size) nonblanchable purpuric macules resulting from the rupture of small blood vessels. Color may be red, purple, or brown.
  - Ecchymosis: Non-blanching, purpuric macules or patches greater than 3 mm in diameter.

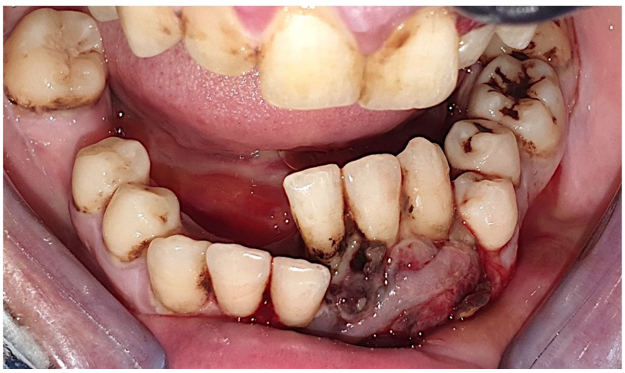

Figure 12. Large hematoma on the floor of the mouth after traffic accident.

Lesions with surface modification:

- **Keratosis:** A white plaque characterized by the thickening of the keratin layer of the epithelium. Authors have distinguished 3 types of keratosis: (1) reactive keratosis, (2) dysplastic/malignant keratosis, and (3) keratosis of unknown significance [20] (Figure 13).
- **Pseudo membrane:** Exogenous white lesion that can be scraped clean. It is primarily suggestive of acute candidiasis [21] (Figure 14).

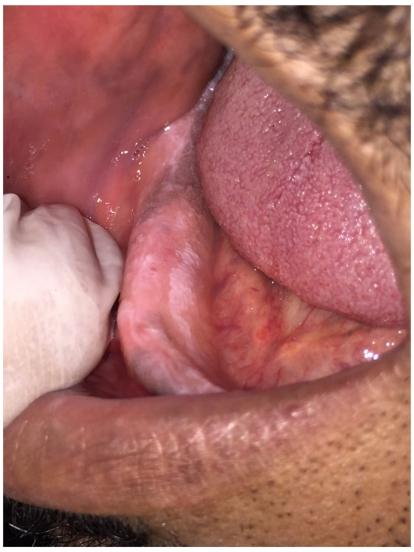

Figure 13. Keratosis in the lingual aspect of the mandibular alveolar ridge.

Figure 14. Pseudo membranous candidiasis.

3.2. Secondary Lesions

Depressed lesions:

- **Erosion:** shallow, moist or crusted lesion and slightly depressed, usually resulting from a broken vesicle, epithelial breakdown, or trauma [18] (**Figure 15**).
- **Ulcer:** Lesion due to the loss of continuity of the epithelium. The center is initially red and then turns gray-white being covered with fibrin clot. The margins of the lesion may be erythematous and can be smooth or craterlike when it is above the level of the normal mucosa [16].
- Ulcers are usually painful and often require topical or systemic drug therapy or effective management. They are more common in lesions such as recurrent aphthous stomatitis, HSV, traumatic ulcers, immune related lesions etc [18] [22] (**Figure 16**).
- **Fissure:** Sharply defined linear or wedge-shaped tears in the epidermis or

mucosa with abrupt walls (Figure 17).

- **Fistula:** An abnormal pathological pathway between two anatomic spaces or a pathway extending from an internal cavity or organ to the surface of the mucosa [17].
- Scar: A permanent mark or cicatrix remaining after a wound heals that may be subsequent to an oral surgery, burn or intraoral trauma [18].

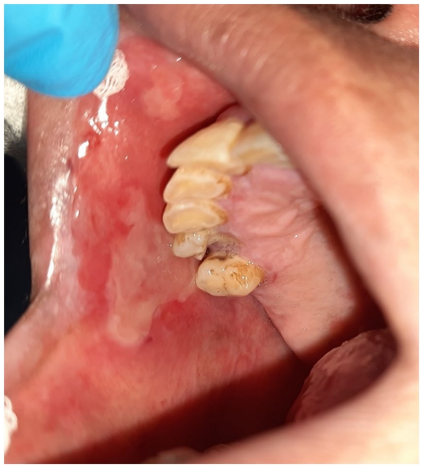

Figure 15. Erosive lichen planus on jugal mucosa.

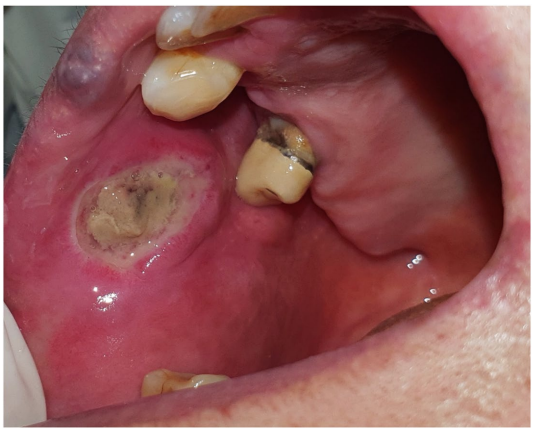

Figure 16. Post-surgical ulcer after laser treatment of hemangioma.

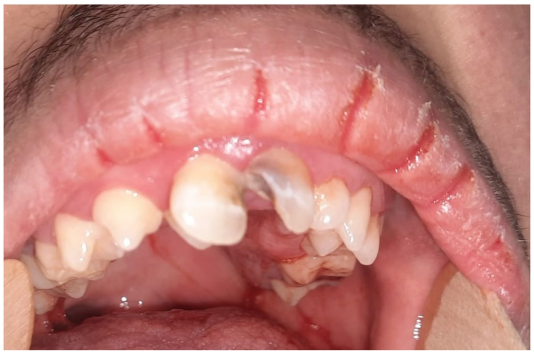

Figure 17. Fissures on the upper lip.

4. Conclusion

Accurate diagnosis of OML relies on careful clinical examination and thorough assessment of the patient's medical history. Since many systemic and serious conditions can first appear in the mouth, dentists play a crucial role in early detection. Recognizing subtle clinical signs, understanding risk factors, and correlating findings with the patient's history not only aids in accurate diagnosis but also ensures timely and effective management. Therefore, reinforcing clinical vigilance and diagnostic skills among oral health professionals is essential for improving patient outcomes and contributing to the broader landscape of interdisciplinary healthcare.

Conflicts of Interest

The authors declare no conflicts of interest.

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