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The Relationship Between Hiatal Hernia Size, Specific Clinical Symptoms, and Endoscopic Mucosal Changes

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Abstract

Background: *Hiatal hernia (HH) is a frequent anatomical abnormality often associated with gastroesophageal reflux disease (GERD). However, the exact relationships between the size of the hernia, the clinical symptoms, and the appearance and extent of endoscopic mucosal changes are subjects of active clinical interest and ongoing research. These relationships are important to understand, for purposes of enhancing optimization of diagnostic methods and optimizing management strategies.*

Aim: *This study aimed to investigate the relationship between hiatal hernia size, specific clinical symptoms, and endoscopic mucosal changes in patients presenting with reflux symptoms at a tertiary care center.*

Methodology: *A descriptive cross-sectional study was conducted with 416 consecutive patients who had dyspeptic symptoms consistent with hiatal hernia. All patients underwent upper gastrointestinal endoscopy. Hiatal hernia size was measured, by the distance from the Z-line (squamo-columnar junction) to the diaphragmatic indentation. Clinical symptoms (heartburn, regurgitation, epigastric pain, dysphagia) and endoscopic mucosal changes (reflux oesophagitis using Los Angeles classification, presence of bile, mucosal prolapse, bleeding) were recorded. Statistical analyses were utilized to analyze associations between symptoms, endoscopic changes (Chi-Square, Fischer's exact), and regression (binary logistic), with $p<0.05$ being statistically significant.*

Results: *The most frequently reported symptom was heartburn (66.6%), followed by epigastric pain (61.5%). The largest size of a hiatal hernia being 2cm, and 3cm displayed similar frequencies (46.9% for each size). A significant relationship was reported between hiatal hernia size (≥3cm), and regurgitation ($p<0.001$); abdominal tenderness ($p<0.001$), reflux oesophagitis ($p=0.020$), and mucosal prolapse ($p=0.001$). In addition, hiatal hernia size had a statistically significant positive relationship with reflux oesophagitis severity (GERD grading) whereby hiatal hernia size 3cm or greater were principally associated with Grade C oesophagitis ($p<0.001$). Furthermore, age ($p=0.004$) and body mass index (BMI) ($p<0.001$) were also statistically significant relationship with variable (hiatal hernia size).*

Conclusion: *This research demonstrated an exact, significant association between an increasing hiatal hernia size and certain symptoms, such as regurgitation, and more severe endoscopic mucosal changes; especially higher-grade reflux oesophagitis and mucosal prolapse. Hiatal hernia size is one of the key determinants of both clinical and endoscopic manifestations of the disease, emphasizing the benefit of its precise endoscopic assessment in symptomatic patients.*

Keywords: *Hiatal Hernia Size, Clinical Symptoms, Endoscopic Mucosal Changes, Reflux Oesophagitis, GERD, Endoscopy.*

1.0.Introduction

Hiatal hernia, where the gastroesophageal junction (GEJ) and sometimes part of the stomach goes above the diaphragm, is a big anatomical problem with many clinical implications (Kim & Bak, 2011). For decades the relationship between hiatal hernias and gastroesophageal reflux disease (GERD) has been

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debated and researched and now there is a growing consensus that bigger hernias mean more reflux (Kim & Bak, 2011). The GEJ is a complex anatomical and physiological structure designed to be an anti-reflux barrier. A hiatal hernia disrupts this barrier, impairs oesophageal acid clearance and allows GERD to develop and worsen (Kim & Bak, 2011). This has evolved into the "two-sphincter hypothesis" where both the presence of a hiatal hernia and the functional abnormality of the lower oesophageal sphincter contribute to the disease (Kim & Bak, 2011). Type I (sliding) hiatal hernias are most commonly associated with GERD but having a hernia does not predict symptom severity or extent of oesophageal mucosal damage (Dean et al., 2012). So a more detailed understanding of how hernia size specifically affects different symptoms and endoscopic mucosal changes is key to refining diagnosis and treatment.

Patients with hiatal hernia can present with varied symptoms, often dominated by typical GERD symptoms like heartburn and regurgitation. But other symptoms like epigastric pain, dysphagia, nausea and even atypical symptoms like palpitations can occur making diagnosis based on symptomatology alone challenging (Wallner et al., 2002; 2018). The intensity and frequency of these symptoms are often thought to correlate with the degree of GEJ disruption which is largely determined by the size of the hiatal hernia. Bigger hernias can lead to more incompetence of the anti-reflux barrier, more volume of refluxate and delayed oesophageal clearance and potentially more pronounced or specific symptom profiles (Kahrilas et al., 2008). While studies have linked hiatal hernia to reflux symptoms generally (Gordon et al., 2004; Harris, 2024a) we need more detailed investigation into how *specific* symptoms like the difference between heartburn and regurgitation relate to different hernia sizes. This is clinically relevant as regurgitation for example might indicate a more compromised sphincter mechanism often associated with bigger hernias.

Endoscopy plays a key role in the diagnosis of hiatal hernia and assessment of mucosal consequences. It allows direct visualization and measurement of the hernia, typically defined by the proximal displacement of the Z-line (squamo-columnar junction) more than 2cm above the diaphragmatic indentation (Kahrilas et al., 2008; Kim & Bak, 2011). Beyond confirming the presence and size of the hernia, endoscopy is crucial for identifying and grading oesophageal mucosal changes, most commonly reflux oesophagitis, using standardized systems like the Los Angeles (LA) Classification (Katz et al., 2013). The severity of oesophagitis, ranging from minor mucosal breaks (Grade A) to extensive circumferential damage (Grade D), is a key indicator of disease severity and a predictor of complications like Barrett's oesophagus and oesophageal adenocarcinoma (Ronkainen et al., 2005; Andrici et al., 2013). It is hypothesized that larger hiatal hernias, by facilitating more severe and prolonged acid exposure, would correlate with higher grades of oesophagitis and other mucosal changes like erosions, ulcerations, or mucosal prolapse. Establishing such a correlation robustly can aid in risk stratification and guide the intensity of medical or surgical interventions (ASGE Standard of Practice Committee et al., 2012; Wulansari et al., 2024).

Despite the general acceptance of a link between hiatal hernia and GERD, the specific impact of hernia size on the constellation of clinical symptoms and the spectrum of endoscopic mucosal findings needs more focused attention, especially in diverse populations. Many studies have looked into this but variations in diagnostic criteria for hernia size, symptom reporting and population characteristics can lead to different conclusions (Ott et al., 1985; Weitzendorfer et al., 2017). For instance, while Wallner et al. (2002; 2018) found that hernias less than 2cm are often asymptomatic in a Swedish population, the threshold for clinical significance and the pattern of symptom-sizemucosal change correlation may be different in other demographic settings, such as an African population where dietary habits, genetic predispositions and healthcare seeking behavior may vary.

We conceived this study to bridge this gap by examining these relationships in patients presenting to a Nigerian tertiary hospital. Understanding these correlations in our local context is key to improving diagnostic accuracy, predicting disease severity and optimizing patient management strategies, potentially reducing morbidity from misdiagnosis or delayed appropriate intervention.

So, the aim of this study was to critically examine and determine the specific relationships between endoscopically measured hiatal hernia size, prevalence and nature of symptoms and type and severity of endoscopic mucosal changes (reflux oesophagitis grade, mucosal prolapse and presence of bile) in patients presenting with reflux symptoms at the University of Port Harcourt Teaching Hospital. This study seeks to show how the anatomical size of a hiatal hernia translates to clinical and pathological manifestations.

2.0.Methodology

This study is a descriptive cross-sectional study. It was done in the surgery department of the University of Port Harcourt Teaching Hospital (UPTH), which is a major tertiary referral centre for Rivers state and other neighbouring states in Southern Nigeria. The study population consists of 416 consecutive adult patients (18 years and older) who presented to the general surgery outpatient clinic and those referred from the medical outpatient clinic with dyspeptic symptoms in the year 2022 may have signs and symptoms of hiatal hernia, such as heartburn, regurgitation, or epigastric pain.

The research adopted a serial sampling method, meaning that all patients who were eligible to participate in the study were recruited after providing written informed consent. The inclusion criteria required the patients to present with reflux symptoms suggesting sliding hiatal hernia and agree to participate in the study, which included patients undergoing upper gastrointestinal endoscopy. Patients who did not provide consent or were considered unstable or unfit for upper GI endoscopy were excluded.

Clinical data was collected utilizing a structured proforma administered by the researcher or a trained assistant. The

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proforma collected comprehensive measures of patient demographics, medical history and important clinical symptoms. Symptoms recorded in detail were heartburn (presence and type), regurgitation, anorexia, nausea, vomiting, palpitations, epigastric pain, and dysphagia. Lifestyle factors (alcohol consumption and smoking), together with clinical parameters (Body Mass Index - BMI), were also recorded. A comprehensive clinical examination was conducted, including assessment for tenderness in the abdomen.

All subjects recruited for the study underwent upper gastrointestinal endoscopy supervised by either the principal investigator or a consultant of the unit, using a Karl Storz Endoscope unit (Model TL 100) with a gastroscope (Model 13821 PKS). The upper gastrointestinal endoscopy was done after giving local pharyngeal anaesthesia with 10% lignocaine spray and mild intravenous sedation (diazepam, pentazocine) and an antispasmodic (buscopan). The endoscopic examination systematically inspected the oesophagus, stomach and duodenum. The size of the hiatal hernia was determined by measuring two distances; (A) the length of the upper incisors to the Z-line (squamocolumnar junction) and (B) the length of the upper incisors to the diaphragmatic indentation. The axial length of the hiatal hernia (in centimetres) was calculated as (B - A) centimetres.

Endoscopic mucosal changes were carefully documented. Reflux oesophagitis was graded according to the Los Angeles (LA) Classification system (Grade A: one or more mucosal breaks ≤5mm, not extending between tops of two mucosal folds; Grade B: one or more mucosal breaks >5mm, not extending between tops of two mucosal folds; Grade C: mucosal breaks continuous between tops of ≥2 folds but <75% of circumference; Grade D: mucosal breaks involving ≥75% of oesophageal circumference). Other findings such as the presence of bile in the oesophagus, mucosal prolapse at the GEJ, peptic ulcers, and signs of bleeding were also recorded. Biopsies were taken if clinically indicated, though histological analysis is not the primary focus of this specific correlational study on size, symptoms, and gross mucosal changes.

Using the Statistical Product and Service Solutions (SPSS) version 25, data were entered and then analysed. Continuous variables such as age and body mass index (BMI) were summarized as mean ± standard deviation and categorical variables such as symptoms, hernia size categories, LA grades, etc. were summarized by frequencies and percentages. To assess the associations of interest for this study, hiatal hernia size was frequently categorized (e.g. <3cm vs. ≥3cm) for analysis, based on visual distributions and clinical judgment. Associations between hiatal hernia size and clinical symptoms, as well as hernia size and endoscopic assessment of mucosal changes (i.e., GERD grading), were analysed using the Chi-Square test or Fischer's exact test when cell counts were low. Where relevant, binary logistic regression was also used to assess predictors of hiatal hernia size and manifestations. A p-value of <0.05 was used for all analyses to consider the results to be statistically significant.

3.0.Results

A total of 416 participants, meeting the inclusion criteria and having undergone upper gastrointestinal endoscopy, were included in the final analysis. The mean age of the participants was 44.3 ± 14.3 years (range: 15-88 years), with the largest proportion (31.3%) in the 40-49 years age group. Females constituted 65.4% (n=272) of the study population.

Clinical Symptoms and Hiatal Hernia Size

The most frequently reported symptom was heartburn, experienced by 277 (66.6%) participants, followed by epigastric pain in 256 (61.5%) participants, and regurgitation in 131 (31.5%) participants. Dysphagia was reported by 25 (6.0%) participants. The distribution of hiatal hernia sizes is presented in Table 1. The predominant sizes were 2cm and 3cm, each occurring in 195 (46.9%) participants.

Table 1: Distribution of Endoscopically Measured Hiatal Hernia Sizes (N=416)

Hernia Size (cm)	Frequency (n)	Percent (%)
1	10	2.4
2	195	46.9
2.5	4	1.0
3	195	46.9
4	10	2.4
5	2	0.5
Total	**416**	**100.0**

The relationship between specific clinical symptoms and hiatal hernia size (grouped as <3cm vs. ≥3cm for analysis based on predominant sizes and analytical approach in the primary data) can be found in Table 2. A statistically significant relationship was found between larger hiatal hernia size (≥3cm) and the symptom of regurgitation (62.6% of those with regurgitation had HH ≥3cm vs. 37.4% had HH <3cm, p<0.001). Moreover, abdominal tenderness on examination was also statistically significantly higher in those with larger hernias (61.1% of those with tenderness had HH ≥3cm, p<0.001). Heartburn was common, but when dichotomized as significant vs. not significant noted no statistically significant association between size of hernia (p=0.200). The same holds true for epigastric pain (p=0.125) and dysphagia (p=0.142).

Table 2: Association Between Specific Clinical Symptoms/Signs and Hiatal Hernia Size (N=416)

Table 2: Association Between Specific Clinical Symptoms/Signs and Hiatal Hernia Size (N=416)

Symptom/Sign	Hiatal Hernia Size <3 cm, n (%)	Hiatal Hernia Size ≥3 cm, n (%)	χ^2 / Fisher's Exact	P-value
Heartburn	133 (48.0)	144 (52.0)	1.643	0.200
No Heartburn	76 (54.7)	63 (45.3)		
Regurgitation	49 (37.4)	82 (62.6)	12.602	< 0.001*
No Regurgitation	160 (56.1)	125 (43.9)		
Epigastric Pain	121 (47.3)	135 (52.7)	2.356	0.125
No Epigastric Pain	88 (55.0)	72 (45.0)		
Dysphagia	9 (36.0)	16 (64.0)	2.158	0.142
No Dysphagia	200 (51.2)	191 (48.8)		
Abdominal Tenderness	82 (38.9)	129 (61.1)	22.172	< 0.001*
No Abdominal Tenderness	127 (61.9)	78 (38.1)		

Note: Percentages for symptoms are calculated based on the total number of patients experiencing that symptom. Percentages for 'No Symptom' rows are calculated based on those not experiencing the symptom, for comparative context within the table structure derived from the parent study. χ^2 values and p-values reflect the association for the presence of the symptom versus hernia size category. ***Significant**

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Endoscopic Mucosal Changes and Hiatal Hernia Size

Reflux oesophagitis was observed in 404 (97.1%) participants. The severity of oesophagitis, graded by the Los Angeles (LA) Classification, is shown in Table 3. Grade C oesophagitis was the most common, found in 234 (56.3%) participants, followed by Grade B in 163 (39.2%), and Grade A in 19 (4.6%). No patients were classified as Grade D.

Table 3: Distribution of Reflux Oesophagitis Severity (LA Classification) (N=416 patients, 404 with oesophagitis

LA Grade	Frequency (n)	Percent (%) of Those with Oesophagitis (n = 404)	Percent (%) of Total Sample (N = 416)
Grade A	19	4.7%	4.6%
Grade B	163	40.3%	39.2%
Grade C	234	57.9%	56.3%
No Oesophagitis	12	N/A	2.9%
Total Oesophagitis	404	100.0%	97.1%

A highly significant association was found between hiatal hernia size and the LA grade of reflux oesophagitis ($p<0.001$), as detailed in Table 4. Patients with larger hernias (≥3cm) were significantly more likely to have higher grades of oesophagitis. Specifically, 80.8% of patients with Grade C oesophagitis had hernias ≥3cm, compared to only 10.4% of those with Grade B and 5.3% of those with Grade A oesophagitis having hernias of this size.

Table 4: Association Between Hiatal Hernia Size and GERD Grading (Los Angeles Classification) (N=404 with oesophagitis)

Table 4: Association Between Hiatal Hernia Size and GERD Grading (Los Angeles Classification) (N=404 with oesophagitis)

GERD Grade (LA Classification)	Hiatal Hernia Size <3 cm, n (%)	Hiatal Hernia Size ≥3 cm, n (%)	χ^2 P value
Grade A	18 (94.7)	1 (5.3)	205.913 < 0.001*
Grade B	146 (89.6)	17 (10.4)	
Grade C	45 (19.2)	189 (80.8)	

Note: Percentages are calculated based on the total number of patients within each GERD grade.
*Significant

Other endoscopic mucosal changes were also assessed in relation to hiatal hernia size (Table 5). The presence of mucosal prolapse was significantly associated with larger hiatal hernias ($p<0.001$), with 82.0% of patients exhibiting mucosal prolapse having hernias ≥3cm. The presence of bile in the oesophagus ($p=0.545$) and complications like bleeding ($p=0.467$, though numbers were small, n=8) did not show a statistically significant association with hernia size in this dichotomized analysis. Peptic ulcer disease, present in 25 (6.0%) participants, also showed no significant association with hernia size ($p=0.520$).

Table 5: Association Between Hiatal Hernia Size and Other Endoscopic Mucosal Changes (N=416)

Endoscopic Finding	Hiatal Hernia Size <3 cm, n (%)	Hiatal Hernia Size ≥3 cm, n (%)	χ^2 / Fisher's Exact	Pvalue
Reflux Oesoph (presence)	199 (49.3)	205 (50.7)	5.413	0.020*
No Oesophagitis	10 (83.3)	2 (16.7)		
Presence of Bile	57 (47.9)	62 (52.1)	0.365	0.545
No Bile Present	152 (51.2)	145 (48.8)		
Mucosal Prolapse	9 (18.0)	41 (82.0)	23.629	< 0.001*
No Mucosal Prolapse	200 (54.6)	166 (45.4)		
Peptic Ulcer	11 (44.0)	14 (56.0)	0.414	0.520
No Peptic Ulcer	198 (50.6)	193 (49.4)		
Bleeding (complication)	3 (37.5)	5 (62.5)	0.530	0.467
No Bleeding	206 (50.5)	202 (49.5)		

Note: Percentages are calculated based on the total number of patients exhibiting that finding. χ^2 values and pvalues reflect the association for the presence of the finding versus hernia size category.
*Significant

Patient Characteristics and Hiatal Hernia Size

The relationship between hiatal hernia size and various patient characteristics was also explored, as summarized in Table 6.

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Table 6: Association Between Hiatal Hernia Size and Selected Demographic/Lifestyle Factors (N=416)

Variable		Categories / Distribution (Hiatal Hernia Size <3 cm vs ≥3 cm)	χ^2 / Fisher's Exact	P - value
Age (years)	**Group**	<20 (5 vs 12), 20–29 (33 vs 14), 30–39 (53 vs 39), 40–49 (65 vs 65), 50–59 (21 vs 33), ≥60 (32 vs 44)	17.246	0.004*
Body	**Mass Index**	Normal (90 vs 49), Overweight (109 vs 99), Class 1 Obesity (8 vs 49), Class 2 Obesity (2 vs 7), Class 3 Obesity (0 vs 3)	50.001	< 0.001*
Alcohol Consumption		≤ 40g/day (205 vs 201), 40–80g/day (4 vs 6)	0.430	0.542
Smoking		Yes (3 vs 7), No (206 vs 200)	1.679	0.195

Note: Numbers in parentheses for Age Group and BMI categories represent (n with HH <3cm vs. n with HH ≥3cm) for each category, illustrating the distribution that contributes to the overall chi-square test. For Alcohol Consumption and Smoking, they represent (n with HH <3cm vs. n with HH ≥3cm) for each exposure level.

*Significant

Examination of these patient characteristics found a significant association between the size of hiatal hernia and age group (p=0.004), suggesting increased likelihood of larger hernia size in older patients (≥3cm). This is further supported by logistic regression analyses, which resultantly found younger age groups (20-29 years and 30-39 years) were less likely to have larger hernias compared to patients 60 years and older. Body Mass Index (BMI) contributed a highly significant association with size of hiatal hernia (p<0.001); higher BMI, especially noted in the obese groups (Class 1, 2, and 3), was significantly associated with larger hiatal hernias. Conversely, lifestyle factors such as alcohol intake (p=0.542) and smoking (p=0.195) were not statistically significant factors of hiatal hernia size in this cohort.

4.0.Discussion of Results

This study shows the relationship between hiatal hernia size, symptoms and endoscopic mucosal changes in a cohort of Nigerian patients with dyspeptic symptoms. The findings show that the anatomical size of a hiatal hernia is not just an incidental finding but a key determinant of patient reported symptoms and oesophageal pathology. A major observation was the strong and statistically significant association between hiatal hernia size (particularly those ≥3cm) and regurgitation. While heartburn was the most common symptom overall, its association with hernia size was not as strong as that of regurgitation in this dichotomised analysis. This is in line with the understanding that larger hernias disrupt the GEJ anti-reflux mechanisms more profoundly and allow easier and more voluminous retrograde flow of gastric contents manifesting as regurgitation (Kahrilas et al., 2008; Gotkhinde, 2025; Harris, 2024). Wallner et al. (2002/2018) also found that reflux related symptoms including acid regurgitation were associated with increasing hernia length particularly for hernias ≥2cm. This study further shows that regurgitation is linked to hernias ≥3cm in this specific population.

The relationship between hiatal hernia size and severity of reflux oesophagitis, as graded by the Los Angeles classification was another major finding of this study. There was a clear and highly significant trend: larger hiatal hernias were associated with more severe grades of oesophagitis, especially Grade C. This is in line with many previous studies (Ott et al., 1985; Gordon et al., 2004; Chan, 2017; Baker et al., 2024). The pathophysiology is likely to be multi-factorial: larger hernias can act as a reservoir for acid, prolonging contact time with the oesophageal mucosa; they can impair oesophageal acid clearance mechanisms; and they often signify a more incompetent lower oesophageal sphincter (Kim & Bak, 2011; Kahrilas et al., 1999). The predominance of Grade C oesophagitis (56.3%) in this symptomatic cohort and its strong link to hernias ≥3cm shows the significant mucosal impact of larger hernias. This is different from Wallner et al. (2002) where Grade A was more common in a general population sample, suggesting our hospital based symptomatic cohort is likely to be a population with more advanced disease. The absence of Grade D oesophagitis might be due to referral patterns, early treatment seeking for severe symptoms or regional variations in disease extremity.

Beyond oesophagitis grade, this study also found a significant association between larger hiatal hernia size and endoscopic mucosal prolapse. This is logical as a larger hernial sac and a more patulous GEJ would allow for easier invagination or prolapse of gastric mucosal folds into the distal oesophagus particularly during endoscopic manoeuvres or with changes in intra-abdominal pressure (Kahrilas & Pandolfino, 2006; Kim & Bak, 2011; Sunkara et al., 2018).While the presence of bile in the oesophagus and minor bleeding did not reach statistical significance in relation to hernia size in this analysis (possibly due to sample size within these subgroups or the dichotomized nature of hernia size), these findings still warrant attention, as bile reflux can contribute to mucosal injury, and bleeding, though infrequent here, is a known complication (Al-Tashi et al., 2008). The lack of a significant association with peptic ulcer disease suggests that while PUD can co-exist, its primary pathophysiology may be distinct from factors driving hiatal hernia enlargement in this cohort.

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The observed large associations of increasing age and higher BMI with larger hiatal hernia sizes are consistent with literature (Louis et al., 1999; Weitzendorfer et al., 2017). Ageing is associated with progressive laxity of the ephreno-esophageal ligament and the muscular diaphragmatic crura (Eliska, 1973), while obesity is associated with increases in intra-abdominal pressure which predisposes to hernia formation and growth (Louis et al., 1999). The most common hernia sizes of 2cm and 3cm in the study and the clear thresholds in symptoms and mucosal injury found for hernias <3cm and ≥3cm may indicate that 3cm is a clinically relevant threshold for predicting greater disease severity in the study population. This is consistent with findings that hernias of ≥ 23cm are regarded as clinically more significant in terms of reflux (Wallner et al., 2002; Kahrilas et al., 2008). The robust capacity of abdominal tenderness to predict larger hernias as demonstrated in the regression analysis was interesting and represents another clinical sign that deserves further evaluation; this could perhaps represent more severe inflammatory response, or mechanical irritation, relating to larger hernia size.

The clinical ramifications of these results are powerful. Accurate assessment and reporting of hiatal hernia size endoscopically should be routine during upper GI endoscopy on patients with reflux symptoms. A larger hernia—particularly ≥3cm—should raise the clinician's awareness of swirl indications of greater likelihood of severe symptoms such as regurgitation, more severe grades of oesophagitis, and other factors such as mucosal prolapse. Such information can have implications for management decisions, such as the degree of acid suppression, the use of prokinetics with regurgitation, issues with surveillance—such as with severe grades of oesophagitis and more frequent endoscopic surveillance for more frequent endoscopic surveillance, and for considering more timely discussions on anti-reflux surgery for patients with large hiatus hernias with symptoms or complications that are refractory (Katz et al., 2013; Yetman, 2023; Daly et al., 2024). There is indication to suggest that not all hiatus hernias are created equally and that size is clearly a factor in the clinical and pathological constellation of this prevalent condition.

5.0.Conclusion

The study has definitively demonstrated a significant and direct relationship between the size of hiatal hernia and the development of certain clinical symptoms, in addition to the severity of endoscopic mucosal changes in patients presenting with dyspeptic symptoms. The analysis indicated that hiatal hernias of ≥3cm were strongly related to an increased likelihood of a greater number of patients reporting dysphagia and regurgitation, as well as abdominal tenderness on examination, and a more severe grade of reflux oesophagitis (specifically LA Grade C) and mucosal prolapse seen on endoscopy. Overall, the results clearly demonstrate a meaningful association between the size of hiatal hernia and both the clinical severity and pathological extent of GERDrelated complications. Hence, size of hiatal hernia role as an important predictor of true clinical and pathological severity of GERD should not be underestimated. Therefore, careful endoscopic characterization and measurement of hiatal hernia is essential for accurate risk stratification and informing treatment target development. It seems prudent for clinicians to maintain a higher index of suspicion for more severe disease, and contemplate higher intensity treatment or earlier specialist referral for those patients with problematic symptoms of regurgitation or advanced oesophagitis and larger hiatal hernias. Further studies over time to measure the natural history of different sizes of hernia, and their response to different treatments in comparison, may shed light on these findings.

6.0.Ethical Considerations

The study was undertaken in accordance with ethical principles in the Declaration of Helsinki. The research protocol was approved by the Research and Ethics Committee of the University of Port Harcourt Teaching Hospital (UPTH/ADM/90/S.II/VOL.XI/1037). Participants were advised of the purpose, procedures, risks and benefits of the study during individual sessions before obtaining written informed consent from each patient before being included in the study or any related procedures, including the upper gastrointestinal endoscopy. Participation remained voluntary, and patients were told their decision to participate or decline would not affect the quality of care. Patient data were anonymised with tag numbers assigned to proformas to protect patient confidentiality and anonymity, and were used only for the purpose of the research as outlined in the study.

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Ethical approval was obtained from Hospital Ethics Committee.

Consent was obtained from patients.

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