DOI: https://doi.org/10.53350/pjmhs22162593

ORIGINAL ARTICLE

Clinicopathological Study of Duodenal Gastrointestinal Stromal Tumors (GIST)

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ABSTRACT

Objectives: Tumors of the gastrointestinal tract (GIST) are the most commonly seen tumors of the gut. The current study aimed to evaluate the clinical and pathological features of gastrointestinal stromal tumors presented in our setting.

Methodology:
A prospective observational study was conducted at a tertiary care center, Pakistan between January 2019 to March 2021. All cases of duodenal and stomach gastrointestinal stromal tumors diagnosed and treated at our center were analyzed in our study. All clinicopathological tumors including patient characteristics, treatments, histological examinations, and Genomic mutation were documented. The clinicopathologic parameters were compared between stomach and duodenal GIST.

Results: A total of 221 patients were enrolled in the study. The majority were below the age of sixty years. The male to female ratio was 0.97. The most common presenting symptom was active bleeding or severe anemia with a frequency of 114 (51.6%). The majority of the duodenal GIST were present in the descending portion. 147 (66.5%) patients were offered limited resection while 25.8% were offered pancreaticoduodenectomy, and the remainder were not operated. About 30 (13.6%) patients had genetic mutation. Of these, the majority had a KIT mutation. In four patients, KIT and PDGFRA were both mutated. We stratified the patients with respect to the clinicopathological factors and found that tumor size was significantly associated with duodenal GIST ($p<0.001$). Tumor size of > 10 cm was more frequently found in duodenum than stomach >10 [26 (11.8%) vs. 21 (6.7%)].

Conclusion: The present study highlights the clinicopathological pattern of GIST in our population. Furthermore, it indicated that the tumor size was significantly greater in patients diagnosed with duodenal GIST as compared to stomach GIST.

Keywords: Duodenum, GIST, gastrointestinal stromal tumors, stomach adenocarcinoma

INTRODUCTION

Tumors of the gastrointestinal tract (GIST) are the most commonly seen tumors of the gut [1]. Previously, there has been a shift in how the prognosis of the tumors is done. The name GIST for instance was derived from structural and histological features of the tumors [1,2]. It can be seen as a mesenchymal tumor of the GIT which codes for a proto-oncogene called CD117 [3]. GIST can happen in the entire gut tube but also in other GIT areas such as the pancreas, omentum, mesentery and retroperitoneum.

Only 5% of GISTs are found in the esophagus, 10% in the large bowel, 20 to 30% in the small bowel and remaining 50 to 60% can be seen to come from the stomach. Around 30% of GISTs are metastatic and liver is the most common organ for malignant GISTs [4].The differentiation of benign and malignant GIST tumors is not well understood. Indicators such as the size of the tumor and its proliferative nature are important parameters for prognosis [5,6]. GIST which are seen outside of the gut tube are known as EGIST (Extra-gastrointestinal stromal tumors). Prevalence of EGIST is seen as 5 to 7% only [7,8].

Since GISTs have an overlapping morphological picture, it is hard to differentiate them cytologically from GI neoplasms such as nerve sheath tumors and smooth muscle tumors [9,10]. Although many investigators have described various features used in the cytologic diagnosis of GIST, few have reported their findings in patients with malignant GIST. The present study aimed to evaluate the clinical and pathological features of GIT stromal tumors presented in our setting.

METHODS AND MATERIALS

A prospective, observational study was conducted at a tertiary care center, Pakistan between January 2019 to March 2021. All cases of duodenal and stomach gastrointestinal stromal tumors diagnosed and treated at our center were analyzed in our study. Ethical approval was obtained prior to the data acquisition. A non-probability convenience sampling technique was used to recruit participants.

Duodenal GISTs were evaluated against stomach GISTs in terms of clinical and pathological parameters and outcomes. Before data collection, informed written consent was obtained from all participants. Followed by demographic information such as age and gender, clinicopathological features including preoperative symptoms, anatomical location, surgical method, resection margin, tumor size, mitotic index, morphology, immunohistochemistry, genomic mutation, NIH risk category (NIH), and history of adjuvant treatment were documented.

Employing the modified NIH risk classification technique provided by Joensuu [11], the GISTs were categorized as very low, low, moderate, and high risk. Patients with other solid tumors or GISTs in other places, as well as those with distant metastases or tumor rupture, neoadjuvant care, and no follow-up history, were excluded from the research study. SPSS 26.0 for Windows was used to analyze the data (SPSS Inc., Chicago, IL). Unless otherwise noted, numerical variables were given as mean SD. The Chi-square test or Fisher's exact test were used to evaluate discrete variables. At 5%, the p-values were considered to be statistically significant

RESULTS

A total of 221 patients were enrolled in the study. The majority were below the age of sixty years. The male to female ratio was 0.97. The most common presenting symptom was active bleeding or severe anemia with a frequency of 114 (51.6%). The majority of the duodenal GIST were present in the descending portion. 147 (66.5%) patients were offered limited resection while 25.8% were offered pancreaticoduodenectomy, and the remainder were not operated. About 30 (13.6%) patients had genetic mutation. Of these, the majority had a KIT mutation. In four patients, KIT and PDGFRA were both mutated (Table 1).

Table 1: Patient Characteristics (Clinical and Sociodemographic) of Study Participants

Parameters	n (221)
Age	
<60	133 (60.2%)
>60	88 (39.8%)
Gender	
Male	109 (49.3%)
Female	112 (50.7%)
Symptoms	
Bleeding or anemia	114 (51.6%)
Abdominal pain	50 (22.6%)
Abdominal mass	10 (4.5%)
Abdominal discomfort	10 (4.5%)
Anorexia	5 (2.3%)
Others	32 (14.5%)
Anatomical location	
Superior portion	35 (15.8%)
Descending portion	114 (51.6%)
Horizontal portion	54 (24.4%)
Ascending portion	18 (8.1%)
Surgical procedure	
Limited resection	147 (66.5%)
Pancreaticoduodenectomy	57 (25.8%)
No surgery	17 (7.7%)
Resection margin	
R0	203 (91.9%)
R1/2	1 (0.5%)
No surgery	17 (7.7%)
Tumor	
Yes	204 (92.3%)
No	17 (7.7%)
Tumor size (cm)	
<=2	25 (11.3%)
2-5	99 (44.8%)
5-10	54 (24.4%)
<10	26 (11.8%)
Mitotic index	
<=5	133 (60.2%)
>5	43 (19.5%)
Not available	44 (19.9%)
Morphology	
Yes	118 (53.4%)
No	103 (46.6%)
Morphology	
Spindle	109 (49.3%)
Epithelioid	1 (0.5%)
Mixed	8 (3.6%)
Genomic mutation	
Yes	30 (13.6%)
No	191 (86.4%)
Genomic mutation type	
KIT	23 (76.7%)
PDGFRA	1 (3.3%)
KIT and PDGFRA	4 (13.3%)
Wild type	3 (10%)
NH risk category	
No category	
Very low	21 (9.5%)
Low	89 (40.3%)
Intermediate	2 (0.9%)
High	109 (49.3%)
Neoadjuvant therapy	
No	211 (95.5%)
Yes	10 (4.5%)
Adjuvant therapy	
No	194 (87.8%)
Yes	27 (12.2%)
Follow up duration	39.7 ± 39.4

Table 2: Association between clinicopathological factors with the site of GIST (duodenal versus stomach) tumors.

	Duodenum	Stomach	
Age			0.791
<60	133 (60.2%)	185 (59.3%)	
>60	88 (39.8%)	127 (40.7%)	
Gender			0.826
Male	109 (49.3%)	156 (50%)	
Female	112 (50.7%)	156 (50%)	
Tumor size (cm)			<0.001
<=2	25 (11.3%)	104 (33.3%)	
2-5	99 (44.8%)	114 (36.5%)	
5-10	54 (24.4%)	71 (22.8%)	
>10	26 (11.8%)	21 (6.7%)	
Mitotic index			<0.001
<=5	133 (60.2%)	186 (59.6%)	
>5	43 (19.5%)	118 (37.8%)	
Not available	44 (19.9%)	8 (2.6%)	
Morphology			
Yes	118 (53.4%)	300 (96.2%)	
No	103 (46.6%)	12 (3.8%)	
Morphology			0.825
Spindle	109 (49.3%)	281 (90.1%)	
Epithelioid	1 (0.5%)	2 (0.6%)	
Mixed	8 (3.6%)	17 (5.4%)	
NIH risk category			<0.001
No category	0 (0%)	7 (2.2%)	
Very low	21 (9.5%)	87 (27.9%)	
Low	89 (40.3%)	80 (25.6%)	
Intermediate	2 (0.9%)	72 (23.1%)	
High	109 (49.3%)	66 (21.2%)	

We stratified the patients with respect to the clinicopathological factors and found that tumor size was significantly associated with duodenal GIST ($p<0.001$). Tumor size of > 10 cm was more frequently found in duodenum than stomach >10 [26 (11.8%) vs. 21 (6.7%)] (Table 2). Mitotic index was significantly higher in stomach GIST as compared to duodenal GIST.

DISCUSSION

In our study, we found the majority of the patients to be male and the remaining were female. In the male population, GIST duodenal tumors were more likely to be seen in the stomach as compared to the duodenum. Similarly, females were more likely to have benign GIST tumors as compared to malignant GIST tumors. Al-Maqrashi et al. in their study found the majority of the patients to be female (56.8%) [12]. The most common area of the tumor was the stomach (63.6%) and then the ileum/jejunum (18.2%).

The rate of survival of localized disease was more (89.9%) as compared to metastatic disease (80.2%). Soliman et al. found the average age of the participants to be 48.9 years old [13] which is younger than the studies conducted by Kim et al. who found the age of the patients to be 60.8 years [14] and Wang et al. who found 60 to be the median age [15]. El-Zohairy et al. however found the average age of patients to be 52.8 years [16].

Lin et al. looked at the clinical manifestations of the GISTS and found that the majority of the GISTS presented with nonspecific symptoms which prevented physicians from diagnosing the cause early and treating the tumors [17]. The authors also found clinical symptoms such as GI bleeding and abdominal pain to be the most common presenting symptoms. Similar findings were seen by Miettinen et al. in their study on stromal tumors [18].

A larger sample size would have been helpful to identify clinical and pathological features of stromal tumors. Another limitation is that our study is a retrospective study along with minimal data about risk factors such as rupture of tumors and invasion of the serosa. Our study could have also been conducted in more hospitals instead of a single tertiary care hospital.

CONCLUSION

The present study highlights the clinicopathological pattern of GIST in our population. Furthermore, it indicated that the tumor size was significantly greater in patients diagnosed with duodenal GIST as compared to stomach GIST.

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