



The Upward Trend of Proximal Gastric Cancers and the Challenges of Advanced Gastric Cancer Management in Nigeria: Our Experience in a Tertiary Health Facility in North-Eastern Nigeria

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Abstract

Background: Gastric cancer was once captioned as the “Captain of Death”. Although, it has lost the ignominious title now, it is still a major cause of cancer related morbidity and mortality. According to global cancer observatory report in May, 2019, gastric cancer still has a high prevalence rate in Nigeria. It is responsible for 3.5% of all cancers seen in males in 2018 and responsible for 3% of all cancer related deaths in Nigeria. Cancers involving the antrum and body of the stomach are termed as distal, while those involving the cardia and siewert type 111 gastro-oesophageal cancers are considered as proximal. Previous report from Irabor et al. indicated a low incidence for proximal gastric cancers, a stable state prevalence for distal gastric cancers and rejected the role of *H-pylori* related gastritis in the aetiopathogenesis of gastric cancers in Ibadan, South-western Nigeria. We noted an increasing rise in the prevalence of proximal gastric cancers and a strong causal relationship between *H-pylori* related gastric disorders and gastric cancers in North-eastern Nigeria. Like previous reports, majority of our patients presented late with advanced gastric cancers and the outcome is still abysmal despite years of experience and increased availability of adjuvant care.

Objectives: We aim to demonstrate an upward trend in the prevalence of proximal gastric cancers in developing country like Nigeria and demonstrate the effect of *H-pylori* related gastric disorders on the emergence of gastric cancers. We also aim to demonstrate the burden of advanced disease that present to the surgeon in poor resource health facilities and the challenge of managing morbidities associated with advanced gastric cancers.

Patients and Methods: This is a prospective cross-sectional study of 52 patients that presented with various clinical types of gastric cancers from January 2004 to December 2012 at the general surgery unit of University of Maiduguri Teaching Hospital, Borno State, Nigeria. Patients’ characteristics studied included the Biodata, relevant clinical and family history, *H-pylori* antibody test, endoscopic biopsy and histopathologic assessment of gastric biopsy specimen, staging radiological investigations and their results and the morbidities related to the indicated surgical care or metastatic complications. Informed consent was obtained from all participants according to the Helsinki guidelines and ethical clearance was given by the hospital authority.

Data Analysis: All data obtained was assessed using the statistical package for social 20.0 (IBM, Armonk, NY, USA). Continuous variables were presented as mean \pm SD. Categorical variables were expressed as frequencies and percentages. The Pearson’s chi square test was used to determine the relationship between two categorical variables. $P < 0.05$ was considered statistically significant.

Results: The study populations were 52 patients. 50% were males and females each, giving a male to female ratio of 1:1. The mean age was 50.5 (\pm 4.04) with an age range of 16 to 85 years. The most common clinical type is early distal gastric cancer (34.6%), advanced distal gastric cancers, 28.8%. Early proximal gastric cancers constituted 23.1% and advanced proximal cancers 13.5% respectively. 57.7% presented clinically as early disease and 42.3% as advanced gastric cancers. The most common clinical symptom is dyspepsia, seen in 84.6% of all patients, followed by weight loss (82.7%); anorexia (73.1%), projectile vomiting (30.8%) and dysphagia (25%). 34.6% have a positive *H-pylori* serology.

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The most common cancer is adenocarcinoma (86.5%); followed by gastro-intestinal stromal tumors (11.5%) and squamous cell carcinoma (1.9%). The most common histological sub-type is Intestinal and diffuse adenocarcinoma, 21.2% each. Poorly differentiated adenocarcinoma 17.3%, moderately differentiated 13.5% and well differentiated adenocarcinoma 11.5%. Rare sub-types were also seen. Mucinous adenocarcinoma (9.6%) and signet ring carcinoma (5.8%).

The most frequent surgical procedure done was palliative feeding jejunostomy (40.4%). Billroth 2 gastrectomy (26.9%) was the preferred procedure for early distal gastric tumors and proximal partial gastrectomy with primary gastro-oesophageal anastomosis (15.4%) for early proximal gastric tumors. In this study, 9.6% of the patients had total gastrectomy with Roux-en-Y anastomosis and Billroth 1 gastrectomy for early proximal and distal gastric tumors respectively. Post-operatively, 50% of the patients had no post-operative complications. The most common post-operative morbidity was anastomotic leak (11.5%) and the least common were, late dumping syndrome, duodenal blow out and anastomotic stump obstruction; 1.9% each.

34.6% of the patients did not survive up to a year after diagnosis. These are patients with advanced disease. 38.5% lived for 3 years and above. But, only 5.7% of the patients were alive 5 years after surgery.

Conclusion: Proximal gastric cancer is on the rise in the African continent and distal gastric cancer prevalence is not declining as observed in Western countries. The so-called “African Enigma” of high *H-pylori* prevalence and low gastric cancer prevalence is at best a myth. There seem to be a strong relationship between high *H-pylori* related gastric disorders and gastric cancers. Nothing much has changed in the last two decades in terms of late presentation of gastric cancers. The outcome of treatment is still abysmal as overall survival is still less than a year.

Keywords: Rising proximal cancers; *H-pylori* related gastric cancer; Burden of advanced gastric cancers; Developing country

Introduction

Gastric cancer is reported to be the second most seen malignancy in the world, responsible for 9.9% of all newly diagnosed malignant lesions and responsible for 12.1% of all cancer related deaths. Majorities are seen in China and Japan and relatively lower prevalence rates are seen in Europe and North America [1]. Although the prevalence of gastric cancer in the western nations has declined, it is still a significant surgical burden globally, being one of the most commonly diagnosed cancers worldwide. The GLOBOCAN 2014 project from the World Health Organization (WHO), estimated that approximately about one million newly diagnosed gastric cancers are seen globally (952,000 cases; 7% of all malignancies), placing gastric cancer as the 5th most common cancer in the world [2].

Traditionally, distal gastric cancers are reported to be more prevalent at the beginning of the century and later the prevalence steadily regressed as control of *H-pylori* related gastric disorders improved [1]. Previous reports from Nigeria indicated a steady state for all clinical types of gastric cancers and categorically rejected the role of *H-pylori* related gastric disorders in the aetiology of gastric cancers, the so-called “African Enigma” [3]. Holcombe reported that gastric cancers account for less than 2% of all cancers in Northern Nigeria [4]. Abdul Kareem in 2009 reported a slightly higher rate of gastrointestinal tumors in the Southwest of Nigeria. A study he conducted over 11 years showed an average of 8 patients per year with gastric cancers [5].

The classification of gastric cancers in to proximal and distal has mainly been anatomical. There are others that considered the demarcation to be surgical, as proximal gastric cancers are said to carry worse prognosis compared to the distal group [6]. The lack of serosa in the proximal part of the stomach is said to favor early local advancement. Although the Western world has noticed and documented an increase in the prevalence of proximal gastric cancers

[2], unfortunately there is dearth of literature to highlight the current state in developing nation like Nigeria. In fact, previous reports indicated a very low incidence for proximal gastric cancers in Nigeria [7].

H-pylori related gastritis is widely accepted as an important cause of non-cardiac gastric cancers [8]. Even African authors have noticed this association [9].

Advanced gastric cancers are those that breached the muscularis propria. These, advance locally and systemically easily, with poor prognosis. Gastric cancers of all types are often encountered as late presentations in Africa [10]. Late presentation of gastric cancer patients is also universal, as only 27% of newly diagnosed gastric cancers are found to be localized even in some European countries with disappointing 5-years overall survival rate of 30.4% [11]. Multidisciplinary and multimodal therapeutic strategies can improve the prognosis of the localized disease. Advanced gastric cancers however are aggressive, with abysmal median survival of eleven months despite advances in the therapeutic methods used in their management [11].

Patients and Methods

Patients

This is a prospective cross-sectional study of 52 patients that were managed as cases of gastric malignancy at the General Surgery Unit of University of Maiduguri Teaching Hospital, Borno State, Nigeria. The study period was from January 2004 to December 2012. The patients recruited presented both electively *via* the surgical out-patient clinic and as emergency via the emergency room, mostly from metastatic complications of advanced disease.

Methods

All the patients with clinical diagnosis of gastric tumour and

admitted during the study period were recruited. A total of 52 patients were recruited. The Biodata of each patient was obtained, particularly, the age, gender, and occupation. Basic clinical symptoms of gastric malignancy were elicited. Family history of gastric cancers, dietary history, history of cigarette smoking, alcohol intake and past surgical history were obtained and documented. Upper gastro-intestinal endoscopy and biopsy was done for all patients and endoscopic specimen was sent for histopathological assessment and also for microscopy and culture in those with positive *H-pylori* serological test. All the patients had staging abdominal USS and chest radiograph. None had a staging CT or MRI. The ABO blood group of all patients was assessed and basic hematological and biochemical panels of each patient plus, cardiac assessment for fitness for surgery were obtained.

All patients with early proximal and distal gastric cancers had surgery with adjuvant chemotherapy. Early proximal cancers were treated with either partial proximal gastrectomy with primary gastro-oesophageal anastomosis or total gastrectomy with roux-en-y reconstruction depending on the intra-operative finding. Early distal gastric cancers were treated with either Billroth 2 or Billroth 1 gastrectomy. All had regional lymphadenectomy and resected specimens were histologically assessed for tumour free margins. Those with advanced disease were offered mainly palliative feeding jejunostomy or Cyto-reductive partial gastrectomy. Palliative thoracocentesis, closed thoracotomy tube drainage, paracentesis and pathological fracture external fixation were done for patients with metastatic gastric cancers. Majority had palliative oral capacetabine monotherapy.

All patients were followed up for 7 years to assess the disease free survival and overall survival. Those managed in 2012 just completed their yearly surveillance endoscopy, abdominal USS and chest radiograph.

Informed consent was obtained from all patients according to Helsinki guidelines and ethical clearance was granted by the hospital management.

Results

A total of 97 patients were initially recruited. Only 52 were enrolled after radiological and endoscopic assessment, as many turned out to have negative endoscopic and histological reports. The study population was finally a total of 52 patients. 50% were males and females each, giving a male to female ratio of 1:1. The mean age was 50.5 (± 4.04) with an age range of 16 years to 85 years. The most common clinical type is early distal gastric cancer, 34.6%. This is closely followed by advanced distal gastric cancers, 28.8%, giving a combined prevalence of 63.4% for distal gastric cancers. Early proximal gastric cancers constituted 23.1% and advanced proximal cancers 13.5% respectively. Collectively, 36.6% are proximal gastric cancers. The proximal to distal gastric cancer ratio is about 1:2 (Table 1).

In the study, 57.7% presented clinically as early disease and 42.3% as advanced gastric cancers. The most common clinical symptom in both groups is dyspepsia, seen in 84.6% of all patients, followed by weight loss (82.7%), anorexia (73.1%), projectile vomiting (30.8%) and dysphagia (25%). The most common morbidity in those with advanced disease is upper gastro-intestinal bleeding (13.5%), followed by gastric outlet obstruction (11.5%). Majority (40.4%) of those with advanced disease presented electively *via* the surgical out-patient clinic. Respiratory difficulty due to lungs metastasis (9.6%), Jaundice

Table 1: Showing the distribution of clinical diagnosis.

Clinical Type	Frequency	Percent
Early proximal cancer	12	23.1
Advanced proximal cancer	7	13.5
Early distal cancers	18	34.6
Advanced distal cancers	15	28.8
Total	52	100

Table 2: Showing distribution of associated family history.

Family History	Value
First degree relative	13
Second degree relative	13
None	26
Total	52

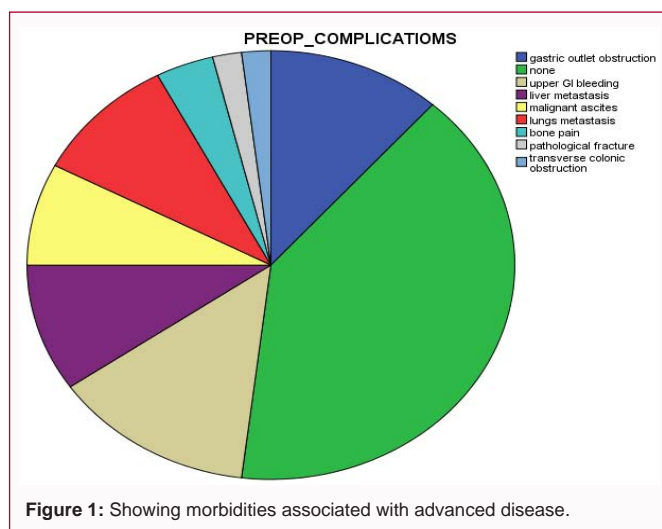


Figure 1: Showing morbidities associated with advanced disease.

and debility from liver metastasis (9.6%) and malignant ascites (7.7%) are the other common presentations of the advanced disease (Figure 1). And these presented to the emergency room for resuscitation.

Although 50% of the patients admitted to family history of gastric related disorders, only 25% have a positive history of first degree relative involvement. Only 8 patients are categorical with a diagnosis of gastric cancer in their relatives. Five were in the early proximal gastric cancer group and 3 in the advanced distal gastric cancer group (Table 3).

A total of 34.6% of the patients have a positive *H-pylori* serology and all had positive culture after microbiological assessment. 25% of those with positive *H-pylori* serology and culture were in the distal gastric cancer group and 9.6% in the proximal gastric cancer group. 30.8% had neither the serology or microscopy and culture tests done (Table 4). 38.5% smoked and half of these people have a history of 10 pack-years of smoking. 30.8% consumed alcoholic beverages; majority drank locally brewed alcohol made in metallic drums. 65.4% consume smoked food, mainly smoked catfish and barbeque. Most of those living in rural areas also use the open fire system of cooking. 32.7% of the patients consume highly salted, roasted meat, often sold as a delicacy (SUYA). 55.8% of the patients are either farmers or fishermen and their staple diet is maize and millet. Only 1 patient had Cholecystectomy prior to the onset of symptoms. None has previous gastro-enteric anastomosis or vagotomy.

Table 3: Showing relationship of the family history with the clinical diagnosis.

	Diagnosis clinical				Total
	Early proximal cancer	Advanced proximal cancer	Early distal cancers	Advanced distal cancers	
First degree relative	2	4	5	2	13
Second degree relative	7	0	2	4	13
None	3	3	11	9	26
Total	12	7	18	15	52

Table 4: Showing relationship of H-pylori serology/culture with clinical diagnosis.

	Diagnosis clinical				Total
	Early proximal cancer	Advanced proximal cancer	Early distal cancers	Advanced distal cancers	
Negative	6	4	5	3	18
Positive	5	0	9	4	18
Not done	1	3	4	8	16
Total	12	7	18	15	52

Table 5: Showing the distribution of the preoperative morbidities associated with advanced gastric cancers.

	Adenocarcinoma type							Total
	Intestinal	Diffuse	Signet ring	Mucinous	Poorly differentiated	Moderately differentiated	Well differentiated	
Gastric outlet obstruction	0	3	0	1	0	2	0	6
None	5	3	1	3	3	1	5	21
Upper gi bleeding	4	1	0	0	1	1	0	7
Liver metastasis	1	1	2	0	1	0	0	5
Malignant ascites	0	1	0	1	1	1	0	4
Lungs metastasis	1	2	0	0	1	0	1	5
Bone pain	0	0	0	0	1	1	0	2
Pathological fracture	0	0	0	0	1	0	0	1
Transverse colonic obstruction	0	0	0	0	0	1	0	1
Total	11	11	3	5	9	7	6	52

Table 6: Showing distribution of post-operative complications.

	Frequency	Percent
SSI	5	9.6
Afferent loop syndrome	3	5.8
Bile reflux gastritis	4	7.7
Anastomotic leak	6	11.5
Stump obstruction	1	1.9
Duodenal blow out	1	1.9
Recurrence	1	1.9
None	26	50
Hypocalcaemia	2	3.8
Early dumping	2	3.8
Late dumping	1	1.9
Total	52	100

The most common cancer is Adenocarcinoma (86.5%), followed by gastro-intestinal stromal tumors (11.5%) and squamous cell carcinoma (1.9%).

The most common histological sub-type is intestinal and diffuse adenocarcinoma, 21.2% each. Poorly differentiated adenocarcinoma 17.3%, moderately differentiated 13.5% and well differentiated

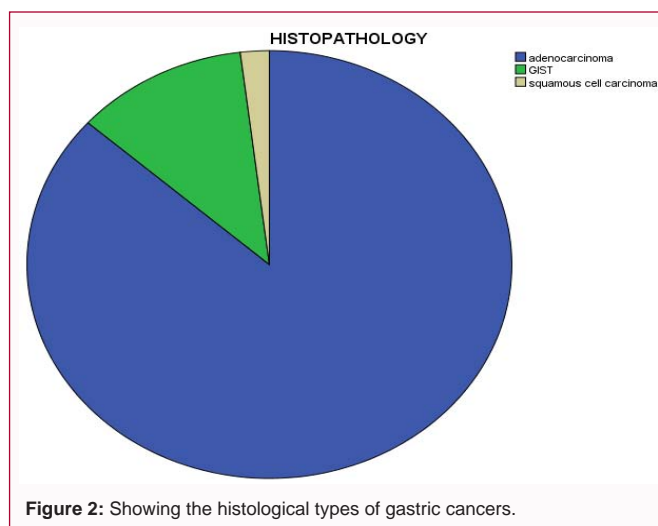
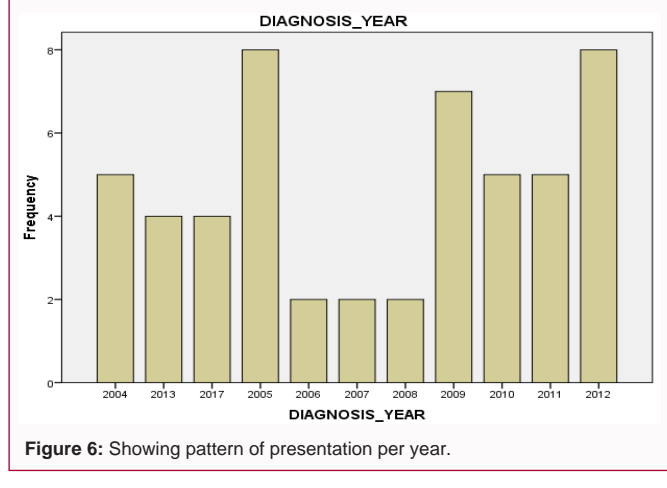
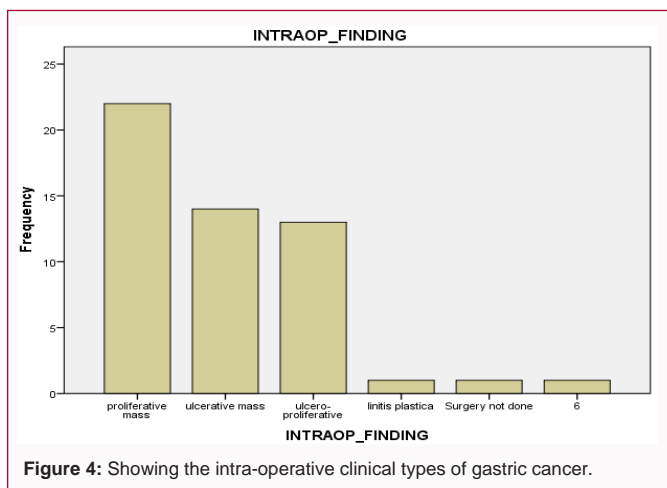
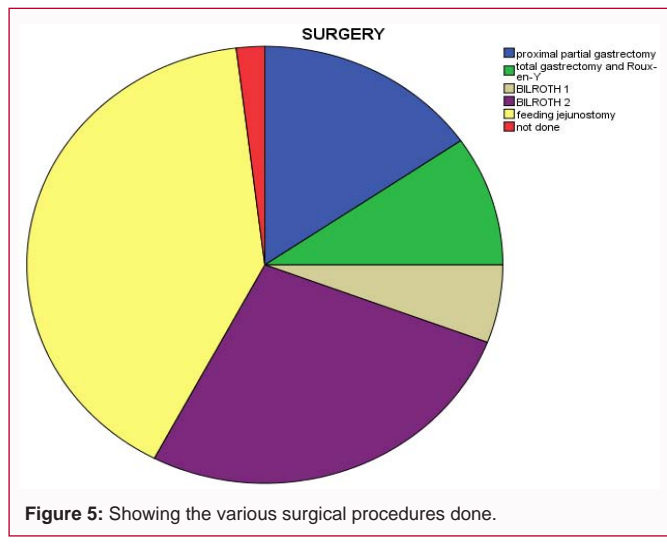
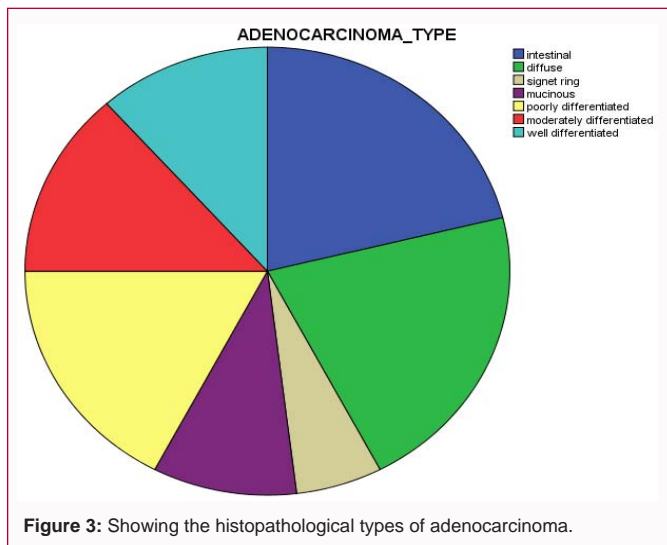


Figure 2: Showing the histological types of gastric cancers.

adenocarcinoma 11.5%. Rare sub-types were also seen. Mucinous adenocarcinoma (9.6%) and signet ring carcinoma (5.8%).

The histological subtypes were noticed to influence presentation, especially, those with advanced disease. Pre-operative complications associated with advanced disease differ with the histological subtype.

It is evident the most common histological subtypes are



associated with more preoperative morbidities. Upper GI bleeding being the most common morbidity is however, more commonly seen in intestinal histopathological subtype. All pathological fractures are seen in the poorly differentiated subtype. The most common endoscopic and intra-operative finding is a polypoid mass, 42.3%. Ulcerative lesions constituted 26.9% and Ulcero-proliferative lesions 25%. The least common presentation is linitis plastica.

The most frequent surgical procedure done was palliative feeding jejunostomy (40.4%) for inoperable disease. Bilroth 2 gastrectomy (26.9%) was the preferred procedure for early distal gastric tumors and proximal partial gastrectomy with primary gastro-oesophageal anastomosis (15.4%) for early proximal gastric tumors. 9.6% had total gastrectomy with Roux-en-Y anastomosis and Billroth 1 gastrectomy for early proximal and distal gastric tumors respectively.

About 50% of the patients had no post-operative complications. The most common post-operative morbidity was anastomotic leak (11.5%) and the least common were, late dumping syndrome, duodenal blow out and anastomotic stump obstruction; 1.9% each.

One third (34.6%) of the patients did not survive up to a year after diagnosis. These are patients with advanced disease. 38.5% lived for 3 years and above. But, only 5.7% of the patients were alive 5 years after surgery.

Table 7: Showing the distribution of the overall survival after surgery.

Overall survival	Frequency	Percent
Less than a year	18	34.6
1 year	7	13.5
2 years	7	13.5
3 years	11	21.2
4 years	5	9.6
5 years	3	5.8
6 years and above	1	1.9
Total	52	100

The overall survival is affected by not only the clinical stage of the disease but, also, by the histological type of the cancer, type of surgery, the level of lymphadenectomy and the resection margin. Early proximal and distal gastric adenocarcinomas tend to have better outcome (Table 8 and 9).

Majority of those that survived for 3 years and above after surgery had either a D2 or D1 dissection or an R0 or R1 resection margin.

As all the patients received only either curative or palliative chemotherapy, it is not assessed for effect on overall survival.

We also noticed variation in the number of patients presenting

Table 8: Showing relationship between clinical stage, histological type and overall survival.

Histopathology			Survival year							Total
			Less than a year	1 year	2 years	3 years	4 years	5 years	6 years and above	
Adenocarcinoma	Diagnosis clinical	Early proximal cancer	0	2	4	2	1	0	1	10
		Advanced proximal cancer	6	0	0	0	0	0	0	6
		Early distal cancers	0	1	2	7	4	2	0	16
		Advanced distal cancers	11	2	0	0	0	0	0	13
	Total	17	5	6	9	5	2	1	45	
GIST	Diagnosis clinical	Early proximal cancer	0	0	0	1		1		2
		Advanced proximal cancer	0	1	0	0		0		1
		Early distal cancers	0	0	1	0		0		1
		Advanced distal cancers	1	1	0	0		0		2
	Total	1	2	1	1		1		6	
Squamous cell carcinoma	Diagnosis clinical	Early distal cancers				1				1
	Total				1				1	
Total	Diagnosis clinical	Early proximal cancer	0	2	4	3	1	1	1	12
		Advanced proximal cancer	6	1	0	0	0	0	0	7
		Early distal cancers	0	1	3	8	4	2	0	18
		Advanced distal cancers	12	3	0	0	0	0	0	15
	Total	18	7	7	11	5	3	1	52	

per year with most patients presenting in 2005, 2009 and 2012, perhaps due to the effect of Insurgency (Figure 6).

Discussion

The global prevalence of gastric cancer has declined over several decades. In the early 20th century, it was the most frequent cause of cancer related death in men, and the third leading cause of cancer related death in women in the USA. The decline in the United States and Europe is probably due to effective *H-pylori* eradication, dietary changes and process of food preservation [12]. The incidence of gastric cancer is said to be twice more common in males than females, twice as frequent in blacks than whites, and the incidence also rises with advancing age [13]. In the early part of the century decline is steady in most developed parts of the world. The use of refrigeration of foods, the availability of fresh fruits and vegetables, and the limited consumption of salt preserved food were considered as important causes of decrease in prevalence of *H-pylori* infection in developed nations of Europe and North America [13]. The sustained campaign against smoking and increased tariff for cigarette manufacturing companies in some industrialized countries also helped in the decline [13].

We noticed an aberration in gender distribution in our study, with an equal distribution of cases among both genders. This gender related incidence concordance may be due to the small sample size of 52 out of the 97 subjects that were initially recruited. The time of the study also coincided with the rise in Boko Haram insurgency in the North-eastern Nigeria. Report from Irabor et al. [3] reported a male: female ratio of 1.4:1. However, his study covered patients that presented at University Teaching Hospital, Ibadan; a tertiary health facility and most of the patients are only from South-western Nigeria.

All patients that were managed at secondary tier or private facilities are not captured. Globocan report in 2018 on cancer in Nigeria noticed male gender preponderance in gastric cancer. But its data is also limited, as country-specific data sources are: Abuja Cancer Registry, Calabar Cancer Registry and Ibadan Cancer Registry. A relatively small portion of malignancies compared to those seen in other Tertiary, Secondary and Private Health facilities in the remaining 34 states of Nigeria. The methodology for data analysis was only weighted/simple average of the most recent local rates applied to 2018 population.

The mean age was 50.5 (± 4.04) with an age range of 16 years to 85 years and a peak at 56 years to 65 years. This result is similar to other reports from Nigeria. Irabor reported a mean age of 55.35 years and a range of 24 to 99. The peak was in the 61 years to 70 years age group with significant increases between 41 years to 60 years. Patients aged 40 years and below accounted for 18% [14]. The Irabor's reports is higher than reports from other parts of Nigeria where the peak is from 40 years to 60 years [5,7,15,19]. This shows that gastric cancers are seen in younger age groups in Africa compared to the developed nations of Europe and USA.

There seem to be a significant variation in the number of patients seen per year, with a yearly average of 13 patients. The peak years were 2005, 2009 and 2012 (Figure 6). The fluctuation in presentation may be related to the Boko Haram terrorist insurrection with death of large number of males, loss of source of income in a country where patients pay for their medical care out of pocket. Irabor et al. [14] reported an average annual rate of approximately 15 patients per year in Ibadan, South-western Nigeria [14]. Surgeons from Tunisia, Kenya and Senegal reported higher annual rates of 20, 26 and 31 patients per

Table 9: Showing relationship between level of lymph node dissection and overall survival.

Survival year			Resection margin				Total
			R0	R1	R2	R3	
Less than a year	Lymphadenectomy	not done			1	17	18
	Total				1	17	18
1 year	Lymphadenectomy	D1	1	1		0	2
		D2	0	1		0	1
		not done	0	0		4	4
Total			1	2		4	7
2 years	Lymphadenectomy	D1	4	1			5
		D2	2	0			2
		Total		6	1		
3 years	Lymphadenectomy	D1	4	2	1		7
		D2	1	2	1		4
		Total		5	4	2	
4 years	Lymphadenectomy	D1	2	1			3
		D2	2	0			2
		Total		4	1		
5 years	Lymphadenectomy	D1	2	1			3
	Total		2	1			3
6 years and above	Lymphadenectomy	D1	1				1
	Total		1				1
Total	Lymphadenectomy	D1	14	6	1	0	21
		D2	5	3	1	0	9
		not done	0	0	1	21	22
	Total		19	9	3	21	52

year [15-17]. Some developed countries reported an alarming annual rate of about 120 patients per year [18].

The combined prevalence of all the diagnosed cases is 63.4% for distal gastric cancers and 36.6% for proximal gastric cancers. The proximal to distal gastric cancer ratio is about 1:2 (Table 1). Abdul Kareem et al. [5] and Irabor et al. [14] also reported the preponderance of the distal gastric cancers. Reports from most of Africa, south of the Sahara, indicated the Antrum to be the site of predilection [19]. It is hard to locate reports from Nigeria or other African countries indicating a rising trend for proximal gastric cancers even with the adoption of Western-type food and lifestyles in most countries in Africa [3]. The incidence of distal gastric cancer has decreased in many western countries; several reports indicated an increase in cases of cancer arising in the cardia, with an increase in the incidence of Stewart Type adenocarcinomas, especially in white male population. This increase is more noticeable in rich European countries and the USA [20,21].

About 42.3% of our patients presented with locally advanced or metastatic disease (Table 2). This poses significant challenge in their treatment. Many of these patients were often treated at primary level health facilities or by unorthodox methods of herbs and other concoctions. They are only referred to the tertiary centre after failure of those treatments. The expertise for surgeries for gastric malignancies and the various dexterous reconstructions are often only available at the tertiary centers. Patients living in rural areas avoid these centers initially because of the exorbitant cost of care and lack of universal

health insurance coverage. They, therefore, only present as a last resort when the disease has advanced. Nkaza et al. [10] also reported the high incidence of late presentation in Zimbabwe [10].

The Correa model described a gradual transition of precancerous lesions to malignant gastric tumors over 10 years to 15 years. Endoscopic screening of high risk patients may lead to diagnosis of gastric cancers at an early-stage where they are still operable with high chance of curative resection and prolonged overall survival. A multi-centre study in Europe estimated that progression from precancerous to cancerous gastric lesions occur within a decade. The progression for patients with atrophic gastritis, intestinal metaplasia, low-grade dysplasia or high-grade dysplasia were 0.8%, 1.8%, 4.0% and 33.0%, respectively [22]. Lazarus et al. in South Africa did a pilot endoscopic screening and biopsy for 1336 patients and found 9 asymptomatic carcinomas [23]. Jaskiewicz did another study in high risk area of the Transkei region of South Africa in adults older than 35 years and recorded the following: metaplastic lesions (24%), dysplastic lesions (9%) and asymptomatic carcinoma at 2% [24]. Unfortunately, there is no routine endoscopic screening program for gastric cancers in North-eastern Nigeria or any part of the country. Thus, the health care system is mostly burdened with advanced inoperable malignant diseases.

Adenocarcinoma is the most common malignant lesion seen (86.5%), followed by gastro-intestinal stromal tumors (11.5%) and squamous cell carcinoma at 1.9% (Figure 2). Irabor et al. [14] from Southwestern Nigeria reported almost similar figures, except, for the

presence of Gastric Lymphomas and Carcinoid tumors. His study reported the adenocarcinoma as 89% of gastric malignancies [14]. The adenocarcinoma sub-type we found were: Intestinal and Diffuse Adenocarcinoma, 21.2% each. Poorly differentiated adenocarcinoma 17.3% moderately differentiated 13.5%, well differentiated adenocarcinoma at 11.5%, mucus secreting (9.6%) and Signet ring type at 5.8% (Figure 3). Irabor at Ibadan, Nigeria found mucin-secreting adenocarcinoma at 4.3% and 2.7% signet ring type. Other types included leiomyosarcoma (3%), carcinoid tumor (2.45%), Non-Hodgkin's lymphoma (2.1%), squamous cell carcinoma (1.4%) and Hodgkin's lymphoma (0.7%). Anaplastic carcinoma, malignant fibrous Histiocytoma and Gastro-intestinal Stromal Tumors contributed 0.35% each [14].

H-pylori related gastritis played important role in our study. 34.6% of our patients had positive *H-pylori* serology and positive culture after microbiological assessment. 25% of them were diagnosed with distal gastric intestinal type adenocarcinoma and 9.6% with proximal gastric adenocarcinoma. 30.8% had neither the serology or microscopy and culture tests done (Table 4). Those that reported via the Emergency Room with metastatic complications mostly were not tested for *H-pylori*. Previous reports from Africa questioned the role of *H-pylori* gastritis in the aetiology of gastric cancers [25]. But, Komolafe et al. [19] in Ile-Ife, Southwestern Nigeria; in a study of 107 gastric tissue specimens found that 60% of diagnosed gastric carcinoma specimens contained *H-Pylori* [19]. Although the cause of gastric cancer is a multifactorial, helicobacter pylori infection is one of the risk factors. The infection with *H-pylori* increases the risk of having gastric malignancy by six-fold [26]. The World Health Organization (WHO) classified *H-pylori* as a class I carcinogen in 1994 [27].

About 55.8% of our patients are either Farmers or Fishermen. Gastric cancer is known to be commoner in the low income class [28], perhaps due to poor preservation of food and increased *H-pylori* infection rate. The staple diet of most of our patients is either Maize or Millet. The Fungus, *Fusarium Moniliforme* produces the carcinogenic fungal toxin: Fuminosins B1. This toxin has been isolated in high quantity from mouldy Maize in the Transkei area of South Africa. The level of the Fuminosins B1 toxin in the Maize correlated with the incidence of gastro-oesophageal cancers in the Transkei [29].

Only 5.7% of the patients were alive 5 years after surgery (Table 7). Late presentation with inoperable disease significantly contributes to this, because, those with early proximal and distal gastric adenocarcinomas tend to have better outcome (Table 8 and 9). Reports from South America is similar. Laurence et al. [31] reported that, patients with T4 tumors had the worst outcomes and those with overall survival for five years were 5.4% [30]. Patients with T2/T3 tumors have an overall survival in five years of 11.4% [30].

Poorly differentiated and signet ring type adenocarcinoma contributed to higher mortality in our patients. Similar observation was made in patients with gastric cancers in China and Japan [31]. Patients that survived for 3 years and above after surgery had either a D2 or D1 dissection and an R0 or R1 resection. Many reports attributed the post-operative overall survival in operable disease to the adequacy of lymph node dissection. The American College of surgeons recommended that at least 15 lymph nodes are removed (D1 lymphadenectomy). Japanese Surgeons recorded higher post-operative overall survival by doing a D2 lymphadenectomy

[32]. Laurence et al. [31] also reported that patients who had a D0 lymphadenectomy have 2.8 times higher death risk in five years than D2-dissected patients. Those who had a D1 lymphadenectomy have 1.4 times higher death risk in five years than the D2 lymphadenectomy [30].

Conclusion

The incidence of proximal gastric cancers in developing countries like Nigeria is evolving; the trend is rising as in the affluent Western countries. The role of *H-pylori* related gastritis in the aetiology of gastric cancers is no longer speculative.

Recommendation

Routine *H-pylori* and endoscopic screening should be instituted to allow for early diagnosis and effective *H-pylori* eradication protocol should be designed based on the antibiotic sensitivity pattern of our local environment.

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