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Research Communication

Clinical features can distinguish gastrointestinal stromal tumor from other subepithelial gastric tumors

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Introduction

Subepithelial gastric tumors (SGTs) include a heterogeneous group of pathologies; of which, gastrointestinal stromal tumor (GIST) is the most common [1–3]. Traditionally, surgical resection has been the standard approach for most SGTs, driven by the malignant potential of GIST [3,4]. Although certain tumor characteristics are known to be associated with GIST, limited data are available comparing features of GIST and other common non-GIST SGTs [3,5,6]. Using retrospective institutional data, this study aimed to identify clinical features that differentiate GIST from non-GIST SGTs.

Methods

Between 2000 and 2020, consecutive patients with a histologic diagnosis of heterotopic pancreas, leiomyoma, schwannoma, lipoma, and GIST involving the stomach were identified. Patients with non-GIST SGTs and GIST were compared. Gastric tumors extending to the gastroesophageal junction were included; esophageal tumors involving the gastroesophageal junction were not. Patients without a preoperative clinical diagnosis of SGT were excluded. The final study cohort consisted of 253 patients. The primary study outcome was a histologic diagnosis of GIST.

Results

Of the 253 patients evaluated, 5 (1.9%), 22 (8.7%), 16 (6.3%), 10 (4.0%), and 200 (79.1%) had a histologic diagnosis of heterotopic pancreas, leiomyoma, lipoma, schwannoma, and GIST, respectively (Table).

Compared with non-GIST SGTs, GISTs were more likely to be distributed within the body of the stomach (102 [51.0%] in GIST vs 14 [26.4%] in non-GIST; $P < .001$). In contrast, leiomyomas were more likely to be distributed within the cardia/fundus: 19 of 22 leiomyomas (86.4%) vs 78 of 231 nonleiomyomas (33.8%) ($P < .001$).

Of note, 173 patients (68.4%) underwent biopsy of their SGT; of which, 101 (58.4%) were endoscopic ultrasound (EUS)-guided fine-needle aspiration (FNA) biopsies, 57 (33.0%) were endoscopic forceps biopsies, and 15 (8.6%) were percutaneous biopsies. Among those who did undergo a preoperative biopsy, 107 (61.9%) had a biopsy that provided a single histologic diagnosis, whereas the remainder (n = 66 [38.1%]) were indeterminate. There was no significant difference between the biopsy method and definitive histologic diagnosis on biopsy: biopsy results were indeterminate for 39 of 101 patients (38.6%) who underwent EUS-guided FNA biopsy, whereas

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Table
Patient cohort and descriptive analysis comparing GIST vs non-GIST SGTs.

Variables	Non-GIST SGT (n = 53 [20.9%]) n (%)	GIST (n = 200 [79.1%]) n (%)	*P* value
Age (y), median (IQR)	56 (48–65)	64 (57–71)	< 0.01
Sex			
Male	22 (41.5)	82 (41.0)	.95
Female	31 (58.5)	118 (59.0)	
Race			
White	41 (77.4)	124 (62.0)	< .01
Black	8 (15.1)	76 (38.0)	
AAPI/other	4 (7.6)	0 (0.0)	
Symptoms			
Incidental	31 (58.5)	73 (36.5)	< .01
Abdominal pain/GI distress	16 (30.2)	69 (34.5)	
Anemia/intraluminal GI bleed	3 (5.7)	50 (25.0)	
Intraperitoneal bleed	0 (0.0)	2 (1.0)	
Not reported	3 (5.7)	6 (3.0)	
Size at diagnosis (cm), median (IQR)	2.8 (1.5–4.3)	4.6 (2.8–7.3)	< 0.01
GIST subtype			
Spindle	–	143 (71.5)	–
Epithelioid	–	20 (10.0)	
Mixed	–	21 (10.5)	
Not reported	–	16 (8.0)	
CT scan characteristics (among the 214 patients who underwent CT scan)			
CT type			
Enhanced	28 (93.3)	177 (96.2)	.47
Unenhanced	2 (6.7)	7 (3.8)	
Enhancement pattern (in relation to skeletal muscle)			
Hypoenhancing	7 (23.3)	1 (0.5)	< .01
Isoenhancing	16 (53.3)	164 (89.1)	
Hyperenhancing	4 (13.3)	10 (5.4)	
Not available	3 (10.0)	9 (4.9)	
Heterogeneity			
No	24 (80.0)	95 (51.6)	< .01
Yes	2 (6.7)	86 (46.7)	
Not reported	4 (13.3)	3 (1.6)	
Growth pattern			
Endoluminal	13 (43.3)	37 (20.1)	< .01
Exophytic	9 (30.0)	125 (67.9)	
Mixed	6 (20.0)	20 (10.9)	
Not available	2 (6.7)	2 (1.1)	
Borders			
Well-circumscribed	29 (96.7)	174 (94.6)	.82
Irregular	1 (3.3)	8 (4.4)	
Not available	0 (0.0)	2 (1.1)	
Attenuation			
Soft tissue	23 (76.7)	184 (100.0)	< .01
Fat	7 (23.3)	0 (0.0)	
Ulceration on endoscopy (among the 205 patients who underwent endoscopy)			
No	42 (89.4)	114 (72.2)	.04
Yes	3 (6.4)	36 (22.8)	
Not reported	2 (4.3)	8 (5.1)	
Endoscopic ultrasound characteristics (among the 136 patients who underwent endoscopic ultrasound)			
Echogenicity			
Hypoechoic	21 (72.4)	103 (96.3)	< .01
Isoechoic	0 (0.0)	2 (1.9)	
Hyperechoic	8 (27.6)	2 (1.9)	
Heterogeneity			
Homogeneous	25 (86.2)	49 (45.8)	< .01
Heterogeneous	4 (13.8)	58 (54.2)	
Cystic component			
No	29 (100.0)	79 (73.8)	< .01
Yes	0 (0.0)	28 (26.2)	
Wall layer			
Second	1 (3.5)	7 (6.5)	< .01
Third	12 (41.4)	3 (2.8)	
Fourth	16 (55.2)	90 (84.1)	
Not reported	0 (0.0)	7 (6.5)	
Calcifications			
No	29 (100.0)	96 (89.7)	.07
Yes	0 (0.0)	11 (10.3)	
Tumor distribution			
Cardia/fundus	22 (41.5)	75 (37.5)	< .01
Body	14 (26.4)	102 (51.0)	
Antrum/pylorus	17 (32.1)	23 (11.5)	
Surgery			
None	11 (20.8)	0 (0.0)	< .01
Wedge resection	32 (60.4)	189 (94.5)	
Distal gastrectomy	8 (15.1)	11 (5.5)	
Esophagogastrectomy	2 (3.8)	0 (0.0)	
Surgical approach			
None	11 (20.8)	0 (0.0)	< .01
Open	28 (52.8)	126 (63.0)	
Laparoscopic	14 (26.4)	74 (37.0)	

AAPI, Asian American or Pacific Islander; CT, computed tomography; GI, gastrointestinal; GIST, gastrointestinal stromal tumor; IQR, interquartile range; SGT, subepithelial gastric tumor.

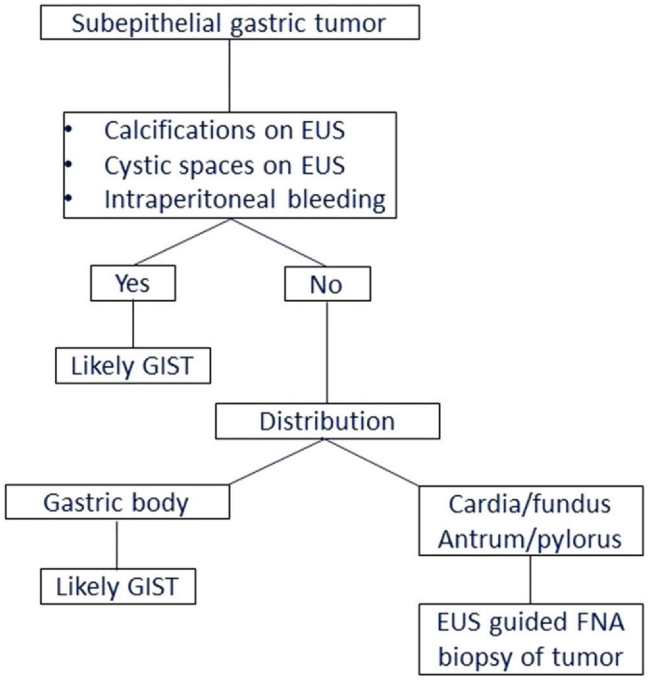

Figure 1. Proposed algorithm for the diagnosis of subepithelial gastric tumors based on tumor distribution. EUS, endoscopic ultrasound; FNA, fine-needle aspiration; GIST, gastrointestinal stromal tumors.

biopsy results were indeterminate for 27 of 72 patients (37.5%) who underwent biopsy via another approach (*P* = .14).

Intraperitoneal bleeding on presentation (n = 2 [0.7%]), cystic appearance on EUS (n = 28 [10.3%]), and the presence of calcifications on EUS (n = 11 [4.0%]) were 100% specific for a diagnosis of GIST, whereas fat attenuation of a tumor on computed tomography (CT) scan was 100% specific for lipoma (n = 7 [2.8%]). In the absence of these features, on multivariable analysis, a histologic diagnosis of GIST was independently associated with increasing age (odds ratio [OR], 1.09; 95% CI, 1.04–1.15; *P* = .001), Black race (OR, 8.81; 95% CI, 2.23–34.89; *P* = .002), heterogeneous appearance on CT scan (OR, 13.64; 95% CI, 1.21–154.04; *P* = .035), and ulceration on upper endoscopy (OR, 14.94; 95% CI, 1.17–191.60; *P* = .038).

Conclusion

A low threshold for surgical resection of all SGTs has been advocated because of the malignant potential of GIST and the limited yield of preoperative biopsy. This approach does not account for morbidity associated with the resection of tumors in unfavorable locations (eg, near the gastroesophageal junction or pylorus) or the low risk associated with expectant management of non-GIST SGTs. Comprehensive radiographic and endoscopic workups can differentiate GIST from benign tumors and allow more rational selection for surgery. This information can also be used to guide decisions for biopsy and direct scope of surgery. A proposed algorithm for the diagnostic workup of a newly identified SGT is provided in the Figure.

Ethics approval

This study was reviewed and approved by the University of Pennsylvania (protocol number: 843719).

Author contributions

Substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data: Straker, El Jack, Karakousis, Sharon, Ahmad, DeMatteo, and Roses. Drafting the article or revising it extensively for important intellectual content: Straker, El Jack, Karakousis, Sharon, Ahmad, DeMatteo, and Roses. Final approval of the version to be published: Straker, El Jack, Karakousis, Sharon, Ahmad, DeMatteo, and Roses. All authors have reviewed and approved the submitted manuscript and agree to be accountable for all aspects of the work submitted.

Conference information

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Declaration of competing interest

The authors declare no competing interests.

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