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Gastric Glomus Tumor on EUS-FNA-Based Cytology; Clinicopathologic and Immuno-Histochemical Features of Four Cases Including a Case with Associated MIR143HG-NOTCH2 Fusion Gene

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interspersed interstitial cells of Cajal, and 1 Schwannoma. The surgical diagnoses agreed with the cytology diagnoses in all cases (accuracy 100%).
Conclusions: EUS-FNB using the core needle can obtain adequate material for the submucosal gastrointestinal mesenchymal lesions to accurately classify these lesions. The small cores from 21 or 22 gauge needles of EUS-FNB can provide tissue for both immunohistochemical and architecture assessment of tumor, so rare mesenchymal lesions such as gangliocytic paraganglioma of duodenum and leiomyoma with interspersed interstitial cell of Cajal can be correctly diagnosed on EUS-FNB sample.

PST045

Gastric Glomus Tumor on EUS-FNA-Based Cytology; Clinicopathologic and Immuno-Histochemical Features of Four Cases Including a Case with Associated MIR143HG-NOTCH2 Fusion Gene

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Introduction: Gastric glomus tumor (GT) is a rare submucosal tumor for which preoperative diagnosis can be challenging. We report cytomorphological and immunohistochemical (IHC) features of four gastric GT cases diagnosed by endoscopic ultrasound guided fine needle aspiration (EUS-FNA) cytology.
Materials and Methods: Files were searched to identify GT diagnosed on EUS-FNA between 2018 and 2021; four cases were found, three with rapid on-site evaluation (ROSE).
Results: A total of 4 cases (3:1 M:F) were included (mean age: 60 years). Three GTs were located in gastric antrum and one in gastric body. Size ranged from 2-2.5 cm (Table 1). Three patients presented with epigastric discomfort, and one had chest wall discomfort and recent history of lung adenocarcinoma. ROSE were performed on 3 cases, all indeterminate. The smears were moderate to highly cellular and showed loose clusters or fragment of small to medium sized bland tumor cells (Table 2). The cells had centrally located round to oval nuclei with inconspicuous nucleoli and moderate amount of eosinophilic to clear cytoplasm (Figure 1). Tumor cells with pale and dark stained nuclei were evenly distributed (Figure 1). Cell blocks revealed branching small vessels surrounded by small-medium cells with round-oval nuclei, inconspicuous nucleoli, and abundant eosinophilic cytoplasm (Figure 1).

Case #, Age/sex	Location	Size	Symptom	Endoscopic findings	Radiological findings	Pathological findings	IHC/molecular finding		
							Positive	Negative	NGS
# 1 61/M	Body	2.5 cm	Epigastric discomfort	Gastric SM nodule	2.3 cm targetoid lesion along Greater curvature	EUS-FNA: consistent with GT Biopsy: Gastric GT	SMA, synaptophysin caldesmon,	C-KIT, AE1/AE3, chromogranin, Desmin, S-100	NA
#2 38/M	Antrum		Epigastric discomfort	Gastric SET	NA	EUS-FNA: consistent with GT Biopsy: NC	SMA, synaptophysin	C-KIT, AE1/AE3, CD34, S-100	NA
#3 70/F	Antrum	2.5cm	GERD	Gastric SM nodule	2.5 cm gastric SM mass	EUS-FNA: consistent with GT Biopsy: Gastric GT	SMA, Synaptophysin, Caldesmon, HHF-35, CD34	C-KIT, DOG-1, AE1/AE3, CK7, CK20, CAM5.2, CD56,CDX2, S-100	NA
#4 71/M	Antrum	2.0cm	Chet wall discomfort	Gastric SM nodule	2x1.9 cm mass	EUS-FNA: consistent with GT Biopsy: NC	SMA, synaptophysin	C-KIT, DOG1, AE1/AE3. chromogranin, CD34, HMB45, SOX-10, S-100,	MIR143HG-NOTCH2 fusion gene

GT, Glomus tumor: GERD, Gastro-esophageal reflux disease: SET, Subepithelial tumor: SM, submucosa: IHC, Immunohistochemistry: NC, non-contributory: NGS, Next generation sequencing: NA, Not applicable

Table 1

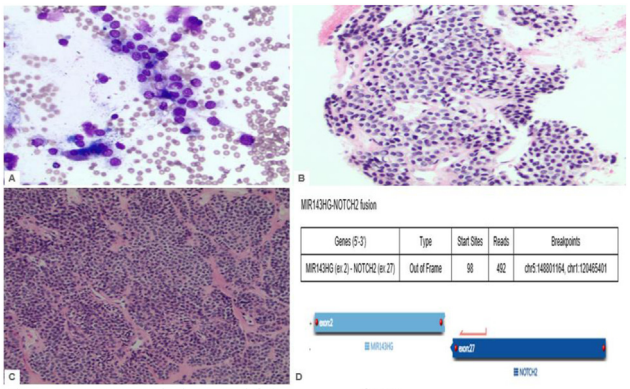

Figure 1: Cytomorphology and fuison gene of GT.

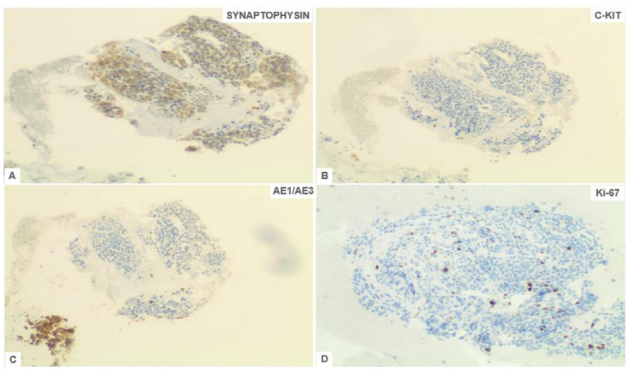

Figure 2: Immunohistochemical features of GT.

Diagnosis	Smear cellularity	Pattern	Cells	Nuclear details	Cytoplasmic details	Other features	IHC/molecular positive finding
Glomus tumor	Low to moderate	Cohesive cluster	Uniform round cells with ill-defined cytoplasmic border	Centrally located, round, smooth nuclear membrane, delicate chromatin, inconspicuous nucleoli	Scant eosinophilic to clear cytoplasm,	Mast cells	SMA, H-caldesmon, HHF-35, type IV collagen, variable synaptophysin, CD34, TLE-1. MIR143-NOTCH gene fusions in more than half glomus tumors.
GIST	Moderate to high	Fascicular tissue fragment, with or without dispersed cell	Spindle or epithelioid cells	Round or oval or stripped nuclei, granular chromatin, inconspicuous nuclei	Granular to eosinophilic cytoplasm	Hyaline globules	C-KIT (95%), DOG-1 (98%), CD34 (82%), PDGRA activating mutation (5-10%)
Solitary fibrous tumor	Scant to moderate cellularity	A meshwork of irregular fascicles and individual cells	Oval, elongate, rounded or stellate cells	Fusiform nucleus, finely dispersed chromatin, an inconspicuous nucleolus	Wispy cytoplasm	Hemangiopericytoma like vessels and ropy collagen fibers	CD34, STAT6. NAB2-STAT6 fusion.
Leiomyoma	Low to moderate	Fascicular/palisading tissue fragment	Round to spindle, rare polygonal cells	Blunt ended nuclei, open nuclear chromatin	Abundant eosinophilic cytoplasm	None	SMA, desmin, caldesmon

Table 2

Neoplastic cells were positive for SMA, synaptophysin and negative for C-KIT, AE1/AE3 and S-100. CD34 was variably positive. Ki-67 was < 2%. For one case, the Fusion Panel - Solid Tumor (50 genes) revealed MIR143HG-NOTCH2 fusion gene (Figure 1, 2). One tumor was resected and consistent with benign GT, three were followed up clinically.

Conclusions: ROSE and cell blocks revealed cohesive bland round-oval tumor cells in GTs. The differential diagnosis on ROSE include neuroendocrine tumors and epithelioid spindle cell neoplasms. IHC and molecular studies can be helpful to assist in rendering an accurate preoperative diagnosis (Table 2).

FNA — HEAD/NECK — SALIVARY GLAND

PST046

The Effectiveness and Subgroup Analyses of The Milan System for Reporting Salivary Gland Cytopathology: A Tertiary Center Experience in Vietnam

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Introduction: The Milan System for Reporting Salivary Gland Cytopathology (MSRSGC) application has become a global consensus for guiding clinical management to correlate the risk of malignancy and cytopathological features.

Materials and Methods: We initiated a single-institute cross-sectional observational study in Vietnam from January 2017 to December 2018. According to the Milan classification, the aspiration cytology for salivary gland tumors was reviewed and recategorized. After correlation with histological results, the risk of malignancy (ROM) and the risk of neoplasm (RON) were determined among the subgroups.

Results: We collected 625 cytology specimens from 593 patients with a female-to-male ratio of 0.8/1. The ages of the patients ranged from 9 to 87 years old, with a median age of 47 years old. Lesions were located in parotid gland (n = 539, 86.2%) and submandibular gland (n = 86, 13.8%). Tables 1 and 2 summarize the results of reclassification. With corresponding surgical diagnoses, 110 (17.6%) cytology specimens were malignant neoplasms, while 461 (73.8%) and 54 (8.6%) cytology specimens were benign neoplasm and non-neoplastic lesions, respectively (Table 3). The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of the MSRSGC were 97.1%, 98.8%, 94.3%, and 99.4%, respectively. There were 148 cytology specimens (from 146 patients) classified into the SUMP

Table 1. The case numbers of each category in the MSRSGC when applying the criteria to reclassify cytology specimens with literature comparison.

Categories	Present study	Lee et al	Wu et al	Reerds et al
ND	48 (7.7%)	400 (28.9%)	294 (18.8%)	2,451 (19.0%)
NN	30 (4.8%)	249 (18.0%)	336 (21.5%)	284 (2.2%)
AUS	21 (3.4%)	135 (9.8%)	60 (3.8%)	413 (3.2%)
BN	308 (49.3%)	455 (32.9%)	581 (37.2%)	7,919 (61.4%)
SUMP	148 (23.7%)	79 (5.7%)	92 (5.9%)	825 (6.4%)
SFM	30 (4.8%)	22 (1.6%)	19 (1.2%)	387 (3.0%)
M	40 (6.4%)	44 (3.2%)	178 (11.4%)	606 (4.7%)
Total cases	625	1384	1560	12,898

Table 2. Risk of malignancy (ROM) and risk of neoplasm (RON) of each category in the MSRSGC when applying the criteria to reclassify cytology specimens.

Categories	Present study	Song et al	Higuchi et al	Maleki et al
	ROM-RON	ROM-RON	ROM-RON	ROM
ND	8.3%-56.3%	17.8%-64.4%	13.4%-72.9%	10.6%-34.0%
NN	6.7%-36.7%	14.3%-21.4%	9.1%-15.2%	7.5%-9.4%
AUS	28.6%-81.0%	30.6%-79.6%	24.9%-77.9%	27.6%-48.3%
BN	0.0%-97.7%	2.2%-100%	1.8%-99.0%	3.2%-100%
SUMP	21.6%-98.0%	46.6%-100%	37.0%-94.8%	41.9%-93.5%
SFM	86.7%-100.0%	78.9%-94.7%	89.7%-100.0%	82.3%-94.1%
M	100.0%-100.0%	98.5%-100%	99.3%-100%	93.6%-96.8%
Total case number	625	429	421	694

Table 3. Corresponding surgical diagnoses of cytology specimens are classified into six categories of the MSRSGC.

Histological diagnoses		Number of cases	The MSRSGC categories						
			ND	NN	AUS	BN	SUMP	SFM	M
Non-neoplastic	Benign cyst	22	13	2	1	4	1		
	Chronic sialadenitis	18	5	7	3	2	1		
	Lymph node hyperplasia	5	1	4					
	Lymphoepithelial sialadenitis	4		3			1		
	Granulomatous lymphadenitis	2		2					
	Acute sialadenitis	1				1			
	Chronic inflammatory tissue	1	1						
	Mucocele	1	1						
	Rosai-Dorfman disease	1		1					
Benign	PA	241	8	2	6	161	61	3	
	WT	163	9	5	2	133	14		
	BCA	36	5		2		29		
	Oncocytoma	7		2		2	3		
	Myoepithelioma	6				2	4		
	Schwannoma	4	1			2	1		
	Cavernous hemangioma	1			1				
	Lipoma	1				1			
Malignant	MEC	34	1	1	3		10	7	12
	AdCC	22	1				8	5	8
	ACC	16			2		4	9	1
	SDC	6					1	1	4
	Lymphoma	5	2	1				2	
	BCAC	4					4		
	CXPA	3					2		1
	LEC	3							3
	Myoepithelial carcinoma	3					3		
	Sebacous carcinoma	3						1	2
	Poorly differentiated carcinoma	2							2
	Cystadenocarcinoma								1
	Giant cell osteoma	1						1	
	Myoepithelial-epithelial carcinoma	1							1
	Fibrosarcoma	1			1				
	SCC	1							1
	Secretory carcinoma	1					1		
	Metastatic melanoma	4						1	3
	Metastatic PTC	1							1
	Total	624	48	30	21	308	147	30	40

Table 4. The different subtypes of the SUMP category had different ROMs and RONs.

	Basaloid	Oncocytic	Clear cell
No. of cases	111	36	1
Median age	45 (13 - 76)	53.5 (9 - 76)	20
Location			
Parotid	95	34	1
Submandibular	16	2	-
Gender			
Male	42	23	-
Female	67	13	1
ROM	16.2%	41.7%	0%
ROM	98.2%	97.2%	100%
Histological diagnoses	PA (n = 58) Basal cell adenoma (n = 29) AdCC (n = 8) Basal cell adenocarcinoma (n = 4) Myoepithelioma (n = 3) Myoepithelial carcinoma (n = 3) CXPA (n = 2) Secretory carcinoma (n = 1) Schwannoma (n = 1) Lymphoepithelial sialadenitis (n = 1) Benign cyst (n = 1)	WT (n = 14) MEC (n = 10) Chronic sialadenitis (n = 1) PA (n = 2) ACC (n = 4) Oncocytoma (n = 3) Myoepithelioma (n = 1) Salivary duct carcinoma (n = 1)	PA (n =1)