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Endosonogragphic features of lesions suggesting gastric ectopic pancreas: experience of a single tertiary center

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Background/aim: We aimed to present the endoscopic ultrasound (EUS) features of gastric lesions suggesting gastric ectopic pancreas during upper gastrointestinal endoscopy that were diagnosed in our gastroenterology unit, which is a tertiary center for endoscopic procedures in Turkey.

Materials and methods: The data of patients who underwent upper gastrointestinal EUS in our center between April 2012 and July 2014 were retrospectively analyzed.

Results: All of the lesions suggesting gastric ectopic pancreas were localized in the gastric antrum. Thirty-six of 44 lesions (81.1%) showed central dimpling. Lesion borders were shown to be definite in 10 (22.7%) lesions, whereas the borders of 34 lesions (77.3%) were indefinite. Thirty-nine lesions (88.6%) had heterogeneous and 5 lesions (11.4%) had homogeneous echo patterns; whereas 29 lesions (65.9%) were hypoechoic, 9 lesions (20.5%) were hyperechoic and 6 lesions (13.6%) had mixed echogenicity. Forty-two lesions (95.5%) were shown to affect only a single sonographic layer of the gastric wall.

Conclusion: EUS features of lesions that strongly suggest gastric ectopic pancreas endoscopically, without any histopathological evidence and without either endoscopic or surgical resection, are as follows: indefinite border appearance, minimal heterogeneous hypoisoechoic echo pattern, existence of anechoic duct-like structures inside the lesion, common localization in the submucosal layer, and existence of umbilication.

Key words: Aberrant pancreas, accessory pancreas, endoscopic ultrasound, heterotopic pancreas

1. Introduction

Ectopic pancreas is a congenital anomaly where pancreatic tissue is settled apart from its normal anatomical localization (1). Heterotopic pancreas, aberrant pancreas, and accessory pancreas are synonyms for this anomaly. It is not related to normal anatomic pancreatic tissue and has its own ductal system. It is mostly asymptomatic, but bleeding, pancreatitis, gastric ulcer, gastric outlet obstruction, and malignant transformation do rarely occur (2). The incidence of ectopic pancreas is reported to be 0.20%–0.25% for abdominal operations and 0.55%–13% in autopsy series (3). Ectopic pancreas is 95% localized in the upper gastrointestinal (GI) system, especially the stomach, duodenum, and jejunum. Gastric ectopic pancreas is reported to account for 75% of all ectopic pancreas localizations (4). More rare localizations inside or outside of the GI system are the ileum, gall bladder, colon, biliary ducts, omentum, spleen, thorax, abdominal wall, and Meckel's diverticula. The stomach, the duodenum, and the pancreas all originate from the foregut during embryologic development, and this can explain the common localization of ectopic pancreatic tissue in the stomach and the duodenum or proximal small bowel (5,6). The endoscopic appearance of gastric ectopic pancreas reveals a normal mucosal view when there is not any malignant transformation with elevated edges and a depressed center in the subepithelial region. The submucosa is the main layer of localization (7).

Endoscopic ultrasound (EUS) is an effective procedure to define which gastric layer the lesion originated from, to make a differential diagnosis of other subepithelial lesions, and to help the decision of endoscopic or surgical resection (8,9).

There are very limited case series that report endosonographic and histopathologic correlations of gastric ectopic pancreas (8,10). Histopathologic sampling

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or pathologic diagnosis of gastric ectopic pancreas is mostly not possible or feasible for two reasons: it is not possible to obtain deep tissue sampling with standard biopsy forceps, and surgical or endoscopic resection is not necessary due to EUS findings when the lesion is asymptomatic (11).

In this study we aimed to present EUS features of lesions strongly suggesting gastric ectopic pancreas during upper GI endoscopy, without histopathologic confirmation.

2. Materials and methods

2.1. Study population

The data of patients who underwent upper GI EUS in our center between April 2012 and July 2014 were retrospectively analyzed. EUS features (size, echogenicity, border, and ductal structure) of 44 patients (56.8% female, 43.2% male) who had endoscopic appearance strongly suggesting gastric ectopic pancreas and referred for EUS were documented. Lesions were labeled as type S or M according to Hase's classification. There were no histopathological confirmations as none of the lesions underwent resection.

As this is a retrospective descriptive report, we did not require ethical approval, and patient anonymity was preserved.

2.2. Endoscopic ultrasonography

Endoscopic ultrasonography was performed with a Fujinon linear array echoendoscope (EG-530 UT; Fujinon, Saitama, Japan) or a Pentax linear echoendoscope (EG-3870 UTK; Pentax, Tokyo, Japan) by experienced endosonographers (S Kacar, S Dişibeyaz, Y Özin, M Akdoğan Kayhan). Lesions were evaluated with a linear probe using frequencies of 10 and 12 MHz, sometimes by filling the stomach with water if necessary.

2.2.1. Procedure

The procedure was performed after informed approval of the patients with standard left lateral decubitis position and open intravenous access. Midazolam (2–5 mg) was administered to the patients in the case of intolerance to the procedure and linear EUS investigation was performed.

2.3. Statistical analysis

Statistical analyses were performed using SPSS 20 for Windows (IBM Corp., Armonk, NY, USA). Normal distribution of data was evaluated with the Kolmogorov–Smirnov test. Numerical variables showing normal distribution were expressed as mean ± standard deviation and those not showing normal distribution were expressed as median (min–max). Categorical variables were expressed as numbers and percentages.

3. Results

The median age of 44 patients was 45 years old (18–71 years). Nineteen of 44 patients were male (43.2%) while 25 of them (56.8%) were female. All possible gastric ectopic pancreas lesions were localized in the gastric antrum.

Tables 1 and 2 show the EUS features and Hase classifications of the patients.

Thirty-six of 44 (81.1%) lesions showed umbilication (central dimpling) on their surfaces. Lesion diameters measured with EUS were found to be 10.9 ± 3.4 mm (4–19 mm). Lesion borders were found to be indefinite in 34 lesions (77.3%), whereas they were definite in 10 (22.7%) of them. Anechoic cystic or tubular structures were determined in 19 (43.2%) lesions (Table 2). Forty-two lesions (95.5%) affected only one sonographic layer, whereas 2 lesions (4.5%) affected two sonographic layers (one involving layers 2 and 3, and the other involving the 3rd and 4th sonographic layers.) Thirty-eight of 42 (90.4%) lesions that involved a single layer had submucosa as the origin, whereas 3 (7.2%) cases were from the muscularis propria and 1 of them (2.4%) affected the muscularis mucosa. Forty lesions (90.9%) were found to be S-type and 4 lesions (9.1%) were defined as M-type according to Hase classification (Table 2).

According to the echogenic appearance of the lesions, 29 lesions (65.9%) had hypoechoic, 9 lesions (20.5%) had hyperechoic, and 6 lesions (13.6%) had mixed echogenicity. Thirty-nine lesions (88.6%) had heterogeneous and 5 lesions (11.4%) had homogeneous structures, according to their ultrasonographic echogenicity.

4. Discussion

Ectopic pancreas is most commonly localized in the gastric antrum and the duodenum or proximal jejunum. However, it can be seen in any part of the GI system from the esophagus to the colon (12,13). In a recent study, 19 of 20 (95%) ectopic gastric pancreas lesions were reported to be localized in the gastric antrum (6,14). In our study all of the 44 lesions were localized in the gastric antrum. Gastric ectopic pancreas can be determined in different ranges of ages. One of the studies in the literature reported a range of 19 to 58 years (median: 39) (7), whereas another one included patients with ages from 18 to 71 (median: 42) (14). In our study we reported patients with ages from 18 to 71 (median: 45).

The mean diameter of lesions in our 44 patients was found to be 10.94 mm (4–19 mm). Chen et al. and Park et al. reported the average diameter of gastric ectopic pancreas lesions as 12 mm (8–20 mm) and 14 mm (6–37 mm), respectively (7,14). Endoscopic appearances with central dimpling (or umbilication), orifice, or diverticulation with elevated edges are helpful in diagnosing probable ectopic pancreas preoperatively. The studies mentioned above reported that central dimpling and umbilication were determined in 18 of 20 (90%) and 9 of 26 (34.6%) patients, respectively (6,13). In our study umbilication was observed in 36 of 44 (81.1%) patients.

Table 1. Summary of EUS features and demographic data of patients with lesions suggesting gastric ectopic pancreas.

Patient	Sex	Age (years)	Location	Umb	Echo 1	Echo 2	Layer	Border	Hase	Size (mm)	Anechoic space
1	M	36	Antrum	Yes	Hypo	Hetero	3	Distinct	S	15	Yes
2	F	51	Antrum	No	Hypo	Hetero	3	Distinct	S	15	No
3	F	51	Antrum	No	Mix	Hetero	3	Indist	S	8	No
4	M	20	Antrum	Yes	Hypo	Hetero	3	Indist	S	7	Yes
5	M	51	Antrum	Yes	Hypo	Hetero	3	Indist	S	10	Yes
6	M	52	Antrum	Yes	Hypo	Hetero	3	Indist	S	6	No
7	M	41	Antrum	Yes	Hypo	Homo	3	Indist	S	8	Yes
8	M	42	Antrum	No	Hyper	Hetero	3	Distinct	S	8	No
9	M	51	Antrum	Yes	Hyper	Hetero	3	Indist	S	8	No
10	F	29	Antrum	Yes	Hyper	Hetero	3	Indist	S	8	No
11	M	19	Antrum	Yes	Mix	Hetero	3	Distinct	S	16	Yes
12	F	43	Antrum	Yes	Hyper	Hetero	3	Indist	S	12	Yes
13	F	36	Antrum	Yes	Hyper	Hetero	3	Indist	S	14	Yes
14	F	56	Antrum	Yes	Hypo	Hetero	3	Indist	S	9	Yes
15	M	21	Antrum	Yes	Hyper	Hetero	3	Indist	S	10	No
16	F	30	Antrum	Yes	Hypo	Hetero	3	Indist	S	10	No
17	M	50	Antrum	Yes	Mix	Homo	3	Indist	S	15	No
18	F	60	Antrum	No	Hypo	Homo	3	Indist	S	4	No
19	M	38	Antrum	Yes	Hypo	Hetero	3	Indist	S	13	No
20	F	58	Antrum	Yes	Hypo	Homo	3	Indist	S	13	No
21	F	46	Antrum	Yes	Hypo	Hetero	4	Distinct	M	9	No
22	M	52	Antrum	Yes	Hypo	Hetero	4	Indist	M	17	No
23	M	41	Antrum	Yes	Hypo	Hetero	3	Indist	S	14	No
24	F	64	Antrum	Yes	Hypo	Hetero	3	Indist	S	12	Yes
25	F	40	Antrum	No	Hypo	Hetero	3	Indist	S	19	No
26	F	35	Antrum	Yes	Hypo	Hetero	3+4	Indist	M	10	Yes
27	F	44	Antrum	Yes	Mix	Hetero	3	Indist	S	5	Yes
28	M	58	Antrum	Yes	Hypo	Hetero	3	Indist	S	11	No
29	F	22	Antrum	Yes	Hypo	Hetero	3	Indist	S	10	No
30	F	29	Antrum	Yes	Hypo	Hetero	3	Distinct	S	11	No
31	M	61	Antrum	Yes	Hypo	Hetero	3	Distinct	S	13	No
32	M	60	Antrum	No	Hyper	Homo	3	Distinct	S	17	Yes
33	F	45	Antrum	Yes	Mix	Hetero	3	Distinct	S	8	Yes
34	F	48	Antrum	No	Hypo	Hetero	3	Indist	S	11	No
35	F	49	Antrum	No	Hyper	Hetero	2	Indist	S	12	Yes
36	M	43	Antrum	Yes	Hypo	Hetero	3	Distinct	S	15	Yes
37	F	47	Antrum	Yes	Hypo	Hetero	3	Indist	S	10	No
38	F	43	Antrum	Yes	Hyper	Hetero	3	Indist	S	9	Yes
39	M	71	Antrum	Yes	Mix	Hetero	3	Indist	S	10	Yes
40	F	57	Antrum	Yes	Hypo	Hetero	3	Indist	S	10	No
41	F	43	Antrum	Yes	Hypo	Hetero	2+3	Indist	S	10	Yes
42	F	54	Antrum	Yes	Hypo	Hetero	4	Indist	M	9	No
43	F	36	Antrum	Yes	Hypo	Hetero	3	Indist	S	6	No
44	M	49	Antrum	Yes	Hypo	Hetero	3	Indist	S	15	Yes

EUS: Endoscopic ultrasonography, Umb: umbilication, Echo 1: echogenicity as hypoechoic or hyperechoic, Echo 2: echogenic appearance as homogeneous or heterogeneous, Homo: homogeneous, Hetero: heterogeneous, Indis: indistinct.

Table 2. Summary of EUS features and Hase classification of gastric lesions suggesting gastric ectopic pancreas in our study group.

EUS features	Number of patients (%)
Echogenicity	
Hypoechoic	29 (65.9)
Hyperechoic	9 (20.5)
Mixed	6 (13.6)
Homogeneity	
Heterogeneous	39 (88.6)
Homogeneous	5 (11.4)
Border	
Indistinct	34 (77.3)
Distinct	10 (22.7)
Anechoic duct-like structure	
Present	19 (43.2)
Absent	25 (56.8)
Umbilication/dimpling	
Present	36 (81.1)
Absent	8 (18.9)
EUS classification	
Superficial type	40 (90.9)
Deep type	4 (9.1)

EUS: Endoscopic ultrasonography.

To obtain a differential diagnosis it is obvious that careful endoscopic evaluation of subepithelial masses may help suggest the etiology of the mass. The appearance of pillow signs and yellow reflections are clues for lipomas. Gastrointestinal stromal tumors may appear as bilobar or "dumbbell-shaped" masses. Varices are tubular and blue. Varices, cysts, and thick folds may disappear with insufflation. Leiomyomas may be present with lesions with superficial ulcers.

According to EUS findings, ectopic pancreas can be localized on different layers of the gastric wall, mainly the submucosa, and less frequently but also in the muscularis mucosa and muscularis propria. In our study 42 of 44 (95.5%) lesions were localized in a single sonographic layer. Thirty-eight (90.4%) lesions originated from the submucosa, 3 (7.2%) from the muscularis propria, and 1 (2.4%) from the muscularis mucosa. Only 2 lesions affected two sonographic layers. The second and third layers were involved in one of them, whereas the other affected the third and fourth layers. In a recent study, it was reported that 9 lesions affected a single layer, 10 of them affected two layers, and 1 patient had 3 sonographic layers involved (7).

Gastric ectopic pancreas is mostly seen in EUS as hypoechoic, heterogeneous, and indefinitely bordered lesions. It was reported in a study that 19 of 20 (95%) gastric ectopic pancreas lesions showed diffuse heterogenic structures (7). We determined diffuse heterogeneity in 39 of 44 (88.6%) patients. In another study, 24 of 26 (92.3%) lesions were found to be hypoechoic (14), whereas only 29 of 44 (65%) of our patients showed hypoechoic patterns. The same study mentioned above reported that 13 of 20 (65%) lesions had indefinite borders (7). Indefinite borders were observed in 34 of 44 (77.3%) of our patients. These findings suggest that we had results parallel with existing data in the literature.

Hase et al. described two types of ectopic pancreas: an S-type and an M-type (10). According to Hase's classification, 18 of 20 (90%) of patients had S-type and 2 (10%) of them had M-type lesions (7). In our study we observed that 40 of 44 (90.9%) lesions were S-type and 4 lesions (9.1%) were M-type.

Biopsy specimens obtained with standard endoscopic forceps cannot show deep tissue samples so they are not diagnostic for gastric ectopic pancreas. When a lesion is observed, a decision is made according to EUS features, and lesions are mostly followed with their size and echogenic differentiation as endoscopic or surgical resection is not necessary in asymptomatic patients. As long as the lesions keep on showing benign signs, histopathologic confirmation is not commonly yielded (11). EUS is a valuable procedure for diagnosis and for making decisions on resection for the subepithelial lesions of the upper GI tract (15–19). It is not possible to obtain deep tissue sampling with standard biopsy forceps, and surgical or endoscopic resection is not necessary for asymptomatic patients. These issues are responsible for the lack of exact pathologic diagnosis of ectopic pancreas lesions in most settings (11).

There are a very small number of case series that report endosonographic and histopathologic correlations of ectopic pancreas (8,10). Ten patients with suspicion of gastric ectopic pancreas underwent EUS before surgical resection. EUS features were compared with histologic findings. Ectopic pancreas was localized on the third (submucosa) and fourth (muscularis propria) layers in 5 patients (50%), whereas it was on the third (submucosa) layer in the other half of the patients. All of the lesions showed heterogeneous and hypoechoic echo patterns with rare hyperechoic regions. An anechoic duct-like structure was observed in 35% and 65.4% of the groups of patients in other studies (7,14). We observed anechoic cystic or tubular structures in 19 of 44 of our patients (43.2%).

Resection criteria for the lesions are: diameter of more than 3 cm, irregular mucosa, irregular shape, suspicion

of malignancy, marked heterogeneity, irregular borders, increased size during follow up, changes in echogenicity, and lesions causing complications. We did not determine any indication for resection.

The main limitations of this study are the lack of histological confirmation and the small number of participants.

In conclusion, EUS features of gastric ectopic pancreas are clinically important because of difficulties in getting histopathologic confirmation and to help determine the appropriate management of follow-up as gastric ectopic pancreas is mostly asymptomatic. In our study we tried to define the characteristic EUS features of our own patients with the help of the literature and previous methods such as the Hase classification. We obtained parallel results about the EUS characteristics of our 44 lesions when compared to recent literature. This study provides supporting evidence that EUS is a very effective and definitive procedure for the diagnosis and follow-up of gastric ectopic pancreas as it has well-defined features. Further topics of study may be correlations of EUS features with histologic sampling or resection materials with a greater number of patients.

References

1. Armstrong CP, King PM, Dixon JM, Macleod IB. The clinical significance of heterotopic pancreas in the gastrointestinal tract. Br J Surg 1981; 68: 384-387.
2. Hsia CY, Wu CW, Lui WY. Heterotopic pancreas: a difficult diagnosis. J Clin Gastroenterol 1999; 28: 144-147.
3. Tanaka K, Tsunoda T, Eto T, Yamada M, Tajima Y, Shimogama H, Yamaguchi T, Matsuo S, Izawa K. Diagnosis and management of heterotopic pancreas. Int Surg 1993; 78: 32-35.
4. Monig SP, Selzner M, Raab M, Eidt S. Heterotopic pancreas. A difficult diagnosis. Digest Dis Sci 1996; 41: 1238-1240.
5. Biswas A, Husain EA, Feakins RM, Abraham AT. Heterotopic pancreas mimicking cholangiocarcinoma. Case report and literature review. JOP 2007; 8: 28-34.
6. Park HS, Jang KY, Kim YK, Yu HC, Cho BH, Moon WS. Cystic lesion mimicking intraductal papillary mucinous tumor arising in heterotopic pancreas of the stomach and synchronous intraductal papillary mucinous adenocarcinoma of the pancreas. Int J Surg Pathol 2008; 16: 324-328.
7. Chen SH, Huang WH, Feng CL, Chou JW, Hsu CH, Peng CY, Yang MD. Clinical analysis of ectopic pancreas with endoscopic ultrasonography: an experience in a medical center. Journal Gastrointest Surg 2008; 12: 877-881.
8. Matsushita M, Hajiro K, Okazaki K, Takakuwa H. Gastric aberrant pancreas: EUS analysis in comparison with the histology. Gastrointest Endosc 1999; 49: 493-497.
9. Ryu DY, Kim GH, Park Do Y, Lee BE, Cheong JH, Kim DU, Woo HY, Heo J, Song GA. Endoscopic removal of gastric ectopic pancreas: an initial experience with endoscopic submucosal dissection. World J Gastroentero 2010; 16: 4589-4593.
10. Hase S, Nakazawa S, Yoshino J, Kojima Y, Niwa Y, Ohashi S, Mizutani K. A study on gastric and small intestinal aberrant pancreas by endoscopic ultrasonography--with special reference to comparison with histological appearance. Nihon Shokakibyo Gakkai Zasshi 1989; 86: 1684-1691 (in Japanese with English abstract).
11. Yoshida T, Sakamoto A, Kuroki K, Kojo A, Watanabe H. Electrocoagulation biopsy of aberrant pancreas of the stomach. A case of aberrant gastric pancreas. Am J Gastroenterol 1976; 66: 554-558.
12. Cho JS, Shin KS, Kwon ST, Kim JW, Song CJ, Noh SM, Kang DY, Kim HY, Kang HK. Heterotopic pancreas in the stomach: CT findings. Radiology 2000; 217: 139-144.
13. Erkan N, Vardar E, Vardar R. Heterotopic pancreas: report of two cases. JOP 2007; 8: 588-591.
14. Park SH, Kim GH, Park Do Y, Shin NR, Cheong JH, Moon JY, Lee BE, Song GA, Seo HI, Jeon TY. Endosonographic findings of gastric ectopic pancreas: a single center experience. J Gastroen Hepatol 2011; 26: 1441-1446.
15. Geller A, Wang KK, DiMagno EP. Diagnosis of foregut duplication cysts by endoscopic ultrasonography. Gastroenterology 1995; 109: 838-842.
16. Shen EF, Arnott ID, Plevris J, Penman ID. Endoscopic ultrasonography in the diagnosis and management of suspected upper gastrointestinal submucosal tumours. Br J Surg 2002; 89: 231-235.
17. Rosch T, Lorenz R, Dancygier H, von Wickert A, Classen M. Endosonographic diagnosis of submucosal upper gastrointestinal tract tumors. Scand J Gastroentero 1992; 27: 1-8.
18. Boyce GA, Sivak MV Jr, Rosch T, Classen M, Fleischer DE, Boyce HW Jr, Lightdale CJ, Botet JF, Hawes RH, Lehman GA. Evaluation of submucosal upper gastrointestinal tract lesions by endoscopic ultrasound. Gastrointest Endosc 1991; 37: 449-454.
19. Zhou PH, Yao LQ, Zhong YS, He GJ, Xu MD, Qin XY. Role of endoscopic miniprobe ultrasonography in diagnosis of submucosal tumor of large intestine. World J Gastroentero 2004; 10: 2444-2446.