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Original Research Article

FACTORS AFFECTING THE DIAGNOSTIC YIELD OF ENDOSCOPIC ULTRASOUND GUIDED BIOPSY OF SUB EPITHELIAL LESIONS IN GASTROINTESTINAL TRACT

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ABSTRACT

Background: *Subepithelial lesions (SELs) of the gastrointestinal (GI) tract are often incidental findings during endoscopy, and their evaluation can be challenging. Endoscopic ultrasound-guided biopsy (EUS-GEB) has emerged as a key diagnostic tool for obtaining tissue samples from SELs, yet its diagnostic yield varies due to multiple procedural and lesion-related factors.* ***Objective:*** *To evaluate the factors influencing the diagnostic yield of endoscopic ultrasound-guided biopsy (EUS-GEB) in the assessment of gastrointestinal subepithelial lesions.* ***Study Design:*** *Descriptive study.* ***Setting:*** *Hayatabad Medical Complex, Peshawar, Pakistan.* ***Duration of Study:*** *July 2024 to January 2025.* ***Methods:*** *A total of 60 patients who underwent EUS-GEB for SELs in the gastrointestinal tract were included. Clinical and procedural data were collected, including lesion size, location, echogenicity, needle size, number of needle passes, and endoscopist experience. Histopathological evaluation was conducted on all biopsy samples. Diagnostic yield was defined as the percentage of procedures resulting in a definitive histological diagnosis. Statistical analyses were performed using appropriate tests to identify significant predictors of diagnostic yield.* ***Results:*** *Among the 60 patients enrolled, most lesions were located in the stomach (63.3%) and esophagus (18.3%). The overall diagnostic yield was 68.3%. Lesions larger than 20 mm, more than three needle passes, and procedures performed by more experienced endoscopists were significantly associated with higher diagnostic yield ($p < 0.05$).* ***Conclusion:*** *Lesion size, the number of needle passes, and endoscopist experience are key factors that significantly affect the diagnostic yield of EUS-GEB in evaluating subepithelial lesions of the GI tract. Optimizing these variables may improve diagnostic accuracy and clinical outcomes.*

Keywords: Subepithelial Lesions Endoscopic Ultrasound-Guided Biopsy, Diagnostic Yield, Lesion Size, Endoscopist Experience, Gastrointestinal Tract

INTRODUCTION

Subepithelial lesions (SELs) typically present with no symptoms, leading to often unintentional discovery throughout comprehensive screening endoscopies or procedures conducted for alternative reasons, with a detection rate ranging from 0.36%-0.76% (1-3). A small subset of cases is observed involving iron deficiency anemia, obvious gastrointestinal bleeding, obstruction, as well as abdominal discomfort (4, 5). The location of SELs, determined by their color and shape, may indicate certain characteristics of the lesions. Gastric as well as duodenal lesions possess a greater malignant potential in comparison to esophageal lesions. The occurrence of malignancy in the gastric along with esophageal lesions is significantly greater compared to that in small intestinal and massive intestinal lesions (4, 5). In the endoscopic examination, the lesions are obscured by mucosa that appears normal as well as are protruding into the gastrointestinal tract. Traditional endoscopies exhibit restricted precision in distinguishing between different subtypes of SELs, primarily due to their comparable shapes and colors (6).

The use of conventional endoscopy, whether carried out alone or in conjunction with biopsy, often proves insufficient for determining the etiology of SEL, with diagnostic yields ranging from 17% to 59%. Endoscopic ultrasound (EUS) is employed to identify the layer of origin, precise dimensions, echogenic characteristics, vascularization, as well as the relationship with adjacent structures. Obtaining a sufficient tissue sample can be difficult due to the deep location within the gastrointestinal wall. It is recommended to acquire tissue through EUS-guided fine-needle aspiration, EUS-guided fine-needle biopsy, or mucosal incision-assisted biopsy for lesions exceeding 20 mm and/or displaying high-risk characteristics on EUS, such as echogenic foci, irregular margins, as well as heterogeneity (7, 8).

A small subset of SELs may be identified solely through EUS characteristics. This is particularly true for hypoechoic as well as heterogeneous lesions originating from the third and fourth layers, which present challenges in achieving a definitive classification diagnosis. Most SELs present as benign; however, 15% are recognized as malignant, necessitating endoscopic as well as surgical resection (for example, GI stromal lesions, metastases, or neuroendocrine neoplasms). It is essential to obtain a definitive histologic diagnosis through sufficient tissue collection or resection (7-11).

The diagnostic yield of endoscopic ultrasound-guided biopsy in SELs of the gastrointestinal tract is influenced by several factors that are essential for ensuring accurate and effective diagnosis. Comprehending these factors is essential for enhancing the yield of EUS-GEB and enabling more precise diagnoses of SELs.

METHODOLOGY

This descriptive study was performed from July 2024 to January 2025 at Hayatabad Medical Complex, Peshawar, and included sixty patients who underwent EUS-GEB for the evaluation of subepithelial lesions (SELs) in their gastrointestinal tract. Patient scheduled for EUS-detected SELs who underwent tissue acquisition were considered

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eligible for inclusion. Data were collected from the patients using a predesigned proforma.

The selection criteria included lesions that originated beneath the mucosal layer as determined by endoscopic ultrasound. Patients with extramural compressions or epithelial tumors were not included. All procedures were carried out using a linear array echoendoscope under conscious sedation, and the needle gauge was chosen according to the lesion accessibility and operator preference. A 20-gauge needle was most commonly employed for tissue acquisition and suction was applied where it was necessary. The number of needle passes was recorded for each procedure along with the layer of origin, echogenic pattern and lesion size which was measured in millimeters.

Each lesion's location within the gastrointestinal tract was classified as gastric, esophageal, duodenal, rectal, or colonic based on the endoscopic findings. Echogenicity was defined as hypoechoic, hyperechoic, heterogeneous or anechoic according to EUS visualization. Tissue samples obtained through the procedure were sent for histopathological examination and diagnoses were made based on the microscopic evaluation. The diagnostic yield was defined as the proportion of cases in which the histological examination resulted in a definitive diagnosis.

Data was analyzed by employing SPSS 24. We used the Chi Square test for association of diagnostic yield with various parameters, we kept the value of P significant at < 0.05.

RESULTS

The average age of 60 patients was 51.97±7.295 years. Thirty-eight (63.3%) were male and 22 (36.7%) were female. Around 38 (63.3%) were stomach lesions, 11 (18.3%), while the duodenum had 8 (13.3%) lesions. We found fewer lesions in the rectum 2 (3.3%) and colon 1 (1.7%). Regarding the layer of origin we found that most lesions were located in the muscularis propria 37 (61.7%), which was followed by the submucosa 17 (28.3%). In terms of histological diagnosis, gastrointestinal stromal tumors (GISTs) were found in 29 (48.3%) cases, leiomyomas in 18 (30%), and lipomas 13 (21.7%). The echogenicity of the lesions varied in our study, with hypoechoic lesions found in 34 (56.7%) cases, hyperechoic lesions in 17 (28.3%) while heterogeneous lesions in 7 (11.7%) cases (Table 1).

Regarding the diagnostic yield, we found that 41 cases (68.3%) resulted in a diagnostic outcome while 19 cases (31.7%) were non-diagnostic (Table 2).

Several factors were found to influence the diagnostic yield in our study. Needle size did not have a notable effect on the yield (P=0.19), We observed that the majority of procedures used a 20-gauge needle in both diagnostic 26 (63.4%) and non-diagnostic 9 (47.4%) cases. The number of passes was a notable factor (P=0.002); higher diagnostic yield was associated with procedures involving more than 3 passes 32 (78%). The size of the lesion had also influenced the diagnostic yield (P=0.004), we observed that lesions greater than 20 mm showed a higher diagnostic success rate, 29 (70.7%). The endoscopist's experience was a notable parameter (P=0.002); to our observation those having more than 5 years of experience achieved a higher diagnostic yield, 28 (68.3%) (Table 3).

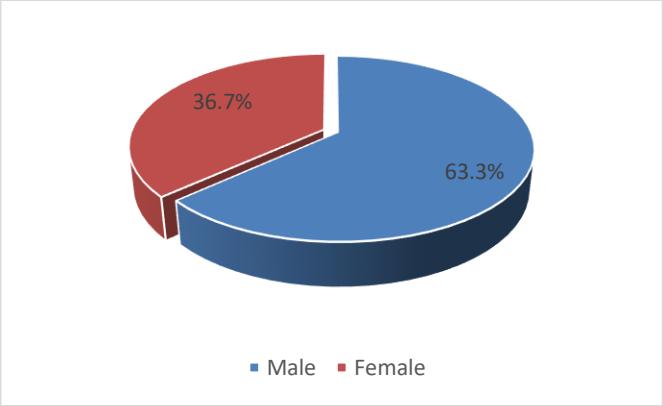

Figure 1: Gender distribution

Table 1: Characteristics of subepithelial lesions

Characteristics of sub epithelial lesions		N	%
Lesion location	Esophagus	11	18.3%
	Stomach	38	63.3%
	Duodenum	8	13.3%
	Rectum	2	3.3%
	Colon	1	1.7%
Lesion layer of origin	Mucosa	4	6.7%
	Submucosa	17	28.3%
	Muscularis Propria	37	61.7%
	Serosa	2	3.3%
Histological Diagnosis	GIST	29	48.3%
	Leiomyoma	18	30.0%
	Lipoma	13	21.7%
Lesion echogenicity	Hypoechoic	34	56.7%
	Heterogeneous	7	11.7%
	Hyperechoic	17	28.3%
	Anechoic	2	3.3%

Table 2: Diagnostic yield

Diagnostic yield	N	%
Diagnostic	41	68.3%
Non-diagnostic	19	31.7%

Table 3: Factors associated with diagnostic yield

Factors		Diagnostic yield				P value
		Diagnostic		Non-diagnostic		
		N	%	N	%	
Needle size (Gauge)	19	5	12.2%	6	31.6%	0.19
	20	26	63.4%	9	47.4%	
	22	10	24.4%	4	21.1%	
No of passes	1 to 3	9	22.0%	12	63.2%	0.002
	> 3	32	78.0%	7	36.8%	
Lesion size	< 20 mm	12	29.3%	13	68.4%	0.004
	> 20 mm	29	70.7%	6	31.6%	
Endoscopist experience	1 to 5 years	13	31.7%	14	73.7%	0.002
	> 5 years	28	68.3%	5	26.3%	

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DISCUSSION

We found that several variables have emerged as crucial in defining the success of the procedure. These factors were lesion size, location, number of needle passes, and the experience of the endoscopist.

One of the most consistent factors for the diagnostic success in our study was the lesion size. Our study found that such lesions which were greater than 20 mm, had potentially increased the diagnostic yield with a success rate of 70.7% for lesions >20 mm compared to 29.3% for those which were <20 mm ($p = 0.02$). This finding is aligned with results from various studies which showed that lesion size has been an important factor in determining the diagnostic success of EUS-FNA. In their study, Attila et al., observed that lesions larger than 2 cm had shown a notably higher diagnostic accuracy of 91.6% compared to the smaller lesions (50%) (12). Similarly, in a different study by Dumanlı et al., they also observed that lesion size was a notable predictor for a successful diagnosis, with larger lesions providing more tissue for a conclusive cytological evaluation (13).

We found that the endoscopist's experience was another important predictor of diagnostic yield. In our results the diagnostic success was notably higher in cases performed by more experienced endoscopists ($p = 0.001$). In their study, Attila et al had noted that operator's experience correlates with diagnostic accuracy of the procedure (12). A study also showed that notable improvement in diagnostic success was noted in their procedures, which were conducted from 2015 to 2020, compared to the earlier years ($p = 0.001$). This trend underscores the importance of advancement in endoscopic techniques, improved technological skills, and increased knowledge gained through years of experience.

The presence of an on-site cytopathologist is another factor that can have an impact on diagnostic yield. Although in our study we did not explicitly mention this in our results, but we had an onsite cytopathologist available in our facility throughout the study, our higher diagnostic rate affirms this fact that onsite cytopathologist can improve the diagnostic yield. This finding corroborates with previous research, which typically reports that having an on-site cytopathologist during EUS-FNA enhances diagnostic accuracy (15, 16).

Moreover, we found that the size of needle did not show a statistically notable effect on the diagnostic success in our study. This is aligned with findings from Dumanlı et al., which found no notable impact of needle size on the diagnostic yield (13). However, a study has suggested that larger needles (22 gauge) are beneficial in acquiring diagnostic yield (17). We also found a notable association between number of needle passes and diagnostic yield, which is again in-line with the findings of the aforementioned study by Dumanli et al (13).

Our results suggest that while the diagnostic yield of EUS-FNA for SELs is generally good with a success rate of 68.3%, there is still room for improvement with especially for smaller lesions and the variation in results depending on endoscopist experience and the procedural setup.

CONCLUSION

In conclusion, our results showed that factors such as number of needle passes, lesion size, and endoscopist experience can significantly influence the diagnostic yield of EUS-GEB of sub epithelial lesions in the gastrointestinal tract. We suggest that refining procedural techniques and ensuring appropriate endoscopist expertise can enhance diagnostic outcomes.

DECLARATIONS

Data Availability Statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRBEC-BMC_02/24)

Consent for publication

Approved

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Not applicable

CONFLICT OF INTEREST

The authors declared an absence of conflict of interest.

AUTHOR CONTRIBUTION

ADNAN LIAQAT (MEDICAL OFFICER)
Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript.

HAMEED BADSHAH (PGR INTERNAL MEDICINE)
Manuscript revisions, critical input.

SHAHZADA AHSAN KAMAL (PGR GENERAL SURGERY)
Study Design, Review of Literature.

MUZAKKIR SHAH (PGR GENERAL SURGERY)
Manuscript drafting.

MUHAMMAD MAAZ (House Officer)
Conception of Study, Final approval of manuscript.

UZMA WAHID (SPECIALIST REGISTRAR GENERAL SURGERY)
Data entry data analysis, and drafting article.

KASHMALA KHAN (MEDICAL OFFICER)
Manuscript revisions, final approval of manuscript.

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