Accuracy of endoscopic ultrasonography in upper gastrointestinal submucosal lesions

Üst gastrointestinal sistem submukozal lezyonlarının tanısında endoskopik ultrasonografininin doğruluğu

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Background/aims: *The aim of this study was to evaluate the accuracy of endoscopic ultrasonography (EUS) and consistency of the EUS findings with histopathologic examination.* ***Methods:*** *EUS was performed in 90 patients with upper gastrointestinal tract submucosal tumors, followed in Türkiye Yüksek ihtisas Hospital, Gastroenterology Clinic. Histopathological diagnosis and EUS findings of 25 of 90 patients were compared.* ***Results:*** *48.9% of the lesions were found to have arisen from muscular is propria, 33.3% from submucosa, 6.6% from mucosa and 10% from muscularis mucosae, and 1.2% from serosa of the 90 patients. In 25 patients histopathologic confirmation was done. 24% of 25 patients were leiomyoma, 20% polyp, 12% lipoma and the remainder were teratoma, carcinoid tumor, adenocarcinoma, polyp and leiomyosarcoma. EUS was successful in detecting all tumors. EUS diagnosis was consistent with histopathogical diagnosis in all patients with EUS findings as leiomyosarcoma (n-2) and polyp (n-6), in 46.2% of patients with EUS findings as leiomyoma, and in 50% of those with lipoma.* ***Conclusions:*** *EUS is an accurate means of evaluating and diagnosing submuocal lesions of the gastrointestinal tract.*

Keywords: Endoscopic ultrasonography, submucosal lesion

Amaç: *Bu çalışmada, üst gastrointestinal sistemin submukozal lezyonlarının endoskopik ultrasongrafi (EUS) bulguları ile histopatolojik tanıyı gösterebilme doğruluğu araştırılmıştır.* ***Yöntem:*** *Türkiye Yüksek İhtisas Hastanesi Gastroenteroloji Kliniğinde, EUS yapılan 90 submukozal tümör hastasının EUS verileri prospektif olarak değerlendirmeye alınmıştır. 25 hastaya histopatolojik olarak tanı konulmuştur. EUS tanısı ve histopatolojik tanıların doğruluğu incelenmiştir.* ***Bulgular:*** *hezyonların %48.9'u muskularis propriadan, %33.3'ü submukozadan, %6.6'sı mukozadan ve %10'u muskularis mukozadan, %1.2'si ise serozadan köken almıştır. 25 hastada histopatolojik inceleme yapılmıştır. 25 hastanın %24'ünde leiomyom, %20'sinde polip, %12'sinde lipom, geri kalanında ise teratom, karisnoid tümör, adenokarisnom, polip ve leiomyosarkom saptanmıştır. EUS tüm tümörleri tespit edebilmiştir. EUS tanılarının histopatolojik tanılarla uyumlu olduğu olduğu görülmüştür.* ***Sonuç:*** *EUS, üst gastrointestinal sistemin submukozal lezyonlarını göstermede doğru sonuçlar vermektedir.*

Anahtar kelimeler: Endoskopik ultrasnografi, leiomyom, submukozal tümör

INTRODUCTION

The diagnosis of submucosal tumors of the gastrointestinal tract is made by radiology (upper GI series), and endoscopy. However, both procedures demonstrate only the endoluminal aspect of the lesion. Neither endoscopy nor barium X-ray visualizes the transmural and extraluminal growth of the tumor nor can they differentiate true submucosal masses from extraluminal compression (1-5).

With the advent of endoscopic ultrasound (EUS) approximately two decades ago, it has become possible to visualize the structure of the GI tract wall. Different echo layers could be ascribed to certain histologic layers of the wall. The EUS layers and echogenicity properties of the gut wall are seen in (Table 1). EUS is considered valuable and sensitive in the diagnosis of submucosal tumors (2-5). We hereby present the experience of our clinic in 90

Table 1. The EUS layers and echo properties of the gut wall

Mucosa	Echo-rich
Muscularis mucosae	Echo-poor
Submucosa	Echo-rich
Muscularis propria	Echo-poor
Serosa	Echo-rich

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patients with submucosal tumors. We aimed to evaluate the accuracy of endoscopic ultrasonography (EUS) and consistency of the EUS findings with histopathologic examination.

MATERIALS AND METHODS

From October 2000 to July 2003, 90 patients (49 male, 41 female) with the suspicion of a submucosal tumor (SMT) in the upper GI tract raised by previous upper GI endoscopy were examined by EUS. EUS was performed by Olympus instruments, GF-UM20. After 5 mg midazolam intravenous sedation, the instrument is introduced and passed to the region of interest which has been defined by the previous upper GI endoscopy. To improve ultrasound contact with GI wall, either water-filled balloon at the tip of the instruments (in the esophagus and duodenum) or water-filling of the stomach or combination of both is used. At each examination, one or more photographs were taken for analysis of tumor size, echo structure, and borders, and demonstration of tumor origin from one of the echogenic wall layers. All findings were recorded prospectively. Histopathological results were also recorded.

RESULTS

Ninety patients with submucosal tumors were included in the study. The mean age was 54.85±12.85 years. EUS diagnoses of 90 patients were as follows: 28.9% leiomyoma, *6.6%* polyp, 2.2% leiomyosarcoma, 3.3% lipoma, 1.1% ectopic pancreas tissue. A specific EUS diagnosis could not be reached in 57.9% of patients.

Tumor histology was achieved in 25 patients (Table 2). Fourteen of them were female and 11 male. The mean age of the 25 patients was 53.02±13.60 years old.

48.9% of the lesions were found to have arisen from muscularis propria, 33.3% from submucosa, 6.6% from mucosa and 10% from muscularis mucosae, and 1.2% from serosa of the 90 patients. Histopathologic confirmation was done in 25 of 90 patients.

EUS was able to detect all tumors. Even small lesions could reliably be detected. Tumor size was 3-50 mm. Tumor structures were homogeneous in most SMT, especially in leiomyomas. Tumor margin was smooth in 82% (81/90) of patients.

When deciding about the endosonographic layer of the SMT, it was seen that myogenic tumors originated from the two echo-poor layers, the second (muscularis mucosae) and fourth layers (muscularis propria) (Figure 1) shows a typical EUS appearance of a polyp.

Table 2. Histopathological diagnosis, age and sex features of 25 cases

Sex	Age	Histopathological diagnosis
Male	24 yr	Granulosa cell tumor
Male	60 yr	Gastrointestinal stromal tumor
Female	39 yr	Inflammatory fibroid polyp
Female	75 yr	Leiomyosarcoma
Female	68 yr	Leiomyosarcoma
Female	50 yr	Leiomyoma
Female	50 yr	Leiomyoma
Female	60 yr	Leiomyoma
Female	65 yr	Leiomyoma
Male	45 yr	Leiomyoma
Male	65 yr	Leiomyoma
Female	40 yr	Mature cystic teratoma
Male	70 yr	Ectopic pancreas tissue
Female	68 yr	Ectopic pancreas tissue
Male	55 yr	Adenocarcinoma
Male	52 yr	Hyperplastic polyp
Female	61 yr	Hyperplastic polyp
Female	63 yr	Hyperplastic polyp
Female	65 yr	Hyperplastic polyp
Female	73 yr	Hyperplastic polyp
Male	43 yr	Lipoma
Male	61 yr	Lipoma
Female	65 yr	Lipoma
Female	31 yr	Carcinoid tumor
Female	37 yr	Neuroendocrine tumor

EUS diagnosis was consistent with histopathogical diagnosis in all patients with EUS findings as leiomyosarcoma (n=2) and polyp (n=6), in 46.2% of patients with EUS findings as leiomyoma, and in 50% of those with lipoma.

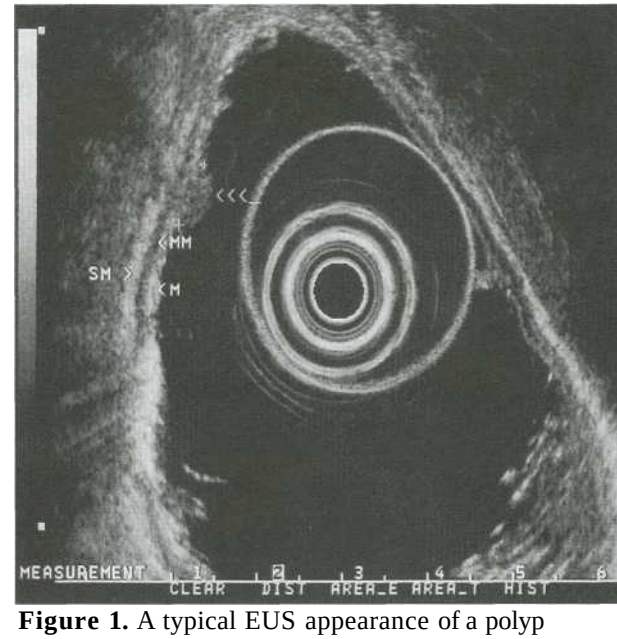

Figure 1. A typical EUS appearance of a polyp

The number of malignant tumors in the study was too small to reach statistical conclusions. Two leiomyosarcoma cases were correctly diagnosed by EUS. Sixteen of 23 patients with SMT of benign nature were predicted correctly by EUS. Nevertheless, seven patients predicted to have leiomyoma were diagnosed otherwise. These cases are shown in (Table 3).

Table 3. The histological diagnosis of 7 patients predicted to have leiomyoma by EUS and originating layer

Histopathological diagnosis	Originating layer
Granulosa cell tumor	Muscularis propria
Mature teratoma	Muscularis propria
Ectopic pancreas tissue	Muscularis propria
Neuroendocrine tumor	Muscularis propria
Gastrointestinal stromal tumor	Muscularis propria
Carcinoid tumor	Muscularis propria
Adenocarcinoma	Submucosa

Figure 2. A typical leiomyoma appearance by EUS

DISCUSSION

Endoscopic ultrasonography is used in the evaluation of upper gastrointestinal submucosal tumors after the diagnosis is made or suspected at previous conventional endoscopy. Our results revealed that EUS has a high diagnostic sensitivity in visualizing submucosal lesions. This is well in accordance with previous studies (3-8). The ways in which EUS may influence diagnosis and treatment of SMT are as follows:

EUS visualizes tumor size and extent with a reasonable accuracy (6). We believe no other imaging method is able to demostrate the precise extent of SMT with a comparable accuracy.

EUS can contribute to the specific diagnosis of the SMT, since we and the previous authors have found that certain tumors, for example myogenic ones, arise from the hypoechoic wall layers. But, histological confirmation is still a medical obligation for definite diagnosis. Palazzo et al. suggested that SMTs of size <30 mm with regular tumor margin were generally benign (8). We also reached a similar conclusion, but did find that 10% of tumors of size <30 mm were malignant. But, we believe new prospective studies are needed to clarify the SMT features suggesting malignancy.

EUS is reliable in differentiating extraluminal compression by other organs or extraluminal tumors from true submucosal lesions. Rösch et al. reported that the sensitivity and specificity rates in differentiating the SMT from extraluminal compressions were 87% and 29% in endoscopy, and 92% and 100% in EUS (7).

We found that seven patients were diagnosed to have leiomyoma, but histological diagnosis differed. We suggest that there are lesions which easily mimic leiomyoma (Figure 2). Shows a typical leiomyoma appearance by EUS. (Figure 3) illustrates a mature cystic teratoma mimicking leiomyoma, which is why histological confirmation should be performed in every case if there is any suspicion. EUS guided fine needle biopsy may aid in the differential diagnosis.

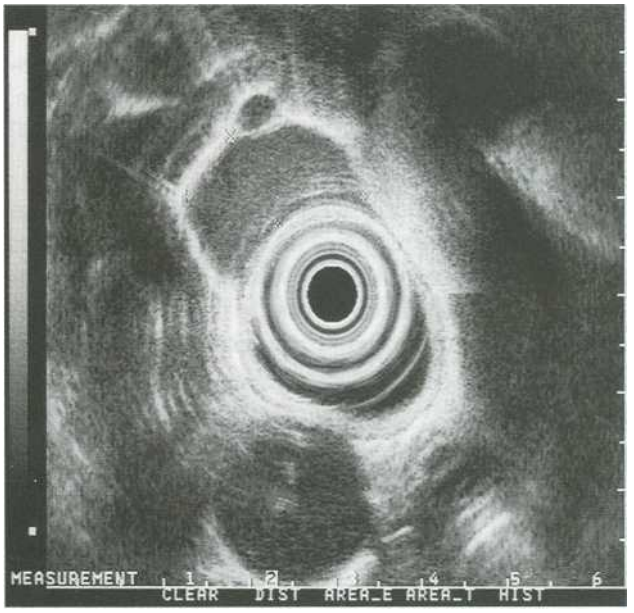

Figure 3. Mature cystic teratoma mimicking leiomyoma

EUS can be used for the follow-up study of patients in SMT, to determine changes in tumor size and pattern. Melzer et al. followed 25 patients with SMT for 19 months. During this follow-up they did not observe any significant change in lesion size, border or echogenicity (9).

EUS is not yet reliable enough in the differentiation between benign and malignant submucosal tumors. But irregular borders and larger size increase the suspicion of malignancy. Rösch also proposed the sensitivity and specificity rates in differentiation between malignant and benign lesions as 64% and 80% (6, 7). We found the sensitivity and specificity rates as 50% and 72%.

Summarizing our results, it can be stated that EUS is the most important diagnostic tool in SMT diagnosis. It can be used in every case of SMT in esophagus, stomach and duodenum detected by endoscopy. Histological diagnosis should be done in any doubtful cases. EUS will progress in the near future. Of course, tremendous developments of EUS instruments will give rise to more accurate diagnoses.

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