ENDOSCOPIC INDICATORS OF OESOPHAGEAL MALIGNANCY: INSIGHTS FROM A CROSS-SECTIONAL STUDY

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ABSTRACT

Introduction: *Oesophageal cancer is a major global health challenge and a leading cause of cancer-related deaths, particularly in Sub-Saharan Africa. Delayed presentation and limited diagnostic capacity contribute to its poor prognosis. Early recognition of endoscopic features predictive of malignancy may improve diagnostic yield and guide timely management.*

Aim: *This study aimed to evaluate endoscopic features predictive of malignancy in patients with oesophageal lesions at a tertiary centre in North-western Nigeria.*

Methodology: *A retrospective cross-sectional study was conducted at the Endoscopy Unit of Usmanu Danfodiyo University Teaching Hospital, Sokoto, from January 2018 to December 2022. Thirty-four patients with endoscopic findings of oesophageal lesions were included. Data on socio-demographics and endoscopic features (site, size, colour, bleeding, ulceration, and stricture) were extracted and analyzed using SPSS version 27. Chi-square test was applied, with $p < 0.05$ considered statistically significant.*

Results: *Of the 34 patients, 26 (76.0%) had histologically confirmed malignant lesions, while 8 (24.0%) were benign. Age and gender were not significantly associated with malignancy ($p = 0.911$ and 0.444, respectively). Similarly, lesions location and size did not show significant associations ($p = 0.684$ and 0.609). However, ulceration ($p = 0.003$), erythematous colour ($p < 0.001$), bleeding ($p < 0.001$), and stricture formation ($p < 0.001$) were significantly predictive of malignancy.*

Conclusion: *The findings underscore the diagnostic value of certain endoscopic features, particularly ulceration, colour changes, bleeding, and strictures, in predicting malignancy. These observations align with international literature and emphasize the importance of careful endoscopic evaluation to enhance biopsy targeting and reduce missed diagnoses, especially in low-resource settings where advanced imaging modalities may not be readily available.*

Key words: *Oesophageal cancer, Endoscopic indicators, Malignancy predictors, Oesophageal lesions, Cross-sectional study*

INTRODUCTION

Oesophageal cancer remains a major global health challenge, ranking among the most lethal cancers due to often late presentation and aggressive behaviour. The two predominant histological subtypes, oesophageal squamous cell carcinoma (OSCC) and oesophageal adenocarcinoma (OAC), have distinct geographical distributions and risk factors.[1] According to recent data from the Global Burden of Disease Study, oesophageal cancer is the seventh most prevalent cancer globally, and the sixth leading cause of cancer-related mortality, particularly burdening regions in East Asia and Sub-Saharan Africa.[2]

Early detection is hindered by nonspecific symptoms and limited access to diagnostic facilities, contributing to a poor prognosis. The critical determinant for improving the prognosis of oesophageal cancer is early detection. When diagnosed at a localized stage, the 5-year survival rate can exceed 45%, highlighting the pivotal importance of timely intervention.[3]

Upper gastrointestinal endoscopy is the primary diagnostic modality for visualizing the oesophageal mucosa and investigating symptoms such as dysphagia, odynophagia, and unintentional weight loss, as well as guiding biopsy for histological confirmation.[4] Recognizing specific morphological features strongly associated with malignancy can increase the diagnostic yield of biopsies, ensuring that suspicious areas are adequately sampled and reducing the risk of a false-negative result.[5]

Several endoscopic features have been associated with malignant oesophageal lesions. Features such as ulceration, irregular or heaped margins, friability, bleeding, strictures, and luminal narrowing are often described in case reports and retrospective series.[4, 6] Ulceration, particularly when deep or with associated irregular borders, is thought to reflect invasive disease, whereas stricture and bleeding suggest advanced or aggressive pathology. Mucosal colour changes, such as erythema or loss of regular mucosal pattern, have also been observed, though their specificity is variable. However, the predictive value of a combination of these features within a single patient cohort, particularly in regions with a high burden of OSCC, requires further elucidation. Furthermore, the significance of other factors, such as the lesion's size and anatomical location within the oesophagus, remains inconsistent across the literature.[7]

Given the high mortality of oesophageal cancer and the central role of endoscopy in its diagnosis, it is imperative to refine our ability to identify malignancy during the initial endoscopic examination. This study, therefore, aims to systematically evaluate the endoscopic features associated with histologically proven malignant oesophageal lesions.

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METHODOLOGY

A retrospective cross-sectional study was conducted, recruiting 34 patients with endoscopic findings of oesophageal lesions over five years at the endoscopy unit of Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto, between January 2018 and December 2022. The study was conducted after obtaining ethical approval from the UDUTH Ethics Committee. Only patients with intrinsic oesophageal lesions visualized during endoscopy and with confirmed histopathological diagnoses (either benign or malignant) within the study period were included. Patients with incomplete endoscopic reports or those without corresponding histopathological diagnoses were excluded from the study. The study population consisted of all patients who underwent endoscopy with findings of oesophageal lesions during the study period. A questionnaire was used to collect information, which included socio-demographic characteristics such as age and gender, as well as endoscopic features, including the location of oesophageal lesions, site, size, colour, bleeding, ulceration, and evidence of stricture. For this study, oesophageal lesions were divided into either malignant or benign based on histological confirmation. The extracted data was imputed into a computer and analyzed using IBM's Statistical Package for the Social Sciences software, version 27 (SPSS, Chicago, IL). Categorical data, such as age and gender, were summarized as frequencies, proportions, and percentages. A chi-square test was used to determine the association of endoscopic indicators. A p-value of less than 0.05 was accepted as statistically significant at a confidence interval of 95%.

RESULTS

A total of thirty-four patients with endoscopic findings of oesophageal lesions were included in this cross-sectional analysis, with ages ranging from 20 to 90 years. Histopathological examination revealed that 26 (76.0%) of the lesions were malignant as shown in figure 1, with a mean age of 55.12 ± 15.03 years and a male-to-female ratio of 1.4:1, while 8 (24.0%) were benign with a mean age of 64.25 ± 13.96 years and a male-to-female ratio of 3:1. The age and gender distribution of oesophageal lesions are shown in Table I. The distribution of lesions by age and gender was analyzed for association with malignancy. The majority of malignant lesions (84.6%) were found in patients over 40 years of age, with the highest frequency in the 41-50 age group (26.9%). While a trend towards a higher prevalence of malignancy was observed in older patients, this difference was not statistically significant (p=0.911). Similarly, although a higher proportion of malignant lesions was found in males (57.7%) compared to females (42.3%), and a larger percentage of benign lesions was found in males (75.0%), this gender difference also failed to reach statistical significance (p = 0.444). The relationship between specific endoscopic features and malignancy is detailed in Table II. The anatomical location of the lesions (upper, mid, or lower oesophagus) and its size (categorized as less than or greater than 3 centimeters)[8] showed no significant association with the histological outcome (p=0.684 and p=0.609, respectively). In contrast, several morphological features demonstrated a statistically significant correlation with malignancy. Ulceration was present in 65.4% of malignant lesions but was absent in benign lesions (p=0.003). An erythematous (reddened) colour of the lesions was observed in 84.6% of malignant cases and in none of the benign cases (p<0.001). In Figure 2, a white arrow indicates an ulcerated and erythematous area. Active bleeding on the surface of the mass was a feature exclusive to malignancy, present in all 26 malignant cases (100%) and absent in all benign cases (p<0.001). Furthermore, the presence of a stricture, indicating luminal narrowing, was significantly associated with malignancy, being present in 76.9% of malignant lesions and absent in all benign lesions (p<0.001). Figure 2

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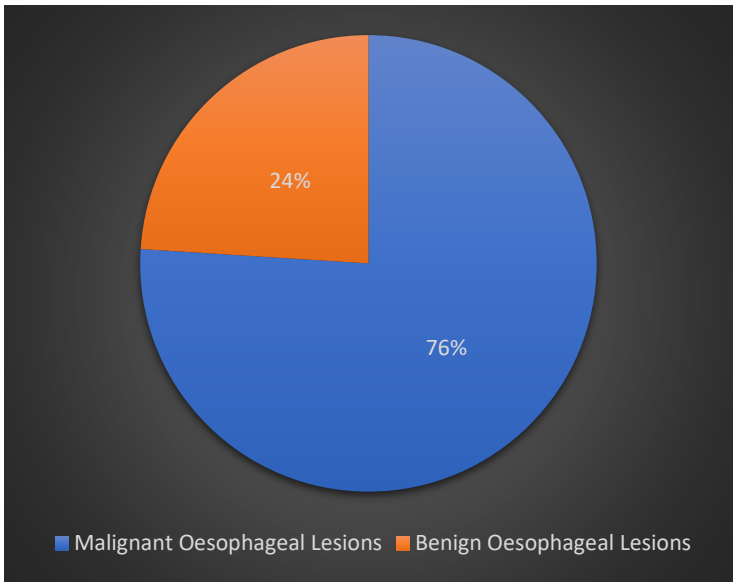

Figure 1: Histological Type of Oesophageal lesions

TABLE I: AGE AND GENDER HISTOLOGICAL DISTRIBUTION OF OESOPHAGEAL LESIONS

Variables	**Malignant E.L. n=26 (%)**	**Benign E.L. n=8 (%)**	**p-value**
Age(yrs)			
20-30	2(7.7)	0(0)	
31-40	2(7.7)	0(0)	p=0.911
41-50	7(26.9)	1(12.5)	
51-60	5(19.2)	2(25)	
61-70	6(23.1)	3(37.5)	
>70	4(15.4)	2(25)	
Gender			
male	15 (57.7)	6 (75)	p=0.444
female	11(42.3)	2(25)	

E. L= Oesophageal lesions

TABLE II: ENDOSCOPIC INDICATORS OF OESOPHAGEAL MALIGNANCY

Variables	**Malignant E.L n=26 (%)**	**Benign E.L n=8(%)**	**p-value**
Location of the lesions			
Upper oesophagus	8(30.8)	1(12.5)	
Mid-oesophagus	11(42.3)	5(62.5)	p=0.684
Lower oesophagus	7(26.9)	2(25)	
Size of the lesions			
<3 centimeter	22(84.6	6(75)	p=0.609
>3cenimeter	4(15.4)	2(25)	
Ulceration			
Present	17(65.4)	0(0)	p= 0.003*
Absent	6(34.6)	8(100)	
Colour			
Erythematous	22(84.6)	0(0)	p<0.001*
Pale	4(15.4)	8(100)	
Bleeding			
Present	26(100)	0(0)	p<0.001*
Absent	0(0)	8(100)	
Stricture			
Present	20(76.9))	0(0)	p<0.001*
Absent	6(23.1)	8(100)	

E.L = Oesophageal lesions

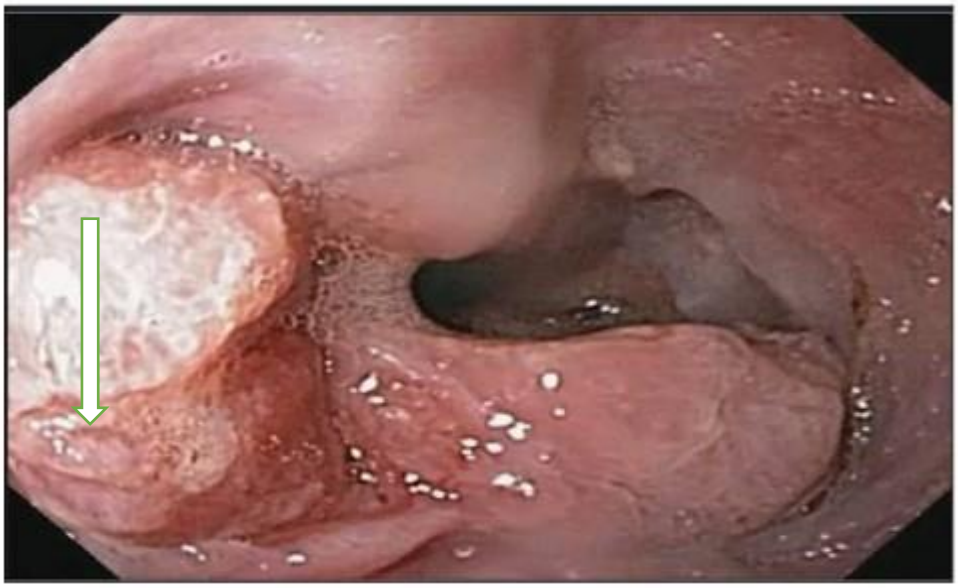

Figure II: Endoscopic image of one of the patients with oesophageal lesions at lower oesophagus. The white arrow points to an ulcerated and erythematous area.

DISCUSSION

The study examined which endoscopic characteristics were substantially linked to malignancy, as determined by histology, in this cross-sectional study of 34 individuals with oesophageal lesions identified by endoscopy. Malignant lesions made up 76% (26/34) of the total. We found strong and statistically significant correlations between malignancy and ulceration, erythematous mucosal colouring, bleeding, and luminal stricturing. However, in our sample, there were no significant correlations between demographic characteristics (gender, age), mass location, or lesions size.

In line with the epidemiology of the disease in North-western Nigeria and the larger Sub-Saharan African region, where oesophageal squamous cell carcinoma (OSCC) is the most common subtype, our cohort of patients with oesophageal lesions had a startlingly high prevalence of malignancy (76%), which reflects the high burden of oesophageal cancer in our setting.[9] The high percentage of malignant oesophageal lesions reported in a comparable study from Kano, Nigeria, further highlights the aggressive nature of presentations in this region.[10]

The lack of a significant association between malignancy and age or gender, despite a trend towards older age and male predominance, was an interesting finding. This contrasts with extensive epidemiological studies, which consistently identify advanced age and male gender as significant risk factors for oesophageal cancer.[11, 12] The observed discrepancy may be due to differences in the demographic distribution of patients presenting with benign and malignant oesophageal lesions. However, the observed trend aligns with established epidemiology and a Nigerian study by Malu et al., which reported a peak incidence of oesophageal cancer in the 5th to 6th decades of life.[13]

Although the literature on endoscopic predictors of oesophageal lesions is limited, Mabula et al reported the endoscopic and clinicopathological characteristics of oesophageal cancer in a retrospective series from Tanzania which revealed that nodularity, ulceration, and luminal narrowing were typical findings, which are consistent with our observations of stricturing and ulcerative lesions in malignant cases. Similar to this, research on oesophageal cancer in general highlights how macroscopic characteristics, including ulceration, infiltrative development, and mucosal irregularity, can increase the likelihood of malignancy.[14] Interestingly, neither lesion size nor anatomical location showed statistically significant relationships. Larger tumours may have a higher probability for malignancy, according to some earlier research, but benign lesions can also enlarge in practice, decreasing the discriminatory value. Size may not be a reliable indicator of malignant versus benign disease in our context, as delayed presentation and late detection may have a greater impact on lesion growth. The absence of anatomical site relationship implies that malignant potential is not limited to any specific oesophageal segment, which is in line with the literature, which reports upper and lower oesophageal cancers in various groups.[15]

One classic endoscopic indicator is the substantial correlation ($p = 0.003$) between ulceration and cancer. Tumour necrosis and profound penetration via the mucosal layers are reflected in ulceration. This result aligns with global research, including a study by Dawsey et al., which characterized malignant oesophageal lesions as often exophytic and ulcerated.[8] All of our malignant patients have spontaneous bleeding ($p<0.001$), which is a result of tumour neovascularity, in which delicate, recently created blood vessels readily burst when they come into contact with the endoscope. One well-known feature of malignant tissue is its friability.[16]

Additionally, a stricture was a strong predictor of malignancy ($p<0.001$). When a tumour grows circumferentially and invades the muscularis propria, it causes tightness and fibrosis, which results in luminal narrowing. Patients frequently present with dysphagia for this reason, which is frequently an indication of severe disease. Stricture formation was also noted as a crucial endoscopic characteristic of malignancy in a study conducted in Iran, a country with a high incidence of OSCC.[17]

The erythematous colour of the lesions, which was completely absent in benign instances ($p < 0.001$) and disproportionately evident in malignant patients (84.6%), was one of the most visually identifiable markers in our analysis. Increased vascularity and inflammation associated with the tumour microenvironment are likely the causes of this erythema. Luminal

obstruction and ulceration were also revealed to be significant predictors of cancer in a retrospective investigation from Cameroon, which our results support.[18]
The small sample size, particularly of the benign group, limits the generalizability of our findings and the statistical power for multivariate analysis to control for confounding variables.

CONCLUSION: This study provides important evidence that specific endoscopic characteristics specifically, stricture formation, active bleeding, erythematous colour, and ulceration are strong predictors of cancer in individuals with oesophageal lesions. A greater understanding of these characteristics may help the endoscopist execute targeted and appropriate biopsies, thereby improving diagnostic yield and reducing the likelihood of false-negative results in a resource-constrained environment, such as ours, where pathology services may be delayed or limited. When any of these characteristics are present, endoscopists needs to keep a high index of suspicion for cancer. Larger sample sizes and prospective, multi-canter investigations are needed in the future to provide a uniform endoscopic scoring system for predicting oesophageal cancer.

CONFLICT OF INTEREST
None

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