# MDCT findings on gastrointestinal tract lipomas located along the esophagus to the rectum

## Özofagustan rektuma gastrointestinal lipomların çok kesitli bilgisayarlı tomografi bulguları

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***Background and Aims:*** *To evaluate the multidedector computed tomography findings of gastrointestinal lipomas in various locations.* ***Materials and Methods:*** *This study included 45 patients who were referred from the gastroenterology or surgery department over the period of 2007 to 2016. The patients were referred for detailed abdominal examination for various reasons and symptoms. Among the included patients, 21 were males and 24 were females. The mean age of the patients was 62.64±11.82 (median 69.5, range 37-81). The main complaints of the patients were abdominal pain, abdominal distension, tiredness, and constipation. All patients were examined through enhanced or nonenhanced multidedector computed tomography. Images were acquired with 64-slice multidedector computed tomography. The densities of the masses were measured in Hounsfield units, and the detailed multidedector computed tomography findings of the masses were summarized.* ***Results:*** *Lipomas were found in 47 patients. Lipomas of the esophagus, stomach, duedonum, jejenum, ileum, and caecum were found in 1 (2.1%), 4 (8.5%), 2 (4.2%), 5 (1.0%), 3 (6.3%), and 9 (19.1%) patients, respectively. Lipomas of the ascending colon, transverse colon, descending colon, sigmoid colon, and rectum were found in 9 (19.1%), 4 (8.5%), 5 (1.0%), 4 (8.5%), and 1 (2.1%) patients, respectively. The lipomas had a mean Hounsfield unit density of –93±10.5 (median 85, range –70–-100). The maximum mean diameter of the lipomas was 23 mm ± 18. 5 (median 20, range 12-50 mm). All lesions were submucosal in location.* ***Conclusion:*** *Lipomas may be located anywhere along the gastrointestinal tract and may be found from the esophagus to the rectum. Multidedector computed tomography is a useful tool for the diagnosis, location, and definition of lesions and does not require or requires minimal assistance from endoscopic biopsy.*

***Key words:*** *Lipoma, multidedector computed tomography, gastrointestinal*

***Giriş ve Amaç:*** *Gastrointestinal sistemde değişik lokasyonlarda saptanan submukozal lipomların çok kesitli bilgisayarlı tomografi bulgularını değerlendirmek.* ***Gereç ve Yöntem:*** *Bu çalışmaya 2007-2016 tarihleri arasında gastroenteroloji ve genel cerrahi kliniklerinden değişik nedenlerle gönderilen ve abdomen bilgisayarlı tomografisi çekilen 47 hasta dahil edildi. Hastaların 21'i erkek, 24'ü kadın idi. Ortalama yaş 62,64 ± 11.82 (medyan 69.5, aralık 37-81) idi. Hastaların başlıca şikayeti abdominal ağrı, distansiyon, halsizlik ve kabızlıktı. Bütün hastalar kontrastlı veya kontrastsız çok kesitli bilgisayarlı tomografi ile değerlendirildi. Görüntüler 64 kesitli çok kesitli bilgisayarlı tomografi cihazı ile elde edildi. Hounsfield ünitesi olarak kitlelerin dansite ölçümleri yapıldı ve çok kesitli bilgisayarlı tomografi bulguları özetlendi.* ***Bulgular:*** *Toplam 47 hastada lipoma saptandı. Özofagusta 1 (%2.1), midede 4 (%8.5), duedonumda 2 (%4.2), jejenumda 5 (%1.0), ileumda 3 (%6.3), çekumda 9 (%19.1), çıkan kolonda 9 (%19.1), transvers kolonda 4 (%8.5), inen kolonda 5 (%1.0), sigmoid kolonda 4 (%8.5) ve rektumda 1 (%2.1) lipom olgusu vardı. Lipomaların ortalama Hounsfield dansite değeri -93±10,5 (median 85, aralık -70 ile -100) idi. Ortalama en büyük tümör çapı 23 mm ± 18. 5 (median 20, aralık 12 ile 50 mm) idi. Tüm lezyonlar submukozal yerleşimli idi.* ***Sonuç:*** *Gastrointestinal trakt lipomaları özefagustan rektuma kadar herhangi bir yerde izlenebilir. Çok kesitli bilgisayarlı tomografi tanı, lokalize etme ve tanımlama açısından endoskopik biyopsinin minimal ya da hiç yardımı olmaksızın faydalı bir görüntüleme yöntemidir.*

***Anahtar kelimeler:*** *Lipom, çok kesitli bilgisayarlı tomografi, gastrointestinal sistem*

## INTRODUCTION

Lipomas are benign tumors of adipose tissue. Although lipomas are mostly found in subcutaneous tissue, they are often observed in the retroperitoneum, striated muscle, and visceral organs (1-7). Lipomas are benign tumors of the gastrointestinal (GI) tract and usually lack malignant potential except when located in the esophagus (8,9). Given that they are usually asymptomatic, lipomas are mostly encountered incidentally during the investigation of the GI tract for other reasons (7). Lipomas of the GI tract are uncommon, slow-growing fatty tumors that can occur anywhere along the gut. They are generally solitary but may also occur in multiples. The peak occurrence of lipomas is during the fifth to seventh decades of life (2).

GI lipomas are localized encapsulated tumors of mature fatty tissue that are mostly often submucosal and occasionally subserosal and are usually solitary; the sizes of GI lipomas range from 1–to 30 cm (3). Most GI lipomas are located in the colon, ileum, and jejunum and are rarely

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responsible for clinical symptoms. Lipomas found in the stomach and esophagus are even more unusual and represent less than 1% of all gastric tumors and account for only 5% of GI lipoma cases (4-6). Their associated symptoms depend on their size and location. Lipomas smaller than 1 cm are generally incapable of inducing symptoms, however, 75% of lipomas with sizes exceeding 4 cm may cause GI symptoms (7).

The diagnosis of GI tract lipomas can be established through endoscopic and radiologic evaluation. However, clearly differentiating between gastric lipomas and other submucosal neoplasm through endoscopy is impossible because routine endoscopic gastric biopsies do not reach the submucosal layer (9). Distinguishing between lipomas and other submucosal neoplasms may not be always possible with endoscopy because the endoscopic sampling of the submucosal lesion may not be always possible (11). MDCT examination is an appropriate first step for definitive diagnosis of a lipoma (2,4).

The purpose of this study was to evaluate MDCT findings on lipomas found in various sites along the GI.

## MATERIALS and METHODS

This study included 45 patients who were referred from the gastroenterology or surgery department over the period of 2007 to 2016. The patients were referred for detailed abdominal examination for various reasons and symptoms. This study was a retrospective single center study. Formal informed consent was obtained from the patients for imaging. The patient group comprised 21 males and 24 females with a mean age of 62.64 ± 11.82 (median 69. 5, range 37–81) (Table1). A total of 47 lipomas were found. The main complaints of the patients were abdominal pain, abdominal distension, tiredness, and constipation. All patients were examined through enhanced or nonenhanced MDCT. Images were acquired with 64-slice MDCT (Aquillion, Toshiba, Ottawara, Japan) with a slice thickness of 5 mm. Water was used as a negative gastrointestinal contrast agent. The density of the masses was measured in Hounsfield units (HUs), and the detailed MDCT findings of the masses were summarized. Routine endoscopic biopsy was not performed in all patients because the finding of a homogeneous mass

**Table 1. Baseline characteristics and MDCT features of the study group.**

| | |
|---|---|
| Total number of patients | n = 45 |
| Total number of lipomas | n =47 |
| Age—year, mean ± standard deviation, (range) | 62.64±11.2 (median 69.5, range 37–81) |
| Gender | 21M (46.6%) 24F (53.4%) |
| Location of lipomas | Esophagus in 1 (2.1%)<br>Stomach in 4 (8.5%),<br>Duedonum in 2 (4.2%)<br>Jejenum in 5 (1.0%)<br>Ileum in 3 (6.3%)<br>Cecum in 9 (19.1%)<br>Ascending colon in 9 (19.1%)<br>Transverse colon in 4 (8.5%)<br>Descending colon in 5 (1.0%)<br>Sigmoid colon in 4 (8.5%)<br>Rectum in 1 (2.1%) |
| Mean HU unit of lipoma density | –93±10.5 (median 85, range –70 to –100) |
| Mean largest diameter of lipomas | 23 mm±18.5 (median 20, range 12 to 50 mm). |
| Contrast enhancement on MDCT | None |
| Contour of lipomas | All smooth (97.8%) except one ulcerated (2.2%) |
| Layer of lipomas | All submucosal (100%) |
| Internal structure of lipomas | All homogenous (100%) |

with between –60 and –120 is nearly patognomonic for a lipoma (2). One radiologist who has had at least 15 years of experience in abdominal imaging evaluated the images acquired by the workstation.

## RESULTS

Lipomas of the esophagus, stomach, duedonum, jejenum, ileum, and caecum were found in 1 (2.1%, Figure 1), 4 (8.5%, Figure 2), 2 (4.2%, Figure 3), 5 (1.0%, Figure 4), 3 (6.3%), and 9 (19.1%, Figure 5) patients, respectively. Lipomas of the ascending colon, transverse colon, descending colon, sigmoid colon, and rectum were found in 9 (19.1%, Figure 6), 4 (8.5%, Figure 7), 5 (1.0%, Figure 8), 4 (8.5%, Figure 9), and 1 (2.1%, Figure 10) patients. The mean HU density of the lipomas was –93 ± 10.5 (median 85, range –70––100). The maximum mean diameter of the lipomas was 23 ± 18.5 mm (median 20, range 12–50 mm). All lesions were submucosal in location. Enhanced MDCT examinations showed that none of the masses showed contrast enhancement. The HU units of lipomas in different locations did not significantly vary. The contours of all identified masses were smooth without lobulation. All masses were round or ovoid in shape with homogenous internal structures.

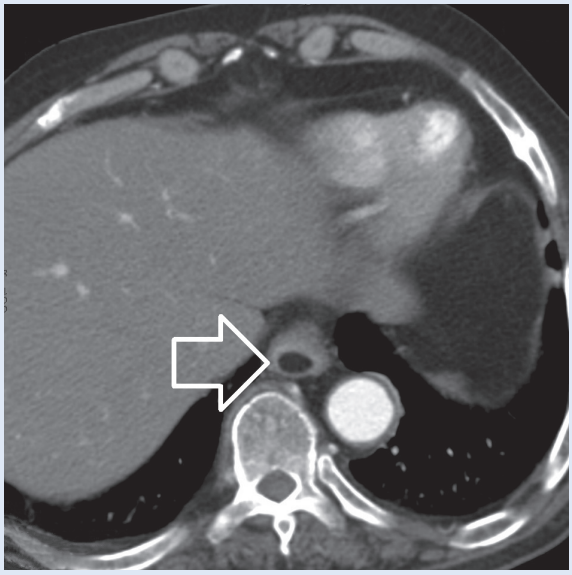

**Figure 1.** Axial MDCT image of a submucosal lipoma (arrows) in the distal esophagus.

## DISCUSSION

Lipomas may cause abdominal pain, bleeding, intussusception, obstruction, volvulus, diarrhea, constipation, or dyspepsia. Intestinal obstruction is a major result of the occlusion of the lumen by a large protruding lesion. Hemorrhage might be due to the ulceration of the overlying mucosa caused by direct pressure from the lipoma or due to intussusception (7). GI bleeding due to direct pressure is usually chronic and can cause anemia (2). Lipomas are usually incidentally found during GI imaging performed for unrelated reasons. Although lipomas lack malignant potential, concomitant malignant lesions can occur. Colonic adenocarcinomas occur in 39% of patients with colonic lipomas (8).

CT is an ideal noninvasive technique for the diagnosis of fatty tumors and can reliably differentiate fat from other

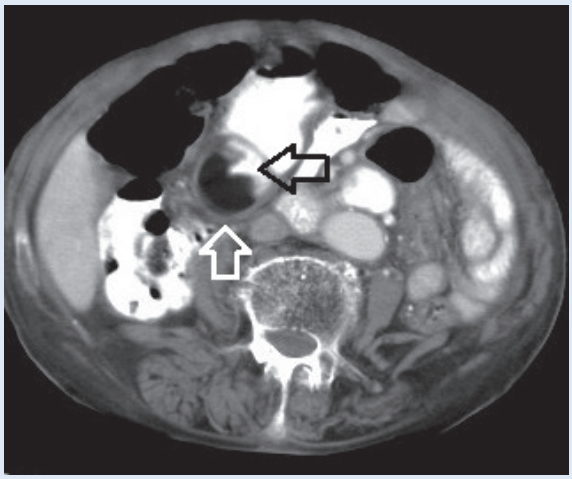

**Figure 2.** Axial MDCT image of a submucosal lipoma (white arrow) in the antrum. The lipoma was ulcerated (black arrow) and was bleeding.

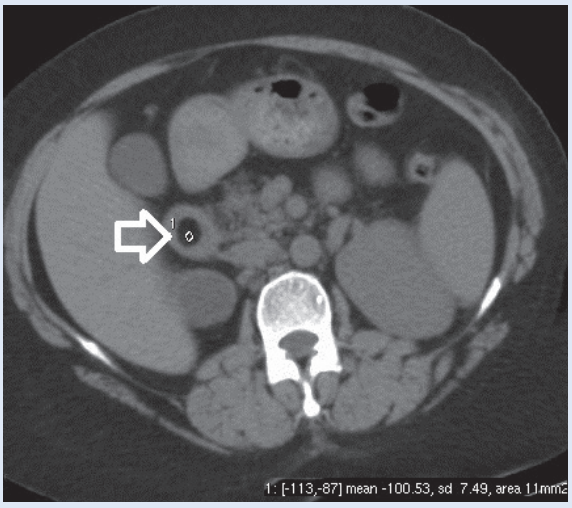


**Figure 3.** Axial MDCT image of a submucosal lipoma (arrows) in the second part of the duodenum.

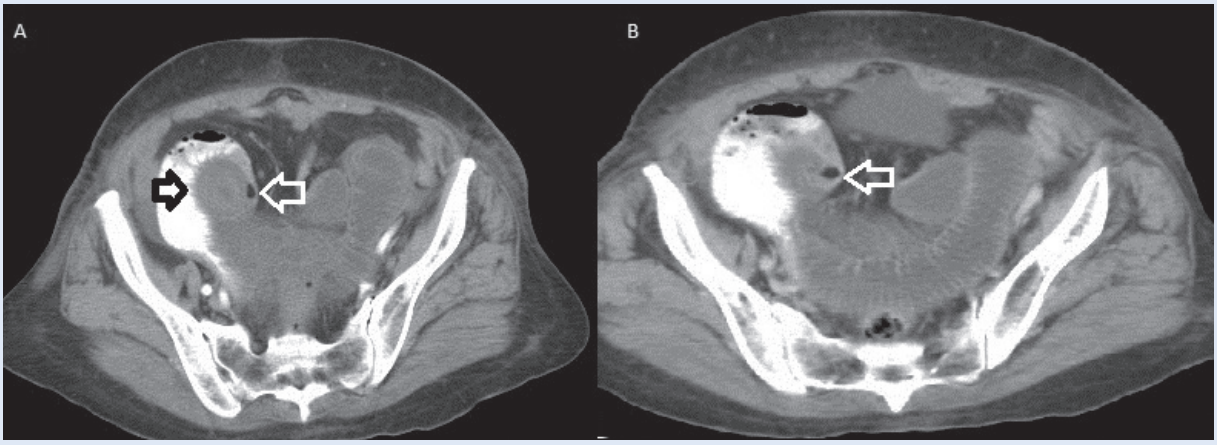


**Figure 4.** Axial MDCT images (a)–(b) of a jejunal lipoma (white arrows) that caused intussusception (black arrow).

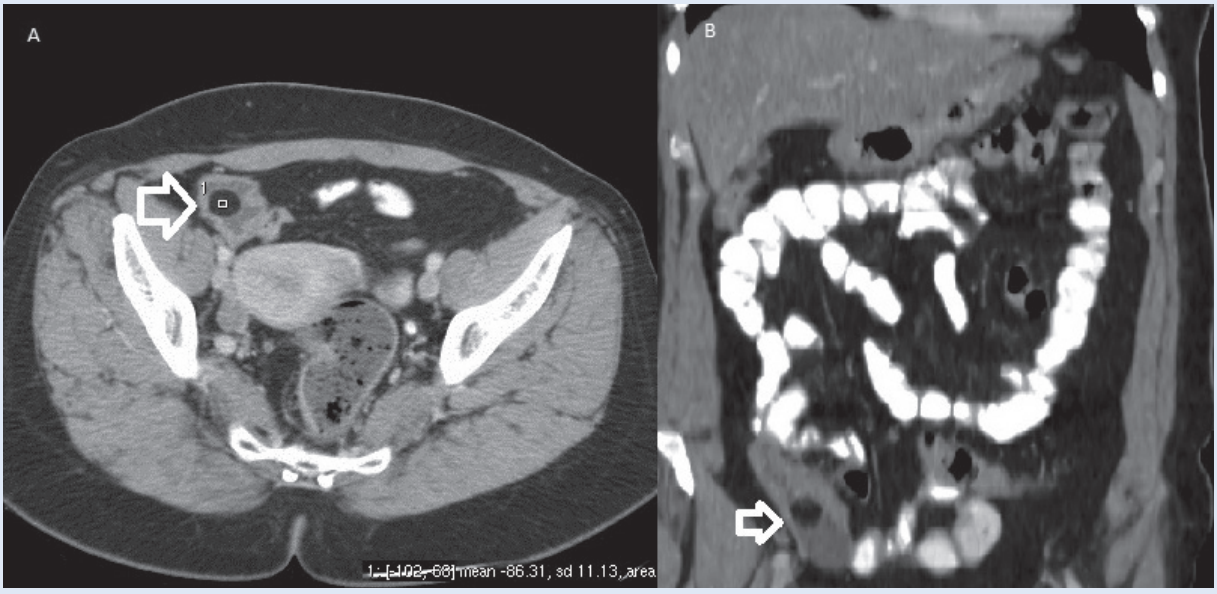


**Figure 5.** Axial (a) and coronal (b) reformatted MDCT images of a cecal lipoma (arrows).

tissues (4). The detection of fatty tissue density within masses on CT scans supports the presence of lipomas (7). The finding of a homogeneous mass with HU units of –80––120 is nearly patognomonic for lipomas (2). On CT and MRI, lipomas are depicted as homogeneous, nonenhancing, well-marginated lesions that are consistent with adipose tissue. Density measurements on CT images consistent with fat are virtually diagnostic for lipomas. Given that lipomas can be incidentally found, they should be considered in the differential diagnosis of GI system-related soft tissue masses. CT or MRI examinations can be performed to correctly diagnose a lipoma nonoperatively, thereby improving treatment planning (12)

## Esophageal lipomas

Lipomas are rarely found in the esophagus and account for less than 1% of all esophageal neoplasms (13,14). Esophageal lipomas constitute the third most common benign tumors of the esophagus after sessile leiomyomas and fibrovascular polyps (1). Although esophageal lipomas account for only 0.4% of the benign tumors of the alimentary tract (14), they may undergo malignant differentiation because of the vascularity of large benign tumors and may be complicated by ulceration (14). The preoperative diagnosis of esophageal lipomas can be confirmed through CT and endoscopic examination, which are performed to evaluate the origin, extent, surface features,

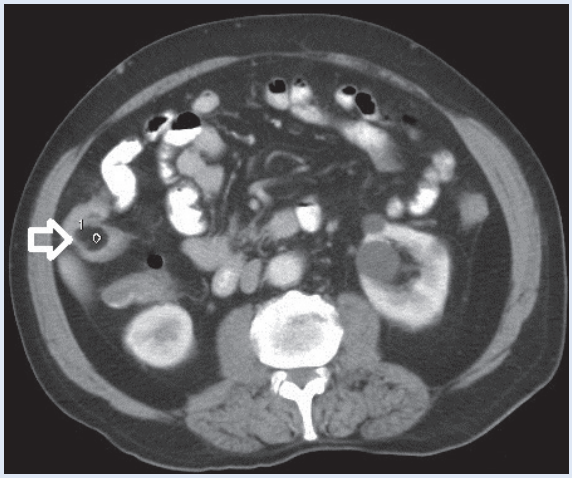

**Figure 6.** Axial MDCT image of an ascending colon lipoma (arrow).

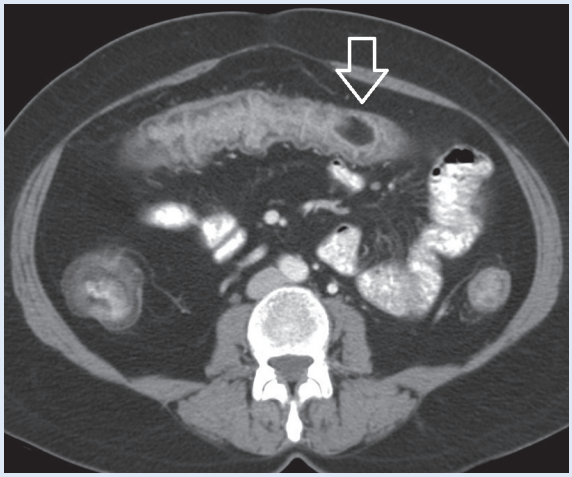

**Figure 7.** Axial MDCT image of a well-defined submucosal lipoma (arrow) located in the transverse colon.

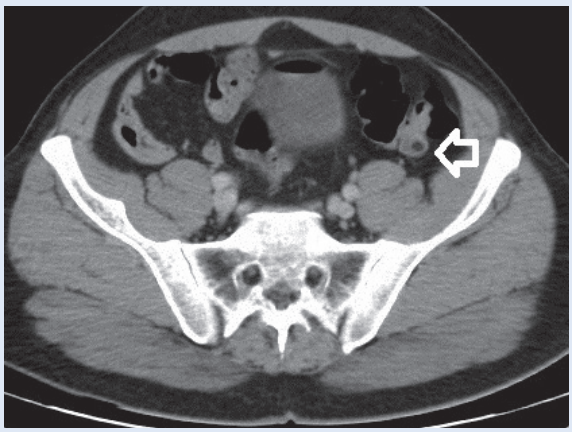

**Figure 8.** Axial MDCT image of a submucosal lipoma (arrow) located in the descending colon lipoma.

**Figure 9.** Axial MDCT image of a submucosal lipoma (arrow) located in the sigmoid colon.

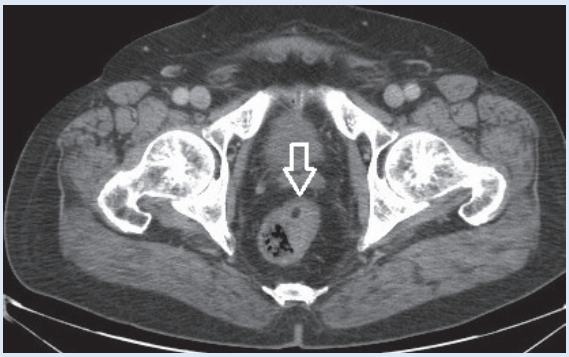

**Figure 10.** Axial MDCT image of a rectal lipoma (arrow).

and consistency of the mass (7-9). Esophageal lipomas must be differentiated from esophageal lipomatosis and liposarcoma on the basis of location and appearance. Lipomas are well-circumscribed, uniform, fatty masses that are surrounded by a single ring of the normal esophageal wall. Esophageal lipomatosis exhibits a double ring appearance because of the circumferential deposition of fat within the esophageal wall. Liposarcomas may have fatty components but usually contain elements with the same density as soft tissue; moreover, these elements show contrast enhancement on CT or by MR (15). In this study, esophageal lipomas do not show contrast enhancement, and the characteristics of the identified lipomas are the same as those previously described.

## Gastric lipomas

Gastric lipomas are rare lesions that account for only 5% of alimentary tract lipomas and for only 3% of all benign gastric masses (2). Gastric lipomas account for 10% of the GI tract lipomas identified in this study. This high ratio may be attributed to the different cohort recruited in this study. A typical gastric lipoma is usually a single, well-differentiated adipose tumor covered by a fibrous

capsule (10). The majority (95%) of gastric lipomas originate from the submucosal layer, and the remainder arises from either the subserosal or intramural layer (16). In the current study, all identified lipomas are submucosal. Lipomas are located mostly in the antrum (2), and others are spread throughout the body and fundus (1). Lipomas with an antral location may cause prolapses into the pylorus. In the current study, the identified lipomas are single and are located in the antrum (3/4, 75%) or in the corpus (1/4, 25%). Gastric lipomas usually occur singly (90%) but may also occur in multiples (1-17). Gastric lipomas larger than 3 cm are commonly symptomatic (16). In the current study, lipomas with diameters of 5 cm caused ulceration and hemorrhage. The most common presentation is chronic or acute upper GI hemorrhage caused by the ulceration of the lipoma. Hemorrhage caused by pressure necrosis overlying the mucosa can be mild and may lead to chronic anemia or it can be severe to the point of causing a medical emergency (1). Lipomas closest to the pylorus can cause obstructive symptoms, frequently by obstructing the pylorus or by prolapsing through the pylorus into the duodenum (6). Other symptoms include abdominal pain, dyspepsia, diarrhea or constipation, and obstruction. Thompson et al stated that CT should be applied to characterize large submucosal masses before endoscopic biopsy is performed (16).

In most cases, a gastric lipoma can be definitively diagnosed through CT. CT findings that suggest gastric lipoma include well-circumscribed areas of uniform fatty density within an attenuation range of –70––120 HU (16). However, if the tumor has ulcerations, inflammation and scarring may extend into the tumor and mask lipomatous characteristics on CT (18,19).

## Small-bowel lipomas

After leiomyomas, lipomas are the second most common benign tumors of the small bowel. Small-bowel lipomas are usually asymptomatic and are discovered incidentally; they may sometimes cause symptoms and, rarely, gastrointestinal bleeding. Patients with small-bowel lipomas may present obstructive symptoms, vomiting, and intussusception (20). The diagnosis of these lipomas is often complicated by the lack of clinical signs and the problems in examining the small intestine through routine endoscopy (21,22). The diagnosis of asymptomatic intestinal lipomas can be facilitated by CT and US. Intestinal lipomas usually appear as sessile protrusions into the intestinal lumen (7). Benign tumors in the small intestine lack a characteristic CT appearance and, in most cases, are difficult to differentiate from malignant lesions. Lipomas can be definitively diagnosed on the basis of the presence of fat attenuation within the mass (22). Small-intestine lipomas may appear on CT scans as round, homogeneous, well-circumscribed masses with densities similar to those of fat. In many cases, their morphological features provide sufficient information for diagnosis.

Small-bowel lipomas tend to cause intussuseption but rarely cause intestinal intussusception (23). Intestinal lipomas arise from the mucinous layer. This origin accounts for the tendency of lipomas to invaginate into the intestine. Intussuseption associated with lipoma usually develops rapidly and recovers spontaneously.

## Colonic lipomas

The colon is the most common location of GI tract lipomas. Colonic lipomas account for 65%–75% of all cases of lipomas (2) and are the third most frequent benign neoplasia of the large intestine following hyperplastic and adenomatous polyps (24).

Colonic lipomas arise from the submucosa but may occasionally extend into the muscularis propria, and up to 10% of colonic lipomas have a subserosal origin. Lipomas are found most commonly in the colon, particularly in the ascending colon and cecum followed by in the transverse colon, descending colon, sigmoid, and least often in the rectum (25). They are generally solitary but may occasionally occur in multiples (2) and may be sessile or pedunculated. They are usually asymptomatic and detected incidentally during colonoscopy and laparotomy. They can cause symptoms when their sizes exceed 2 cm. These symptoms include bleeding with anemia, constipation, changes in bowel habits, abdominal pain, intestinal obstruction, and prolapse; colonic lipomas also rarely cause intussusception (26,27).

CT is used successfully in the diagnosis of colonic lipomas, especially of large lesions. On CT, colonic lipomas appear as sharply demarcated ovoid lesions with absorption densities of –40––120 HU. However, the surrounding soft tissue or stool may artificially increase CT density values. This phenomenon limits the accuracy of CT images in the diagnosis of colonic lipomas. In addition, small tumors are undetectable on CT given the presence of artifacts and partial volume averaging (26). Symptomatic lipomas can cause surgical emergencies, such as intussusception, obstruction, and very rarely massive hemorrhage (24-26).

## Rectal lipomas

Rectal lipomas are extremely rare and could be confused with other lesions. The confusing characteristics of rectal lipomas could be lead to diagnostic problems. Rectal lipomas may present with intussusception, ulceration, in-

testinal obstruction, prolapsus, and rectal bleeding (28). The current cohort was asymptomatic for rectal lipomas.

This study is limited by its retrospective nature. Furthermore, CT cannot accurately determine the GI layer from which lipomas originate. EUS was not correlated in this study.

In conclusion, lipomas occur along the GI tract from the esophagus to the rectum. MDCT is a useful tool for the diagnosis, location, and definition of lesions and does not require or requires minimal assistance from endoscopic biopsy.

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