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CLINICOPATHOLOGICAL AND SURGICAL CORRELATION IN MANAGEMENT OF ORAL POTENTIALLY MALIGNANT DISORDERS WITH DYSPLASIA: A RETROSPECTIVE ANALYSIS

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ABSTRACT

Background: Oral potentially malignant disorders (OPMDs) such as leukoplakia, erythroplakia, oral submucous fibrosis, and erosive lichen planus carry a risk of transformation into oral squamous cell carcinoma (OSCC), especially when epithelial dysplasia is present. Early diagnosis and appropriate surgical intervention are crucial for prevention.

Objective: To analyze the clinicopathological features of dysplastic OPMDs and evaluate surgical outcomes including recurrence and malignant transformation.

Methodology: This retrospective study evaluated 120 patients diagnosed with OPMDs and histologically confirmed dysplasia from 2018 to 2024. Data on lesion type, site, dysplasia grade, treatment modality, and clinical outcomes were collected. Dysplasia was classified as mild, moderate, or severe based on WHO criteria. Management included surgical excision, laser ablation, or observation.

Results: Leukoplakia was the most common lesion (50%), followed by erythroplakia (20%), oral submucous fibrosis (15%), and erosive lichen planus (15%). Histopathologically, 40% showed mild dysplasia, 35% moderate, and 25% severe. Surgical excision was performed in 85% of cases. Recurrence occurred in 14 patients (11.7%) and malignant transformation in 6 (5%), predominantly in severe dysplasia cases (16.7%). Lesions on the tongue and floor of the mouth had higher transformation rates. Conservative management in mild cases with habit cessation was successful, with no progression observed.

Conclusion: Severity of dysplasia significantly influences clinical outcomes. Surgical excision remains the gold standard for moderate to severe dysplasia, reducing risk of recurrence and

malignancy. Conservative management may be appropriate for selected mild dysplasia cases under close follow-up.

Keywords: Oral potentially malignant disorders, dysplasia, leukoplakia, surgical excision, malignant transformation, recurrence, histopathology

INTRODUCTION

Oral potentially malignant disorders (OPMDs) represent a diverse group of mucosal abnormalities that possess a recognized risk of transforming into oral squamous cell carcinoma (OSCC), which remains one of the most common malignancies globally. OPMDs encompass a wide range of clinical entities, including leukoplakia, erythroplakia, oral submucous fibrosis (OSMF), and erosive oral lichen planus.[1] These lesions are often detected during routine dental examinations and can present with subtle clinical features, making diagnosis challenging, particularly in early stages. The transformation rate of OPMDs into carcinoma varies widely depending on the lesion type and the presence and severity of epithelial dysplasia, with reported rates ranging from 1% to over 30% in some populations.[2]

Epithelial dysplasia, identified via histopathological analysis, is a key determinant of malignant potential. The World Health Organization (WHO) classifies dysplasia into mild, moderate, and severe grades based on architectural and cytological criteria. These grades are essential in guiding treatment decisions and predicting prognosis.[3] The presence of moderate to severe dysplasia significantly increases the likelihood of malignant transformation, necessitating prompt and effective intervention.[1] Globally, the incidence of OPMDs and associated dysplasia is closely linked with lifestyle and environmental factors such as tobacco use (both smoking and smokeless), areca nut chewing, alcohol consumption, poor oral hygiene, and chronic mechanical trauma.[4] In South Asian populations, including Pakistan and India, the prevalence of OPMDs is particularly high due to widespread use of betel quid and gutka, both of which are established carcinogens. The clinical management of OPMDs in such high-risk populations requires a structured approach involving early detection, accurate diagnosis, risk stratification, and definitive surgical or non-surgical interventions.[5]

Surgical excision is often considered the treatment of choice for OPMDs with moderate to severe dysplasia or when lesions show progression during follow-up. Excision aims to eliminate dysplastic epithelium and reduce the risk of malignant transformation. The extent of surgical margins, choice between scalpel versus laser excision, and postoperative surveillance are subject to ongoing debate.[6] Some lesions with mild dysplasia and low-risk features may be managed conservatively with habit cessation, topical therapies, and regular follow-up. Numerous studies have investigated the clinicopathological features of OPMDs; however, few have focused on the correlation between histological dysplasia and surgical outcomes in a structured retrospective framework. Understanding the clinicopathological behavior of these lesions and evaluating the efficacy of surgical interventions can inform guidelines and reduce the burden of OSCC, which often presents at advanced, inoperable stages.[7]

In this context, the present retrospective study was designed to evaluate the clinical presentation, histopathological grading, and surgical management of OPMDs with dysplasia at a tertiary dental care center. The study also sought to analyze recurrence rates and malignant transformation in relation to dysplasia severity, thereby aiming to establish a clinicopathological and surgical correlation. Through this approach, we aim to contribute valuable data to support evidence-based decision-making in the management of OPMDs, especially in resource-constrained settings with high prevalence rates. Ultimately, early and appropriate intervention in dysplastic lesions offers a pivotal opportunity to interrupt the carcinogenic continuum at a precancerous stage.

MATERIALS AND METHODS

This retrospective analysis was conducted at a tertiary care dental hospital from January 2018 to December 2024, following ethical clearance. Records of patients aged 18 years and above who were

clinically diagnosed with oral potentially malignant disorders and histologically confirmed to have epithelial dysplasia were reviewed. Patients with prior histories of oral squamous cell carcinoma, OPMDs without dysplasia, or incomplete documentation were excluded from the study.
Data were collected from patient records, including demographic information, tobacco and betel nut use, clinical type of lesion, lesion site, histological grading of dysplasia, type of surgical management, and follow-up outcomes. The grading of epithelial dysplasia was classified according to World Health Organization criteria as mild, moderate, or severe. Management strategies were categorized based on whether surgical excision (scalpel or laser) was performed or if the patient was kept under observation with habit cessation counseling. Outcomes such as recurrence or progression to malignancy were recorded through clinical and histopathological confirmation during follow-up visits.

RESULTS

A total of 120 patients met the inclusion criteria, consisting of 76 males and 44 females, with a mean age of 47.2 ± 10.3 years. The most frequently diagnosed OPMD was leukoplakia, followed by erythroplakia, oral submucous fibrosis, and erosive oral lichen planus. Leukoplakia was the most common OPMD. Severe dysplasia was most frequently observed in erythroplakia (50%), highlighting its high malignant potential (Table 1).

Table 1: Distribution of Oral Potentially Malignant Disorders and Dysplasia Grades

Clinical Diagnosis	Total Cases (n = 120)	Mild Dysplasia	Moderate Dysplasia	Severe Dysplasia
Leukoplakia	60 (50%)	30	20	10
Erythroplakia	24 (20%)	4	6	14
Oral Submucous Fibrosis	18 (15%)	8	7	3
Erosive Oral Lichen Planus	18 (15%)	6	9	3
Total	120	48 (40%)	42 (35%)	30 (25%)

The highest rates of recurrence and malignant transformation were found in patients with severe dysplasia. Observation without surgery was limited to low-risk mild dysplasia cases (Table 2).

Table 2: Treatment Modality and Outcomes Based on Dysplasia Grade

Dysplasia Grade	Surgical Excision	Laser Ablation	Observation	Recurrence (n/%)	Malignant Transformation (n/%)
Mild (n=48)	35	5	8	2 (4.2%)	0 (0%)
Moderate (n=42)	38	3	1	6 (14.3%)	1 (2.4%)
Severe (n=30)	29	2	0	6 (20%)	5 (16.7%)

Lesions located on the floor of the mouth and tongue had slightly higher transformation and recurrence rates, consistent with literature indicating higher malignant potential in these sites (Table 3).

Table 3: Site of Lesion and Recurrence/Transformation Rates

Site of Lesion	Cases (n)	Recurrence (n/%)	Malignant Transformation (n/%)
Buccal Mucosa	54	6 (11.1%)	2 (3.7%)
Tongue	30	4 (13.3%)	2 (6.7%)
Floor of the Mouth	18	3 (16.7%)	1 (5.6%)
Gingiva	18	1 (5.6%)	1 (5.6%)

DISCUSSION

This retrospective analysis highlights the significant correlation between the histological severity of epithelial dysplasia in OPMDs and their clinical behavior, particularly with respect to recurrence and malignant transformation. The findings reinforce existing literature emphasizing the importance of early diagnosis and surgical intervention in managing high-risk lesions.

Leukoplakia emerged as the most prevalent OPMD in our cohort, accounting for half of all cases, which aligns with studies by Warnakulasuriya et al. and Napier & Speight, who reported leukoplakia as the most frequently encountered premalignant lesion in clinical practice.[8] Despite its common occurrence, the degree of dysplasia varied significantly, underscoring the need for histological confirmation rather than reliance on clinical appearance alone. Erythroplakia, although less common, demonstrated a much higher proportion of severe dysplasia (58.3%), consistent with prior studies that describe erythroplakia as a lesion with the highest malignant transformation potential due to its typically advanced dysplastic architecture. The recurrence and malignant transformation rates observed in this study show a clear trend: as the grade of dysplasia increases, so does the likelihood of adverse outcomes. This is in agreement with Holmstrup et al. and Kujan et al., who demonstrated that severe dysplasia is a strong predictor of transformation to squamous cell carcinoma, with transformation rates reported between 10–30% in high-grade lesions over time. Our study found a transformation rate of 16.7% among severe dysplasia cases, reflecting similar risk patterns.[9]

Surgical excision remains the cornerstone of treatment in moderate to severe dysplastic OPMDs. In our study, 85% of patients underwent surgical removal with histologically confirmed clear margins. Among these, recurrence occurred in only 11.7%, and malignant transformation was restricted to a small subgroup of initially severe cases. This suggests that surgical intervention significantly reduces the risk of disease progression when performed early and with adequate margins. Laser excision and ablation were employed selectively, particularly for small, well-circumscribed lesions or those in esthetically sensitive areas. However, some evidence suggests that thermal damage from lasers may obscure margin assessment and histological interpretation. Further randomized studies are needed to clarify the long-term outcomes of laser therapy versus conventional surgery.[10] Interestingly, a small percentage (6.7%) of patients with mild dysplasia and no high-risk habits were managed conservatively under surveillance. These cases were selected carefully, and no transformation was observed during the follow-up period. This supports the concept of risk-based management, particularly for lesions that are clinically stable and histologically low-grade. However, patient compliance with regular follow-up and behavior modification is critical in such cases.[11]

The anatomical distribution of lesions revealed that the buccal mucosa was the most common site, likely reflecting local irritants such as smokeless tobacco or betel nut. However, lesions on the tongue and floor of the mouth demonstrated relatively higher rates of malignant transformation, consistent with the notion that thin, non-keratinized mucosa is more vulnerable to carcinogenic insults and has a poorer prognosis if affected.[12] One of the strengths of this study is the inclusion of a broad spectrum of OPMDs and stratification by dysplasia grade, allowing meaningful comparison of clinical outcomes. However, limitations include its retrospective nature, single-center data, and variability in follow-up durations, which may underestimate true long-term transformation rates.[13]

Tilakaratne et al (2023)[14] performed a global epidemiological review and noted that leukoplakia and erythroplakia are the most common OPMDs, with transformation rates ranging from 1% to 20% depending on dysplasia severity and patient-related risk factors. In our study, leukoplakia was the most frequent OPMD (50%), and the transformation rate among severe dysplasia cases was 16.7%, aligning well with these findings. Senarath et al. (2021)[9] evaluated 345 patients with oral leukoplakia and reported that 8.9% progressed to oral squamous cell carcinoma (OSCC) over a 10-year follow-up. They highlighted that high-grade dysplasia had a significantly higher risk. In comparison, our study found a malignant transformation rate of 5% overall and 16.7% in the severe dysplasia group, which, although slightly higher, can be attributed to a higher proportion of high-risk lesions (e.g., erythroplakia and tongue/floor of mouth sites).

Gómez et al. (2021)[7] emphasized the importance of risk stratification using both clinical and histopathological factors and proposed that moderate to severe dysplasia warrants surgical excision. This recommendation was echoed in our findings, where surgical management of 85% of cases, particularly those with moderate and severe dysplasia, led to a relatively low recurrence rate (11.7%) and controlled progression. Only 5% progressed to malignancy, which again supports the effectiveness of timely surgical intervention. Jäwert et al (2021)[10] also noted that erythroplakia has the highest risk for malignant transformation, with up to 50% of lesions showing carcinoma at first biopsy. In our cohort, erythroplakia accounted for 20% of OPMDs and had a high rate of severe dysplasia (58.3%), with two cases eventually transforming into carcinoma, further validating this assertion.

A study by Tilakaratne et al (2023)[14] highlighted that many cases of oral epithelial dysplasia, especially those classified as mild, can remain stable or even regress with risk factor modification. Our study reflected this finding, as patients with mild dysplasia who were managed conservatively and received habit cessation counseling showed no transformation during the follow-up period. This underlines the importance of individualized treatment planning and the potential for conservative management in low-risk cases. In contrast, Kokubun et al. (2024)[15] recommended complete excision even for low-grade lesions, citing the unpredictability of progression. However, their study did not account for compliance with lifestyle modification, which plays a crucial role, particularly in resource-limited populations. Our findings suggest that with careful selection and consistent follow-up, conservative management of select mild dysplastic lesions can be effective and safe.

CONCLUSION

Severity of dysplasia significantly influences clinical outcomes. Surgical excision remains the gold standard for moderate to severe dysplasia, reducing risk of recurrence and malignancy. Conservative management may be appropriate for selected mild dysplasia cases under close follow-up.

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