ISSN (O) : 2582-3271
PubMed-National Library of Medicine - ID: 101766917

International Journal of Dental Science and Clinical Research (IJDSCR)

Dr. Angel Vaidic Publication

Available Online at: http://www.ijdscr.org

Volume - 8, Issue – 3, June - 2026, Page No. : 56 – 60

Oral Pigmented Lesions: A Diagnostic Approach

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Citation of this Article: Dr. Harshini Ganesan, Dr. Dinakar. J, Dr. Gowri. S, Dr D Swathi, Dr. A. Arun Prasath, "Oral Pigmented Lesions: A Diagnostic Approach'' IJDSCR – June – 2026, Vol. – 8, Issue - 3, Page No. 56-60

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Type of Publication: A Review Article

Conflicts of Interest: Nil

ABSTRACT

Oral pigmented lesions are frequently encountered in clinical practice and range from harmless physiologic pigmentation to malignant oral mucosal melanoma. Distinguishing benign from malignant pigmentation is often difficult because many lesions share similar clinical features, are asymptomatic, and lack clear etiologic triggers. This diagnostic uncertainty is clinically significant: oral melanoma is rare but highly aggressive, and delayed recognition remains a major contributor to poor outcomes. This review provides a practical, clinically focused framework for evaluating oral pigmented lesions, emphasizing classification, key differential diagnoses, and common diagnostic pitfalls. While melanotic macule and amalgam tattoo account for many cases, early melanoma may closely mimic benign focal pigmentation—particularly on high-risk sites such as the palate and maxillary gingiva. Clinicians should maintain a low threshold for biopsy in any unexplained focal lesion, lesions showing enlargement or color variation, or lesions with irregular borders, asymmetry, or atypical location. A structured approach integrating history, thorough intraoral examination, appropriate imaging, and timely biopsy can reduce missed diagnoses and support earlier detection of malignant disease.

Keywords

Oral pigmented lesions; Oral melanoma; Differential diagnosis; Melanotic macule; Amalgam tattoo; Biopsy

INTRODUCTION

Pigmented lesions of the oral mucosa represent a clinically important diagnostic category due to their broad etiologic spectrum, ranging from physiologic pigmentation to systemic disease and malignant neoplasia. Although most oral pigmented lesions are benign, the potential for oral mucosal melanoma necessitates vigilant assessment and timely biopsy of suspicious lesions. (1–3)

Oral pigmentation may arise due to endogenous melanin deposition, exogenous foreign material, vascular lesions, or systemic metabolic conditions. Many lesions are asymptomatic and discovered incidentally during routine dental examinations, emphasizing the critical role of oral healthcare professionals in early detection. (1,4)

CLASSIFICATION OF ORAL PIGMENTED LESIONS

Oral pigmented lesions may be broadly classified as endogenous or exogenous, and further categorized into physiologic, reactive, systemic, and neoplastic causes. (1,4)

1. Endogenous Pigmentation
- Physiologic/racial pigmentation
- Melanotic macule
- Smoker's melanosis
- Post-inflammatory pigmentation
- Melanocytic nevi
- Oral mucosal melanoma

2. Exogenous Pigmentation
- Amalgam tattoo
- Graphite tattoo
- Heavy metal pigmentation
- Drug-induced pigmentation (e.g., antimalarials, minocycline) (1,8)

EPIDEMIOLOGY AND CLINICAL DISTRIBUTION

Large biopsy-based series indicate that oral pigmented lesions represent a small fraction of oral pathology specimens, commonly <1% in retrospective datasets. (4,5) Amalgam tattoo and melanotic macule frequently rank among the most common diagnoses, followed by physiologic pigmentation and melanocytic nevi. (4–6)

Oral mucosal melanoma is rare, accounting for a small proportion of oral malignancies, but carries a poor prognosis due to late diagnosis and early invasion. (2,3)

CLINICAL EVALUATION: KEY HISTORY AND EXAMINATION POINTS

A structured clinical evaluation should include:

History

- Duration and evolution (stable vs progressive)
- Dental treatment history (restorations, endodontics, extraction)
- Smoking history
- Medication history (antimalarials, minocycline, chemotherapeutics) (8)
- Systemic disease symptoms (fatigue, weight loss, endocrine symptoms)
- Clinical Examination
- Site: palate, gingiva, buccal mucosa, lip, tongue
- Pattern: diffuse vs focal
- Borders: well-defined vs irregular
- Surface: flat vs raised

- Colour: uniform vs variegated
- Ulceration or bleeding
- Associated lymphadenopathy (2,3)

PHYSIOLOGIC VS PATHOLOGIC PIGMENTATION

Physiologic (racial) pigmentation is common and typically presents as bilateral, symmetric brown to dark brown discoloration, most often affecting the gingiva. It is usually stable over time and requires no treatment. (1,4)

Pathologic pigmentation tends to be focal, asymmetric, progressive, or associated with surface changes. Clinicians should be cautious not to label focal lesions as physiologic without appropriate evaluation. (1,2)

COMMON BENIGN ORAL PIGMENTED LESIONS

1. **Melanotic Macule**

   Oral melanotic macule is a benign, well-circumscribed brown macule, usually <1 cm. It commonly affects the lower lip, gingiva, and buccal mucosa. Histologically, it is characterized by increased melanin deposition in basal keratinocytes without proliferation of melanocytes. (1,4)

   Although benign, melanotic macule may mimic early melanoma clinically, and biopsy is recommended when the diagnosis is uncertain. (2,7)

2. **Amalgam Tattoo**

   Amalgam tattoo is the most frequent exogenous pigmented lesion. It typically appears as a blue-gray macule near restored teeth. Radiographs may reveal radiopaque fragments; however, absence of radiopacity does not exclude the diagnosis. (4,5)

   Biopsy is recommended when the lesion is enlarging, irregular, or located on high-risk sites without a clear dental restorative history. (1,2)

3. **Smoker's Melanosis**

   Smoker's melanosis is a reactive pigmentation caused by increased melanin production due to tobacco exposure. It typically appears as diffuse light brown pigmentation on the anterior gingiva. Pigmentation may regress with smoking cessation. (1,4)

4. **Oral Melanocytic Nevi**

   Oral nevi are uncommon and may appear as brown, blue, or black macules or papules. The palate and buccal mucosa are common sites. Due to overlap with early melanoma, many authors recommend excision for definitive diagnosis. (1,6)

ORAL MUCOSAL MELANOMA

Oral mucosal melanoma is a rare but aggressive malignancy that most commonly involves the hard palate and maxillary gingiva. (2,3) It often presents as a dark macule or plaque with irregular borders and color variation, though amelanotic variants may appear red or pink. (2,3)

Oral melanoma is frequently diagnosed late due to painless presentation and misdiagnosis as benign pigmentation. Survival rates remain poor compared with cutaneous melanoma. (2,3)

CLINICAL MISDIAGNOSIS AND DIAGNOSTIC PITFALLS

Misdiagnosis is common in oral pigmented lesions, especially when:

- The lesion is asymptomatic
- The patient has no history of dental pain
- Pigmentation is attributed to physiologic causes without confirmation (1–3)

A frequent pitfall is labelling a focal lesion as an amalgam tattoo without radiographic evidence or restoration history. Another pitfall is delaying biopsy due to the lesion's small size or lack of symptoms. (2,7)

BIOPSY INDICATIONS IN ORAL PIGMENTED LESIONS

Biopsy remains the gold standard for definitive diagnosis when clinical assessment cannot exclude malignancy. Oral mucosal melanoma is rare but aggressive; therefore, clinicians should maintain a low threshold for biopsy. (2,3,7)

Biopsy is mandatory when:

1. Focal unexplained pigmentation is present. (2,7)
2. Lesion shows irregular borders, asymmetry, or variegated color. (2,3)
3. Lesion is located on high-risk sites (palate, maxillary gingiva). (2,3)
4. Lesion is progressive (increase in size, darkening). (2,3)
5. Lesion becomes raised, ulcerated, bleeding, or symptomatic. (2,3)

Observation may be acceptable when pigmentation is diffuse, bilateral, symmetric, and stable (physiologic/racial pigmentation). (1,4)

Amalgam tattoo

Clinical diagnosis is acceptable when radiopaque fragments are visible; otherwise biopsy is recommended if uncertain. (4,5)

Biopsy technique

Small lesions are best managed by excisional biopsy; large or suspicious lesions require incisional biopsy from the most pigmented or irregular area. Adequate depth is essential. (2,7)

DIAGNOSTIC WORKFLOW (CLINICAL ALGORITHM)

A practical workflow includes:

1. History and intraoral exam
2. Identify diffuse vs focal pattern
3. Assess risk site (palate/gingiva high risk)
4. Radiograph if amalgam tattoo suspected
5. Biopsy if focal unexplained or suspicious
6. Histopathology ± immunohistochemistry for melanocytic lesions (2,3)

MANAGEMENT PRINCIPLES

Management depends on etiology:

- Physiologic pigmentation: reassurance, documentation
- Amalgam tattoo: observation if confirmed; excision if uncertain
- Melanotic macule: biopsy if uncertain; excision is curative
- Nevi: excision recommended for diagnosis
- Melanoma: urgent referral for wide excision and oncologic management (2,3)

CONCLUSION

Oral pigmented lesions represent a broad diagnostic spectrum. While most lesions are benign, the risk of oral mucosal melanoma requires clinicians to maintain vigilance. A structured diagnostic approach emphasizing lesion pattern, site, progression, and timely biopsy improve diagnostic accuracy and reduces delayed diagnosis. Early identification of malignant lesions remains essential for improving outcomes.

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