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Diagnosis of Oral Potentially Malignant Disorders – A Review

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Abstract

Oral potentially malignant disorders (OPMDs) represent a diverse group of mucosal abnormalities that carry an increased risk of transformation into oral squamous cell carcinoma. Early identification and accurate diagnosis of these disorders are essential to reduce morbidity and mortality associated with oral cancer. Common OPMDs include leukoplakia, erythroplakia, oral submucous fibrosis, proliferative verrucous leukoplakia, oral lichen planus, and actinic cheilitis. In addition, systemic conditions such as dyskeratosis congenita, Fanconi anemia, and Plummer–Vinson syndrome contribute to increased malignant risk. Clinically, these disorders present with varied features such as white or red patches, mucosal atrophy, fibrosis, ulceration, or mixed lesions. Diagnosis requires a comprehensive approach involving patient history, clinical examination, and adjunctive chairside investigations such as toluidine blue staining, autofluorescence, and cytological techniques. However, histopathological evaluation through biopsy remains the gold standard for confirming diagnosis and detecting epithelial dysplasia or early malignant transformation. Early diagnosis combined with appropriate monitoring plays a crucial role in preventing progression to malignancy and improving patient prognosis.

Keywords:oral leukoplakia, erythroplakia, oral submucous fibrosis, lichen planus, palatal lesions in reverse smoking, proliferative verrucous leukoplakia, actinic cheilitis.

Introduction

Oral potentially malignant disorders (OPMDs) are defined as mucosal lesions or conditions that have a statistically increased risk of progressing to oral cancer, particularly oral squamous cell carcinoma[1]. Early recognition of these lesions is fundamental for effective prevention and management of oral malignancies[2].OPMDs include lesions such as leukoplakia, erythroplakia, oral submucous fibrosis, proliferative verrucous leukoplakia, oral lichen planus, and actinic cheilitis.[3] Additionally, systemic diseases like dyskeratosis congenita, Fanconi anemia, and Plummer–Vinson syndrome also predispose individuals to malignant transformation[4].

Clinically, these disorders may manifest as persistent white or red lesions, mucosal fibrosis, ulceration, or atrophy[5]. Identification of etiological factors such as tobacco use, alcohol consumption, areca nut chewing, and ultraviolet exposure is essential during patient evaluation[6], Adjunctive diagnostic techniques—including toluidine blue staining, exfoliative cytology, and autofluorescence—assist in identifying suspicious lesions[7]. However, biopsy with histopathological examination remains the definitive diagnostic method[8]. Detection of epithelial dysplasia or carcinoma in situ determines prognosis and guides treatment planning[9].

Oral Potentially Malignant Disorders (OPMDs)[9]

Oral potentially malignant disorders are oral mucosal abnormalities that are associated with a statistically increased risk of developing cancer of the lip or oral cavity.

Oral Potentially Malignant Lesions

Potentially malignant lesions are morphologically altered areas of oral mucosa in which cancer is more likely to occur than in apparently normal mucosa.

Oral Potentially Malignant Conditions

Potentially malignant conditions are generalized diseases or systemic conditions that are associated with a significantly increased risk of developing oral cancer.

LIST OF ORAL POTENTIALLY MALIGNANT DISORDERS (PMD)

a) PMDs as per WHO (2007)[1]

- Leukoplakia
- Erythroplakia
- Proliferative verrucous leukoplakia (PVL)
- Oral Lichen planus
- Oral submucous fibrosis
- Actinic Cheilitis
- Palatal lesions in Reverse smoking
- Oral lupus erythematosus
- Dyskeratosis congenita
- Oral epidermolysis bullosa

b) PMDs added by WHO (2020) along with WHO 2007[9]

- Oral Lichenoid lesion
- Oral graft versus host disease
- Candidal leukoplakia
- Oral Exophytic verrucous hyperplasia
- Syndromes that may potentiate cancer development in the oral cavity
- Fanconi anaemia (FA)
- Plummer-Vinson syndrome

Leukoplakia

Clinical Features

- Leukoplakia is defined as a white patch that cannot be clinically or pathologically characterized as any other disease[10]
- Appears as a white plaque, often slightly elevated
- Early lesions are thin and translucent
- Advanced lesions may become thick, fissured, or verrucous
- Classified as homogeneous or non-homogeneous
- Common sites: buccal mucosa, tongue, floor of mouth, gingiva
- Usually asymptomatic and detected incidentally[11–12]

Diagnosis

Chairside methods:

- Toluidine blue staining highlights dysplastic areas
- Lugol's iodine differentiates normal and abnormal epithelium
- Brush biopsy and exfoliative cytology detect cellular atypia
- Autofluorescence identifies altered tissue patterns
- Chemiluminescence enhances lesion visibility[13]

Laboratory investigations:

- Biopsy is the gold standard
- Histology may show hyperkeratosis, epithelial dysplasia, or hyperplasia[14]

Erythroplakia

Clinical Features

- Erythroplakia presents as a well-defined red patch with high malignant potential[14]
- Velvety or granular surface
- Common sites: soft palate, tongue, floor of mouth
- May bleed easily
- Often asymptomatic but may cause mild burning
- Frequently associated with severe dysplasia or carcinoma[15]

Diagnosis

- Clinical exclusion of other red lesions
- Toluidine blue staining to identify high-risk areas[16]
- Incisional biopsy confirms diagnosis
- Histology often reveals carcinoma in situ or invasive carcinoma[15]

Oral Submucous Fibrosis (OSMF)

Clinical Features

- OSMF is a chronic fibrotic disorder linked to areca nut chewing[17]
- Burning sensation, especially with spicy foods
- Blanching of mucosa
- Fibrous bands palpable in oral mucosa
- Reduced mouth opening (trismus)
- Restricted tongue movement and rigidity[18]

Gupta et. Al Grading (Based on Mouth Opening) (1988)

Grade I: >35 mm
Grade II: 26–35 mm
Grade III: 15–25 mm
Grade IV: <15 mm[19]

Diagnosis

- Clinical examination and history of areca nut use
- Measurement of mouth opening[20]
- Biopsy shows collagen deposition and epithelial atrophy[17]

Proliferative Verrucous Leukoplakia (PVL)

Clinical Features

- PVL is an aggressive form of leukoplakia[21]
- Multifocal white plaques
- Progresses to verrucous or exophytic lesions[22]
- Persistent and progressive
- High recurrence and malignant transformation rate[23]

Diagnosis

- Clinical monitoring over time
- Multiple biopsies often required
- Histology varies from hyperkeratosis to carcinoma[24]

Oral Lichen Planus

Clinical Features

- A chronic inflammatory disorder affecting middle-aged individuals[25]
- Bilateral white striations (Wickham's striae)
- Forms: reticular, erosive, atrophic, plaque-like
- Common sites: buccal mucosa, tongue, gingiva
- Erosive types cause pain and burning[26]

Diagnosis
- Clinical appearance
- Biopsy shows band-like lymphocytic infiltrate[26]
- Direct immunofluorescence aids confirmation[27]

Actinic Cheilitis
Clinical Features
- A premalignant condition caused by chronic sun exposure[28]
- Affects lower lip
- Dryness, scaling, loss of vermilion border
- Advanced lesions show ulceration and induration

Diagnosis
- Clinical history of sun exposure
- Biopsy confirms dysplasia
- Histology shows solar elastosis[28]

Oral Lupus Erythematosus
Clinical Features
- Erythematous lesions with white radiating striae
- Resemble lichen planus
- May involve gingiva causing desquamative gingivitis[29]

Diagnosis
- Biopsy and histopathology
- Direct immunofluorescence shows lupus band
- Serological tests (ANA, anti-dsDNA) confirm systemic involvement[29]

Dyskeratosis Congenita
Clinical Features
- A genetic disorder with mucocutaneous involvement[30]
- Oral leukoplakia
- Nail dystrophy[31]
- Skin pigmentation
- Increased cancer risk

Diagnosis
- Genetic testing[32]
- Telomere analysis
- Biopsy of oral lesions[33]

Oral Epidermolysis Bullosa
Clinical Features
- Fragile mucosa with blister formation
- Painful ulcers after rupture
- Scarring and restricted mouth opening[34]

Diagnosis
- Clinical history
- Biopsy and immunofluorescence
- Genetic testing[35]

Palatal Lesions in Reverse Smoking
Clinical Features
- Keratotic palate with red duct openings
- Caused by heat exposure
- May show dysplastic changes[36]

Greenburg et al. Grading of Smoker's Palate (Nicotinic Stomatitis) (2015)

Smoker's palate (nicotinic stomatitis) is a heat-induced alteration of the palatal mucosa commonly seen in individuals who smoke tobacco, particularly pipe smokers. Greenburg et al. classified the condition into grades based on the clinical severity of palatal keratosis and ductal inflammation of minor salivary glands.

1.Grade I – Mild
•Mild diffuse whitening or keratosis of the palatal mucosa, mainly in the posterior hard palate.
•Presence of small slightly elevated red dots representing inflamed openings of minor salivary gland ducts.
•Palatal mucosa appears smooth with minimal epithelial thickening.
•Lesion is usually asymptomatic and detected during routine examination.
2.Grade II – Moderate
•Moderate keratinization causing a grayish-white thickened palatal mucosa.
•Red punctate duct openings become more prominent and elevated
•Palatal surface may appear slightly nodular or rough due to epithelial hyperkeratosis.
•Lesion mainly involves the posterior hard palate and may extend toward the soft palate.
3.Grade III – Severe
•Severe hyperkeratosis with a thick, irregular, and fissured palatal surface.
•Numerous prominent umbilicated red nodules corresponding to inflamed minor salivary gland ducts.
•Palate appears leathery with a cobblestone-like surface due to marked keratinization.
•Lesion is usually reversible after smoking cessation, but severe cases require evaluation to rule out dysplasia.

Diagnosis
- Clinical history of reverse smoking
- Biopsy confirms epithelial changes

Oral Lichenoid Lesions
Clinical Features
- White striations or mixed lesions[38]
- Often unilateral
- Associated with drugs or dental materials[39]

Diagnosis
- Clinical correlation with causative factors[40]
- Biopsy and immunofluorescence[41]
- Patch testing for allergens[42]

Plummer–Vinson Syndrome
Clinical Features
- Dysphagia due to esophageal webs[43]
- Iron deficiency anemia
- Atrophic glossitis and mucosal pallor[44]

Diagnosis
- Blood tests (iron deficiency)
- Barium swallow
- Endoscopy[43]

Candidal Leukoplakia
Clinical Features
- Persistent non-scrapable white plaque[45]
- Associated with Candida infection
- May show dysplasia[46]

Diagnosis
- Cytology and fungal culture
- PAS staining[47]
- Biopsy confirms diagnosis[48]

Fanconi Anemia

Clinical Features

- Pancytopenia[49]
- Congenital anomalies
- Oral pigmentation and leukoplakia[50]

Diagnosis

- Chromosomal breakage test[51]
- Bone marrow examination[52]
- Genetic testing[53]

Oral Verrucous Hyperplasia

Clinical Features

- Exophytic verrucous lesion
- Associated with tobacco use
- Potential for malignant transformation[55]

Diagnosis

- Clinical examination
- Biopsy distinguishes from carcinoma[54]

Oral Graft Versus Host Disease

Clinical Features

- Lichenoid lesions
- Ulceration and xerostomia
- Occurs after stem cell transplantation[57]

Diagnosis

- Clinical history
- Biopsy and immunological studies[59]

Conclusion

Oral potentially malignant disorders represent a critical group of lesions requiring early detection and systematic evaluation. A combination of clinical examination, patient history, adjunctive diagnostic techniques, and histopathological analysis is essential for accurate diagnosis. Biopsy remains the gold standard for identifying dysplastic changes and early malignancy. Early diagnosis and regular follow-up significantly reduce the risk of malignant transformation and improve patient outcomes. Increased awareness among clinicians and patients is vital for effective prevention and management of oral cancer.

REFERENCES

1. Warnakulasuriya S, Johnson NW, van der Waal I. Nomenclature and classification of potentially malignant disorders of the oral mucosa: Potentially malignant disorders. J Oral Pathol Med [Internet]. 2007;36(10):575–80. Available from: http://dx.doi.org/10.1111/j.1600-0714.2007.00582.x

2. World Health Organization Collaborating Centre for Oral Cancer. Oral potentially malignant disorders: definition and classification. Oral Oncol. 2020;

3. Neville BW, Damm DD, Allen CM, Chi AC. Oral and maxillofacial pathology. 5th ed. Philadelphia, PA: Elsevier - Health Sciences Division; 2023.

4. Greenberg MS, Glick M, Ship JA.): People's Medical Publishing House. Shelton (CT; 2015.

5. Warnakulasuriya S. Oral potentially malignant disorders: a comprehensive review. Oral Oncol. 2020;102.

6. Lingen MW, Abt E, Agrawal N, Chaturvedi AK, Cohen E, D'Souza G, et al. Evidence-based clinical practice guideline for the evaluation of potentially malignant disorders in the oral cavity: A report of the American Dental Association. J Am Dent Assoc [Internet]. 2017;148(10):712-727.e10. Available from: http://dx.doi.org/10.1016/j.adaj.2017.07.032

7. Reibel J. Prognosis of oral pre-malignant lesions: significance of clinical, histopathological, and molecular biological characteristics. Crit Rev Oral Biol Med [Internet]. 2003;14(1):47–62. Available from: http://dx.doi.org/10.1177/154411130301400105

8. Speight PM, Khurram SA, Kujan O. Oral potentially malignant disorders and malignant transformation. Oral Surg Oral Med Oral Pathol Oral Radiol. 2018;125:612–27.

9. Warnakulasuriya S, Kujan O, Aguirre-Urizar JM, Bagan JV, González-Moles MÁ, Kerr AR, et al. Oral potentially malignant disorders: A consensus report from an international seminar on nomenclature and classification, convened by the WHO Collaborating Centre for Oral Cancer. Oral Dis [Internet]. 2021;27(8):1862–80. Available from: http://dx.doi.org/10.1111/odi.13704

10. Warnakulasuriya S. Clinical features and presentation of oral potentially malignant disorders. Oral Surg Oral Med Oral Pathol Oral Radiol [Internet]. 2018;125(6):582–90. Available from: http://dx.doi.org/10.1016/j.oooo.2018.03.011

11. González-Moles MA, Scully C, Gil-Montoya JA. Oral leukoplakia: A systematic review. Oral Dis. 2010;16(6):549–564. doi:10.1111/j.1601-0825.2010.01673.x.

12.Johnson NW. Epidemiology and aetiology of oral leukoplakia. Journal: Oral Oncology. 2001;37(6):452–60.

13. Prabhu P. Oral leukoplakia: Clinical presentation and management. Journal: Journal of the American Dental Association. 2014;

14. Neville BW, Damm DD, Allen CM, Chi AC. Oral and maxillofacial pathology. 4th ed. St. Louis (MO): Elsevier; 2016.

15. Rajendran A, Sivapathasundharam B. Shafer's textbook of oral pathology. 7th ed. New Delhi, India: Elsevier; 2014.

16. Öhman J, Zlotogorski-Hurvitz A, Dobriyan A, Reiter S, Vered M, Willberg J, et al. Oral erythroplakia and oral erythroplakia-like oral squamous cell carcinoma - what's the difference? BMC Oral Health [Internet]. 2023;23(1):859. Available from: http://dx.doi.org/10.1186/s12903-023-03619-2

17. Jens Jørgen Pindborg & S. M. Sirsat. Oral Submucous Fibrosis. Oral Surgery, Oral Medicine, Oral Pathology. 1966.

18. Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. Oral Oncol [Internet]. 2009;45(4–5):309–16. Available from: http://dx.doi.org/10.1016/j.oraloncology.2008.06.002

19. Gupta D.S., Sharma S.C. Oral Submucous Fibrosis – A New Treatment Regimen. Journal of Oral and Maxillofacial Surgery. 1988.

20. Chetan B. Journal of Indian Academy of Oral Medicine and Radiology. 2012

21. Saman Warnakulasuriya et al. Oral potentially malignant disorders: classification and risk. Oral Oncology. 2007;

22. Batsakis JG. Proliferative verrucous leukoplakia: an aggressive form of oral leukoplakia. Oral Surgery Oral Medicine Oral Pathology. 1999.

23. Hansen LS. Proliferative verrucous leukoplakia: a long-term study. Oral Surgery Oral Medicine Oral Pathology. 1985.

24. Cerero-Lapiedra R, Baladé-Martínez D, Moreno-López L-A, Esparza-Gómez G, Bagán JV. Proliferative verrucous leukoplakia: a proposal for diagnostic criteria. Med Oral Patol Oral Cir Bucal [Internet]. 2010;15(6):e839-45. Available from: http://dx.doi.org/10.4317/medoral.15.e839

25. Scully C. Oral and maxillofacial medicine - E-book: The basis of diagnosis and treatment. 3rd ed. Churchill Livingstone; 2012.

26. van der Meij EH, van der Waal I. Lack of clinicopathologic correlation in the diagnosis of oral lichen planus based on the presently available diagnostic criteria and suggestions for modifications. J Oral Pathol Med [Internet]. 2003;32(9):507–12. Available from: http://dx.doi.org/10.1034/j.1600-0714.2003.00125.x

27. Warnakulasuriya S. Oral potentially malignant disorders: A comprehensive review on clinical aspects and management. Oral Oncol [Internet]. 2020;102(104550):104550. Available from: http://dx.doi.org/10.1016/j.oraloncology.2019.104550

28. Regezi JA. Oral pathology: Clinical pathologic correlations: First south Asia edition. New Delhi, India: Elsevier; 2016.

29. Andrews James WD, Elston DM, Treat JR, Rosenbach MA. Diseases of the Skin: Clinical Dermatology. Elsevier; 2020.

30. Schwartz RA, Vickerman M, Nusrat A. Dyskeratosis congenita: clinical features and pathogenesis. J Am Acad Dermatol [Internet]. 2018;78(2):267–76. Available from: http://dx.doi.org/10.1016/j.jaad.2017.08.061

31. Alter BP. Dyskeratosis congenita and other inherited bone marrow failure syndromes. Hematology/The Education Program of the. American Society of Hematology; 2007.

32. Dyskeratosis congenita: Genetics and diagnostic evaluation. Bethesda (MD): National Institutes of Health. National Institutes of Health. 2009;

33. James WD, Elston DM, Treat JR, Rosenbach MA. Andrews' diseases of the skin: clinical dermatology. Philadelphia: Elsevier; 2020.

34. Fine J-D, Bruckner-Tuderman L, Eady RAJ, Bauer EA, Bauer JW, Has C, et al. Inherited epidermolysis bullosa: updated recommendations on diagnosis and classification. J Am Acad Dermatol [Internet]. 2014;70(6):1103–26. Available from: http://dx.doi.org/10.1016/j.jaad.2014.01.903

35. Rojas P, Krämer S, Véliz S, Seguel M, Alsayer F, Sepúlveda L. Dentoxol mouthwash for people with epidermolysis Bullosa: A qualitative study of self-perceived symptoms and quality of life. Spec Care Dentist [Internet]. 2025;45(2):e70036. Available from: http://dx.doi.org/10.1111/scd.70036

36. Prabhu SR, Wilson DF, Daftary DK, Johnson NW. Oral diseases in the tropics. Oxford: Oxford University Press; 1992.

37. Greenberg MS, Glick M, Ship JA. Burket's Oral Medicine: Diagnosis and Treatment. Shelton (CT: PMPH USA; 2015.

38. Color Atlas of Oral Diseases, Laskaris G. Color Atlas of Oral Diseases. Stuttgart: Thieme; 2017.

39. Ismail SB, Kumar SKS, Zain RB. Oral lichen planus and lichenoid reactions: etiopathogenesis, diagnosis, management and malignant transformation. J Oral Sci [Internet]. 2007;49(2):89–106. Available from: http://dx.doi.org/10.2334/josnusd.49.89

40. Kamath VV, Setlur K, Yerlagudda K. Oral lichenoid lesions - a review and update. Indian J Dermatol [Internet]. 2015;60(1):102. Available from: http://dx.doi.org/10.4103/0019-5154.147830

41. Müller S. Oral lichenoid lesions: distinguishing the benign from the deadly. Mod Pathol [Internet]. 2017;30(s1):S54–67. Available from: http://dx.doi.org/10.1038/modpathol.2016.121

42. Glick M. Burket's Oral Medicine. 13th ed. Shelton: People's Medical Publishing House. 2021.

43. Plummer-Vinson Syndrome Novacek G. Plummer-Vinson syndrome. Orphanet Journal of Rare Diseases. 2006;1.

44. Goel A, Bakshi SS, Soni N, Chhavi N. Iron deficiency anemia and Plummer-Vinson syndrome: current insights. J Blood Med [Internet]. 2017;8:175–84. Available from: http://dx.doi.org/10.2147/JBM.S127801

45. Oral leukoplakia: Present views on diagnosis and management - Warnakulasuriya S. Oral Oncology. 2009;

46. Samaranayake LP. Oral candidosis: an old disease in new guise? Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 1990;69:179–84.

47. Williams D, Lewis M. Pathogenesis and treatment of oral candidosis. J Oral Microbiol [Internet]. 2011;3(1):5771. Available from: http://dx.doi.org/10.3402/jom.v3i0.5771

48. Odell EW. Cawson's essentials of oral pathology and oral medicine. 10th ed. Philadelphia, PA: Elsevier - Health Sciences Division; 2024.

49. De Araujo MR. Fanconi's anemia: clinical and radiographic oral manifestations. Oral Diseases. 2007.

50. Joshi G, Arthur NBJ, Geetha TS, Datari PVR, Modak K, Roy D, et al. Comprehensive laboratory diagnosis of Fanconi anaemia: comparison of cellular and molecular analysis. J Med Genet [Internet]. 2023;60(8):801–9. Available from: http://dx.doi.org/10.1136/jmg-2022-108714

51. Rocha PA da S, Santana NCM, de Arruda JAA, Amaral TMP, Drumond VZ, Torres-Pereira CC, et al. Dental and craniofacial anomalies in fanconi anemia: A systematic review and additional 46 reports. Oral Dis [Internet]. 2025;31(4):1342–57. Available from: http://dx.doi.org/10.1111/odi.15205

52. Errazquin R. Early diagnosis of oral cancer and lesions in Fanconi anemia patients using saliva and plasma. Cancers. 2023.

53. Fund FAR. Clinical care guidelines for Fanconi anemia. Oregon: Fanconi Anemia Research Fund. 2020;

54. Shear M, Pindborg JJ. Verrucous hyperplasia of the oral mucosa. Cancer [Internet]. 1980;46(8):1855–62. Available from: http://dx.doi.org/10.1002/1097-0142(19801015)46:8<1855::aid-cncr2820460825>3.0.co;2-#

55. Wang YP, Chen HM, Kuo RC. Oral verrucous hyperplasia: A clinicopathologic study of 60 cases. Journal of Oral Pathology & Medicine. 2009;

56. Greenberg MS, Glick M, Ship JA. Burket's Oral Medicine: Diagnosis and Treatment. PMPH USA; 2021.

57. World Health Organization. WHO Classification of Head and Neck Tumours. Lyon: International Agency for Research on Cancer. 2017;

58. Schubert MM, Sullivan KM, Schubert MM, et al. Oral manifestations of chronic graft-versus-host disease. Oral Surgery, Oral Medicine, Oral Pathology. 1990;69(5): 598–606.

59. American Academy of Oral Medicine. Diagnostic features of oral graft-versus-host disease. Journal of Oral Pathology & Medicine. 2009;38(6):373–9.