ejpmr, 2022, 9(8), 84-89

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

THE OUTCOME OF PREOPERATIVE ENDOSCOPIC ULTRASONOGRAPHY IN EARLY GASTRIC CANCER

Tanzila Islam[1]*, Mehtab Uddin Ahmed[2], Farhana Shimu[3] and Debarati Bosak[4]

[1]Assistant Professor, Department of Radiology and Imaging, Colonel Malek Medical College, Manikganj, Bangladesh.
[2]Assistant Professor, Department of Surgery, Colonel Malek Medical College, Manikganj, Bangladesh.
[3]Associate Professor, Department of Radiology and Imaging, Dhaka Central International Medical College, Dhaka.
[4]Junior Consultant, Department of Radiology and Imaging, 250 Bed Sadar Hospital, Manikganj, Bangladesh.

***Corresponding Author: Dr. Tanzila Islam**

Assistant Professor, Department of Radiology and Imaging, Colonel Malek Medical College, Manikganj, Bangladesh.

Article Received on 11/06/2022 **Article Revised on 01/07/2022** **Article Accepted on 21/07/2022**

ABSTRACT

Background: *Endoscopic ultrasonography (EUS) is the most routinely utilized tool for early gastric cancer T staging (EGC). However, research on EUS for staging EGC found wildly disparate sensitivities and specificities.* ***Objective:*** *In this study our main goal is to evaluate the outcome of preoperative endoscopic ultrasonography in early gastric cancer.* ***Method:*** *This cross sectional study was carried out at tertiary medical hospital from January 2021 to January 2022. A total of 100 lesions underwent curative surgery or ESD in center, with 100 of them diagnosed with EGCs pathologically were included as a sample population. Conventional endoscopy (video endoscope Q260 or H260, Olympus Medical Systems, Tokyo, Japan) was used to examine all lesions before EUS. There were two types of EUS devices utilized: ultrasound was used for smaller or flat lesions, and ultrasound endoscope (was used for bigger or depressed lesions).* ***Results:*** *During the study, 46% patients belongs to 41-50 years age group and majority were male. The median tumor diameter was >2.0 cm (Range, 0.4–10.0) was accompanied in 55% lesions. In the final pathological diagnosis, the invasion depth was M for 70% lesions and SM for 30% lesions, and differentiated histology was diagnosed in 75% and undifferentiated histology in 25%. Within the mucosal cancer group, 80% were accurately diagnosed as EUS-M whereas among the submucosal cancer group, 20% were under-estimated as M cancer and 45% were over-estimated either as MP (n = 8) or 56% were SS. the accuracy was significantly lower for the lesions located at angle and body of the stomach, ulcer/scar (+), excavated type, lesions with white fur on surface, >2.0 cm in diameter, and submucosal invasion, as well as the undifferentiated types of lesions. In addition, The accuracy of EUS for the lesions within absolute indications and expended indications were 75 and 55%, respectively. For the lesions beyond the indications for endoscopic resection, the accuracy of EUS was 25%.* ***Conclusion:*** *malignancies were independently related with EUS misinterpretation of EGC depth, and 0-III type lesions were an independent risk factor for EUS over-diagnosis of invasion depth. As a result, EUS is not required usually for choosing the treatment strategy for EGC.*

KEYWORDS: *Early gastric cancer (EGC), Endoscopic submucosal dissection (ESD), Endoscopic ultrasonography (EUS).*

INTRODUCTION

Endoscopic therapy does not have a worse long-term result or quality of life than surgical treatment for early gastric cancer (EGC). Endoscopic therapy, particularly endoscopic submucosal dissection (ESD), is now generally acknowledged as a standard treatment for EGC in Japan and Korea due to its reduced invasiveness. With the expansion of the reasons for endoscopic therapy, it has become increasingly critical in pre-treatment planning to precisely estimate the depth of invasion.[1-4]

Endoscopic ultrasonography (EUS) has been recognized as a valuable diagnostic tool for assessing abnormalities in the gastrointestinal tract and the visceral tissues around it. Previous research indicated that EUS was useful in staging gastric cancer with good accuracy (about 90%), sensitivity, and specificity.[5-6]

In this study our main goal is to evaluate the outcome of preoperative endoscopic ultrasonography in early gastric cancer.

Objective

- To asses the outcome of preoperative endoscopic ultrasonography in early gastric cancer.

Methodology

This cross sectional study was carried out at tertiary medical hospital from January 2021 to January 2022. A total of 100 lesions underwent curative surgery or ESD

in center, with 100 of them diagnosed with EGCs pathologically were included as a sample population.

Conventional endoscopy (video endoscope Q260 or H260, Olympus Medical Systems, Tokyo, Japan) was used to examine all lesions before EUS. There were two types of EUS devices utilized: ultrasound was used for smaller or flat lesions, and ultrasound endoscope (was used for bigger or depressed lesions).

The endoscopic and histological results were examined to see if they altered the EUS diagnosis of cancer invasion depth. Version 21.0 of the SPSS program (SPSS, Chicago, IL, USA) was used. A Chi-square test was used for the univariate analyses, and logistic regression was used for multivariate analyses. Two-sided $P < 0.05$ was considered statistically significant.

RESULTS

In table-1 shows age distribution of the patients where most of the patients belongs to 41-50 years age group, 46%. Followed by 44% belong to 51-60 years, 10% belong to 31-40 years.

The following table is given below in detail:

Table 1: Age distribution of the patients.

Age group	%
31-40	10%
41-50	46%
51-60	44%

In figure-1 shows gender distribution of the patients where out of 100 patients 46% were male and 44% were female. The following figure is given below in detail:

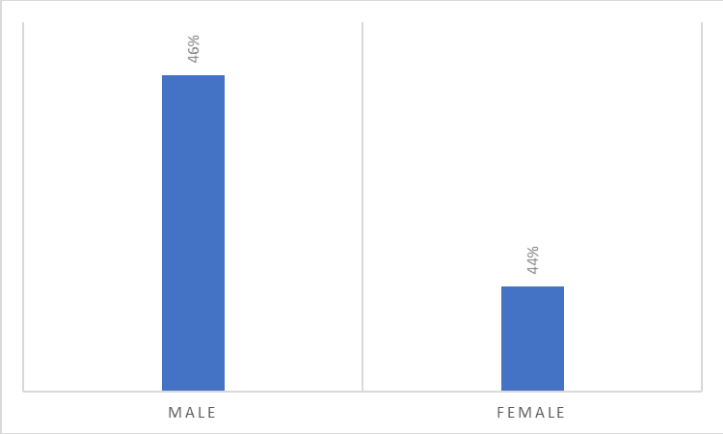

Figure 1: Gender distribution of the patients.

In table-2 shows clinicopathological characteristics of study group where the median tumor diameter was >2.0 cm (Range, 0.4–10.0) was accompanied in 55% lesions. In the final pathological diagnosis, the invasion depth was M for 70% lesions and SM for 30% lesions, and differentiated histology was diagnosed in 75% and undifferentiated histology in 25%. The following table is given below in detail:

Table 2: Clinicopathological characteristics of study group.

Location	**%**
Cardia	15%
Body	20%
Angle	20%
Antrum	45%
Tumor diameter	**%**
≤ 2.0 cm	45%
>2.0 cm	55%
Macroscopic type	**%**
0-I	5%
I-II	75%
II-III	20%
Ulcer	**%**
Positive	25%
Negative	75%
Surface roughness	**%**
Positive	95%
Negative	5%
White fur	**%**

Negative	60%
Mediate	21%
Much	19%
Pathologic depth	**%**
M	70%
SM	30%
EUS type	%
US probe	75%
US-endoscope	25%
Resection method	**%**
ESD	60%
Surgery after ESD	10%
Surgery	30%
Indication	**%**
Absolute indication	35%
Expanded indication	25%
Out of indication	40%
Histology	**%**
Differentiated	75%
Undifferentiated	25%

In table-3 shows accuracy rates for T staging by endoscopic ultrasonography where Within the mucosal cancer group, 80% were accurately diagnosed as EUS-M. Out of these 99 lesions, 62% were diagnosed as EUS-SM, 80% as EUS-MM, and the remaining 44% lesions were diagnosed as EUS-SS. Among the submucosal cancer group, 20% were under-estimated as M cancer and 45% were over-estimated either as MP (n = 8) or 56% were SS. The following figure is given below in detail:

Table 3: Accuracy rates for T staging by endoscopic ultrasonography.

Accuracy rates for T staging by endoscopic ultrasonography	M	SM
M	80%	20%
SM	62%	38%
MP	55%	45%
SS	44%	56%

Table-4 shows influential Factors for Diagnosis Accuracy of EUS where the univariate analysis showed that the accuracy was significantly lower for the lesions located at angle and body of the stomach, ulcer/scar (+), excavated type, lesions with white fur on surface, >2.0 cm in diameter, and submucosal invasion, as well as the undifferentiated types of lesions. The following table is given below in detail:

Table 4: Influential Factors for Diagnosis Accuracy of EUS.

Location	Accuracy	P value	Over staging	P value	Under staging	P value
Cardia	65%	0.001	20%	0.001	15%	0.001
Body	38%		51%		11%	
Angle	30%		50.0%		20%	
Antrum	60%		25%		15%	
Tumor diameter		0.025		0.087		0.324
≤ 2.0 cm	60%		25%		15%	
>2.0 cm	45%		40.0%		15%	
Macroscopic type		0.001		0.001		0.135
0-I	75%		15%		10%	
I-II	60%		25%		15%	
II=III	25%		75%		5%	
Ulcer		0.001		0.001		0.235
Positive	32%		60%		8%	
Negative	65%		25%		15%	

Surface roughness		0.459		0.651		0.321
Positive	55%		34%		10%	
Negative	65%		25%		15%	
White fur		0.002		0.001		0.211
Negative	65%		25%		15%	
Mediate	32%		60%		8%	
Much	47%		34%		19%	
Pathologic depth		0.001		0.211		0.001
M	65%		35%			
SM	32%		33%	35%		
EUS type		0.001		0.222		0.001
US probe	55%		33%	12%		
US-endoscope	60%		35%	5%		
Histology		<0.001		<0.001		0.241
Differentiated	64.0%		24.2%		11.8%	
Under differentiated	30.0%		64.0%		6.0%	

In table-5 shows Multivariate analysis of factors associated with misdiagnosis of EUS in estimating the depth of EGC invasion. Multivariate analysis of these seven factors showed that submucosal invasion (OR 2.615; 95% CI 1.203–5.684, P = 0.015) was independently associated with misdiagnosis of the depth of EGC by EUS. The following table is given below in detail:

Table 5: Multivariate analysis of factors associated with misdiagnosis of EUS in estimating the depth of EGC invasion.

Location	Accuracy	P value	Over staging
Cardia	1	-	-
Body	1.162	0.305, 4.433	0.826
Angle	2.079	0.661, 6.542	0.211
Antrum	1.004	0.422, 2.391	0.992
Tumor diameter			
≤ 2.0 cm	1	-	-
>2.0 cm	1.415	0.748, 2.675	0.286
Macroscopic type			
0-I	1	-	-
I-II	1.512	0.274, 8.334	0.635
II=III	7.210	0.742, 70.061	0.089
Ulcer			
Positive	1	-	-
Negative	0.841	0.228, 3.099	0.795
White fur			
Negative	1	-	-
Mediate	0.890	0.297, 2.669	0.836
Much	1.552	0.650, 3.703	0.322
Pathologic depth			
M	1	-	-
SM	2.615	1.203, 5.684	0.015
Histology			
Differentiated	1	-	-
Under differentiated	1.331	0.386, 4.591	0.651

In table-6 shows Accuracy of EUS for predicting cancer invasion depth according to the indications for endoscopic resection. The accuracy of EUS for the lesions within absolute indications and expended indications were 75 and 55%, respectively. For the lesions beyond the indications for endoscopic resection, the accuracy of EUS was 25%. The following table is given below in detail:

Table 6: Accuracy of EUS for predicting cancer invasion depth according to the indications for endoscopic resection.

Accuracy of EUS	%	Accuracy*	Over staging	Under staging
Absolute indications	35%	75%	25%	0
Expanded indications	25%	55%	45%	0
Out of indications	36%	25%	40%	35%

DISCUSSION

Currently, EUS, which has the ability to visualize the tomographic structure of gastric walls, is considered to be the most reliable diagnostic modality used to predict the depth of gastric cancer. Though previous studies have proven the clinical efficacy of EUS in T staging of gastric cancer, the results have been inconsistent, especially in EGC, ranging from 45 to 92%.[7-11]

In the present study, we retrospectively investigated the diagnostic ability of EUS in EGC; Within the mucosal cancer group, 80% were accurately diagnosed as EUS-M. Out of these 99 lesions, 62% were diagnosed as EUS-SM, 80% as EUS-MM, and the remaining 44% lesions were diagnosed as EUS-SS. Among the submucosal cancer group, 20% were under-estimated as M cancer and 45% were over-estimated either as MP (n = 8) or 56% were SS. The results were consistent with some of the previous studies.[12-14]

It has been reported that the accuracy of EUS tended to decline for the lesions with ulcer (9, 10, 17–19), location in the upper third, and those of large tumor size.[15-19] In this study these factors also led to the misdiagnosis of EGC invasion. In previous studies, the stomach was anatomically divided into three portions, namely the upper, middle, and lower thirds of the stomach based on the classification system of the Japanese Gastric Cancer Association.[20]

However, it is difficult to accurately identify the location of gastric lesions endoscopically according to this classification. As a result, stomach lesions in the current study were divided into four groups, namely the cardia/fundus, the body of the stomach, the angle of the stomach, and the antrum of the stomach, which may be more convenient in the performance of endoscopy. The results showed that the accuracy significantly declined in the lesions located in the body and angle of the stomach as compared with the other locations. In practice, lesions in the body and angle of the stomach, where adequate filling with water is not possible, are difficult to be assessed by EUS.

Ulcer shape was an important factor that affected EUS accuracy.[11] In the present study, the accuracy of EUS in evaluating the invasion depth of EGCs with ulcer or scar was extraordinarily low.

White fur on lesions' surface was found to be a factor influencing the diagnosing ability of EUS, which had not been reported before. However, most lesions without white fur on surface were ulcer/scar negative. This result may explain why this characteristic was not an independent risk factor for misdiagnosis of EGC invasion depth in multivariate analysis.

Concerning the pathohistological findings, invasion depth and differentiation degree were related with accuracy in the univariate analysis in the present study. EUS had a higher accuracy in diagnosing mucosal cancers and differentiated lesions than submucosal cancers and undifferentiated cancers, respectively. What's more, submucosal invasion was the only independent risk factor for misdiagnosis of EGC invasion depth by EUS, which statistically indicates that EUS is less useful for confirming the diagnosis of submucosal invasion.

The frequency of the US-probe is higher than that of the US-endoscope, so the US-probe is much more suitable for the determination of the depth of EGC.[8-11] In the current study, the US-probe was used for smaller lesions or lesions with shallower depressions that were easy to diagnose as mucosal cancer, whereas the US-endoscope was used for lesions with a deep ulceration that were difficult to distinguish between a benign fibrosis and a cancerous invasion. However, the accuracy was not significantly different between US-probe and US endoscope group in the current study.

In the case of underestimation, additional surgery after ESD is indispensable because of the high risk of uncompleted resection or un-curative resection. However, unnecessary surgical resection may be an overtreatment in the case of overestimation. Additionally, a previous study illustrated that conventional endoscopy alone has a sufficient diagnostic accuracy in predicting tumor depth in EGC, with an overall diagnostic accuracy of 73.7%, which was significantly higher than that of EUS.[8] Based on the fact that the overall accuracy of EUS in the diagnosis of invasion depth of EGC is relatively low, we think EUS could not well-improve the selection of treatment method in EGCs overall. Therefore, EUS may not be necessary routinely for treatment of EGCs.

CONCLUSION

In conclusion, the overall accuracy of EUS in identifying EGC invasion depth was quite poor. Submucosal malignancies were independently related with EUS misinterpretation of EGC depth, and 0-III type lesions were an independent risk factor for EUS over-diagnosis of invasion depth. As a result, EUS is not required usually for choosing the treatment strategy for EGC.

REFERENCE

1. Kim SG, Park CM, Lee NR, Kim J, Lyu DH, Park SH, et al. Long-term clinical outcomes of endoscopic submucosal dissection in patients with early gastric cancer: a prospective multicenter cohort study. *Gut Liver*, 2018; 12: 402–10. 10.5009/gnl17414
2. Kim SG, Ji SM, Lee NR, Park SH, You JH, Choi IJ, et al. Quality of life after endoscopic submucosal dissection for early gastric cancer: a prospective multicenter cohort study. *Gut Liver*, 2017; 11: 87–92. 10.5009/gnl15549
3. Ono H, Yao K, Fujishiro M, Oda I, Nimura S, Yahagi N, et al. Guidelines for endoscopic submucosal dissection and endoscopic mucosal resection for early gastric cancer. *Dig Endosc*, 2016; 28: 3–15. 10.1111/den.12518
4. Mocellin S, Marchet A, Nitti D. EUS for the staging of gastric cancer: a meta-analysis. *Gastrointest Endosc*, 2011; 73: 1122–34. 10.1016/j.gie.2011.01.030
5. Mocellin S, Pasquali S. Diagnostic accuracy of endoscopic ultrasonography (EUS) for the preoperative locoregional staging of primary gastric cancer. *Cochrane Database Syst Rev*, 2015; 2015: Cd009944. 10.1002/14651858.CD009944.pub2
6. Tsujii Y, Kato M, Inoue T, Yoshii S, Nagai K, Fujinaga T, et al. Integrated diagnostic strategy for the invasion depth of early gastric cancer by conventional endoscopy and EUS. *Gastrointest Endosc*, 2015; 82: 452–9. 10.1016/j.gie.2015.01.022
7. Lee JY, Choi IJ, Kim CG, Cho SJ, Kook MC, Ryu KW, et al. Therapeutic decision-making using endoscopic ultrasonography in endoscopic treatment of early gastric cancer. *Gut Liver*, 2016; 10: 42–50. 10.5009/gnl14401
8. Choi J, Kim SG Im JP, Kim JS, Jung HC, Song IS. Comparison of endoscopic ultrasonography and conventional endoscopy for prediction of depth of tumor invasion in early gastric cancer. *Endoscopy*, 2010; 42: 705–13. 10.1055/s-0030-1255617
9. Kim SJ, Choi CW. Factors associated with the efficacy of miniprobe endoscopic ultrasonography after conventional endoscopy for the prediction of invasion depth of early gastric cancer. *Scand J Gastroenterol*, 2017; 52: 864–9. 10.1080/00365521.2017.1315167
10. Okada K, Fujisaki J, Kasuga A, Omae M, Yoshimoto K, Hirasawa T, et al. Endoscopic ultrasonography is valuable for identifying early gastric cancers meeting expanded-indication criteria for endoscopic submucosal dissection. *Surg Endosc*, 2011; 25: 841–8. 10.1007/s00464-010-1279-4
11. Kim JH, Song KS, Youn YH, Lee YC, Cheon JH, Song SY, et al. Clinicopathologic factors influence accurate endosonographic assessment for early gastric cancer. *Gastrointest Endosc*, 2007; 66: 901–8. 10.1016/j.gie.2007.06.012
12. Participants in the Paris Workshop. The Paris endoscopic classification of superficial neoplastic lesions: esophagus, stomach, and colon: November 30 to December 1, 2002. *Gastrointest Endosc*, 2003; 58: S3–43. 10.1016/S0016-5107(03)02159-X
13. Fairweather M, Jajoo K, Sainani N, Bertagnolli MM, Wang J. Accuracy of EUS and CT imaging in preoperative gastric cancer staging. *J Surg Oncol*, 2015; 111: 1016–20. 10.1002/jso.23919
14. Nie RC, Yuan SQ, Chen XJ, Chen S, Xu LP, Chen YM, et al. Endoscopic ultrasonography compared with multidetector computed tomography for the preoperative staging of gastric cancer: a meta-analysis. *World J Surg Oncol*, 2017; 15: 113. 10.1186/s12957-017-1176-6
15. Tsuzuki T, Okada H, Kawahara Y, Nasu J, Takenaka R, Inoue M, et al.. Usefulness and problems of endoscopic ultrasonography in prediction of the depth of tumor invasion in early gastric cancer. *Acta Med Okayama*, 2011; 65: 105–12. 10.1016/j.gie.2011.03.362
16. Park CH, Park JC, Chung H, Shin SK, Lee SK, Lee YC. A specific role of endoscopic ultrasonography for therapeutic decision-making in patients with gastric cardia cancer. *Surg Endosc*, 2016; 30: 4193–9. 10.1007/s00464-015-4728-2
17. Hizawa K, Iwai K, Esaki M, Matsumoto T, Suekane H, Iida M. Is endoscopic ultrasonography indispensable in assessing the appropriateness of endoscopic resection for gastric cancer? *Endoscopy*, 2002; 34: 973–8. 10.1055/s-2002-35851
18. Kim J, Kim SG, Chung H, Lim JH, Choi JM, Park JY, et al. Clinical efficacy of endoscopic ultrasonography for decision of treatment strategy of gastric cancer. *Surg Endosc*, 2018; 32: 3789–97. 10.1007/s00464-018-6104-5
19. Park JS, Kim H, Bang B, Kwon K, Shin Y. Accuracy of endoscopic ultrasonography for diagnosing ulcerative early gastric cancers. *Medicine*, 2016; 95: e3955. 10.1097/MD.0000000000003955
20. Japanese Gastric Cancer Association. Japanese classification of gastric carcinoma: 3rd English edition. *Gastric Cancer*, 2011; 14: 101–12. 10.1007/s10120-011-0041-5