Case 12680

Eurorad

Gastric leiomyoma: radiographic, endoscopic and MRI findings

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Section: Abdominal imaging
Area of Interest: Stomach (incl. Oesophagus)
Procedure: Barium meal
Procedure: Endoscopy
Procedure: Diagnostic procedure
Imaging Technique: Echocardiography (transoesophageal)
Imaging Technique: MR
Special Focus: Neoplasia Case Type: Clinical Cases
Authors: Tonolini Massimo, MD1; Ippolito Sonia, MD1; Bareggi Emilia, MD2.
Patient: 40 years, female

Clinical History:

An overweight female patient was being considered for possible bariatric surgery. She was asymptomatic apart from episodes of gastric pyrosis, had no significant past medical history. Physical examination and routine laboratory tests did not reveal abnormal findings.

Imaging Findings:

Double-contrast upper gastrointestinal study (Fig. 1) revealed a broad-based filling defect in the cardias, forming obtuse angles with the adjacent gastric wall. Endoscopy (Fig. 2) confirmed a 2.5 cm ovoid protruding lesion near the gastroesophageal junction, covered by normal mucosal surface without ulceration: biopsy was deemed unfeasible owing to the location.
Cross-sectional imaging of the mass was performed with tailored MRI of the stomach (Fig. 3), using pharmacological hypotonisation and peroral distension using 800 ml water, which achieved optimal luminal and mural distension. The demarcated submucosal cardial lesion showed intermediate T1 (no out-phase signal drop) and homogeneous low T2 signal intensity, poor and progressive contrast enhancement, without features suggesting gastrointestinal stromal tumour such as necrosis and haemorrhage, transmural or exoenteric growth.
Endoscopic follow-up and repeated MRI (Fig. 4) six months later showed unchanged lesion. Endoscopic ultrasound-guided biopsy (not shown) failed to provide a pathologic diagnosis.
Laparoscopic surgery, including hiatoplasty and Toupet fundoplication, confirmed gastric leiomyoma.

Discussion:

An uncommon but not exceptional endoscopic finding, subepithelial gastric masses (SEGMs) are typically mesenchymal in origin, arise within the submucosa or muscularis propria with normal overlying mucosa, and may grow in an endoluminal, exophytic, or mixed fashion. Often incidentally discovered, SEGMs may cause epigastric discomfort, nausea and vomiting, pain or early satiety. Larger lesions may ulcerate and bleed, causing haematemesis, melaena or iron-deficiency anaemia [1].
Unfortunately, endoscopy cannot fully characterize SEGMs. Double-contrast barium studies depict SEGMs as well-circumscribed protruding lesions forming obtuse angles with the adjacent gastric wall, usually with smooth margins

and mucosal surface; large size and ulceration suggest malignancy. Among SEGMs, gastric leiomyomas (GLs) represent the commonest benign gastric tumours, consist of well-differentiated bundles of smooth muscle cells in collagen connective matrix, most usually appear as broad-based cardial masses, and do not require surgery unless symptomatic. Differentiation from other mesenchymal proliferations is crucial, particularly from the more common gastrointestinal stromal tumours (GISTs) associated with a variable risk or progression and metastasis [1-3].
Diagnostic workup of SEGMs mostly relies on endoscopic ultrasound (EUS) which depicts GLs as well-demarcated homogeneous hypoechoic lesions arising in the muscularis mucosa and muscularis propria. EUS criteria including high echogenicity, hyperechoic spots, and marginal halo suggest GISTs with 89.1% sensitivity and 85.7% specificity. Since conventional endoscopic biopsies are typically insufficient, EUS-guided biopsy or a modified deep-tissue biopsy technique after preliminary mucosal incision are required to provide adequate submucosal tissue samples for microscopic and immunohistochemical (particularly C-KIT staining) studies [1, 2, 4].
Cross-sectional imaging including luminal distension and pharmacological hypotonisation proves helpful for assessment of SEGMs. To differentiate GLs from GISTs, helpful CT criteria include cardial location, round/ovoid shape, intraluminal growth, small size (<3.35 cm longest, <2.3 cm shorter diameters), homogeneous enhancement, absent necrosis, poor enhancement (<12.5 and <31.5 Hounsfield units in arterial and portal venous phase respectively) [3, 5-7].
Providing non-radiation imaging with excellent tissue contrast, MRI is increasingly used to investigate gastrointestinal tract disorders, despite technical challenges to overcome artefacts from intraluminal gas, peristalsis, cardiac cycle and respiratory motion. Although MRI applications in the stomach are currently limited to motility studies and tumour staging, in this patient (after suspicious EUS and inconclusive biopsy) MRI allowed visualization of the previously unreported appearance of a GL, excluding features suggesting GIST such as T2-hyperintense or heterogeneous neoplastic tissue, avid and persistent contrast enhancement, necrosis and haemorrhage, transmural or exoenteric growth. Therefore, MRI may help further investigate SEGMs and obviate unnecessary surgery [6, 8, 9].
Differential Diagnosis List: Submucosal leiomyoma of the gastric cardias, Gastrointestinal stromal tumour (GIST), Leiomyosarcoma, Neuroendocrine tumour e.g. gastric carcinoid, Lymphoma, Metastasis, Ectopic pancreas, Schwannoma / Neurofibroma / Glomus tumour, Inflammatory myofibroblastic tumour

Final Diagnosis: Submucosal leiomyoma of the gastric cardias

References:

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Kim GH, Park do Y, Kim S, et al. (2009) Is it possible to differentiate gastric GISTs from gastric leiomyomas by EUS?. World J Gastroenterol 15:3376-3381 (PMID: 19610138)
Okten RS, Kacar S, Kucukay F, et al. (2012) Gastric subepithelial masses: evaluation of multidetector CT (multiplanar reconstruction and virtual gastroscopy) versus endoscopic ultrasonography. Abdom Imaging 37:519-530 (PMID: 21822967)
Kim JH, Chung JW, Ha M, et al. (2013) A feasible modified biopsy method for tissue diagnosis of gastric subepithelial tumors. World J Gastroenterol 19:4752-4757 (PMID: 23922473)
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Sandrasegaran K, Rajesh A, Rushing DA, et al. (2005) Gastrointestinal stromal tumors: CT and MRI findings. Eur Radiol 15:1407-1414 (PMID: 15761716)
Zhu H, Chen H, Zhang S, et al. (2014) Differentiation of gastric true leiomyoma from gastric stromal tumor based on biphasic contrast-enhanced computed tomographic findings. J Comput Assist Tomogr 38:228-234 (PMID:24625607)
Sheybani A, Menias CO, Luna A, et al. (2015) MRI of the stomach: a pictorial review with a focus on oncological applications and gastric motility. Abdom Imaging 40:907-930 (PMID: 25261256)
Yu MH, Lee JM, Baek JH, et al. (2014) MRI features of gastrointestinal stromal tumors. AJR Am J Roentgenol

203:980-991 (PMID: 25341135)

Figure 1

a

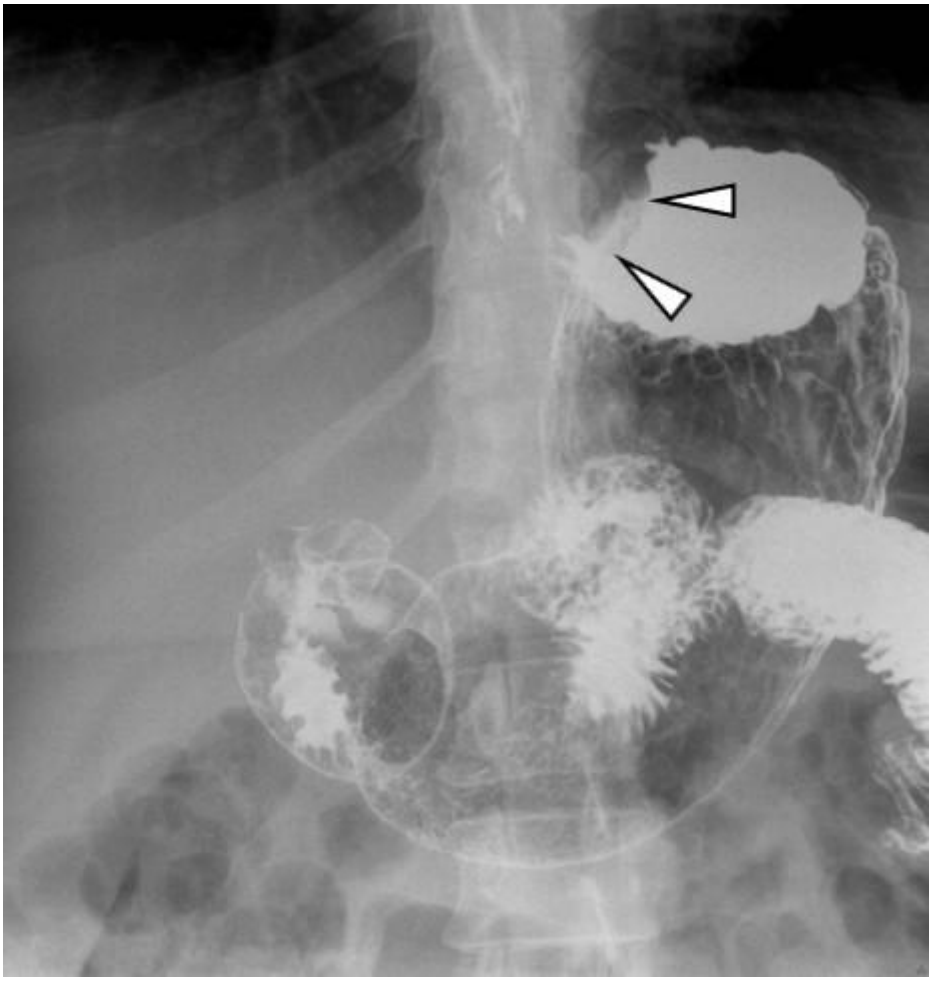
Description: As the only abnormal finding, endoscopy confirmed a 2.5 cm ovoid endoluminal lesion adjacent to the gastroesophageal junction, covered by normal smooth mucosal surface, without signs of ulceration. **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

Figure 2

a

Description: Double-contrast barium study showed a 2.5 cm well-demarcated, broad-based filling defect (arrowheads) adjacent to the gastroesophageal junction, forming obtuse angles with the nearby mucosal surface. **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

b



Description: The well-demarcated, broad-based filling defect (arrowheads) forming obtuse angles with the nearby mucosal surface was interpreted as consistent with the presence of an endoluminal (probably submucosal) mass lesion. **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

Figure 3

a

Description: T2-weighted images showed the stomach (*) filled with endoluminal water, with well-distended walls. **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

b

Description: T2-weighted images showed the stomach (*) filled with endoluminal water, with well-distended walls. **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

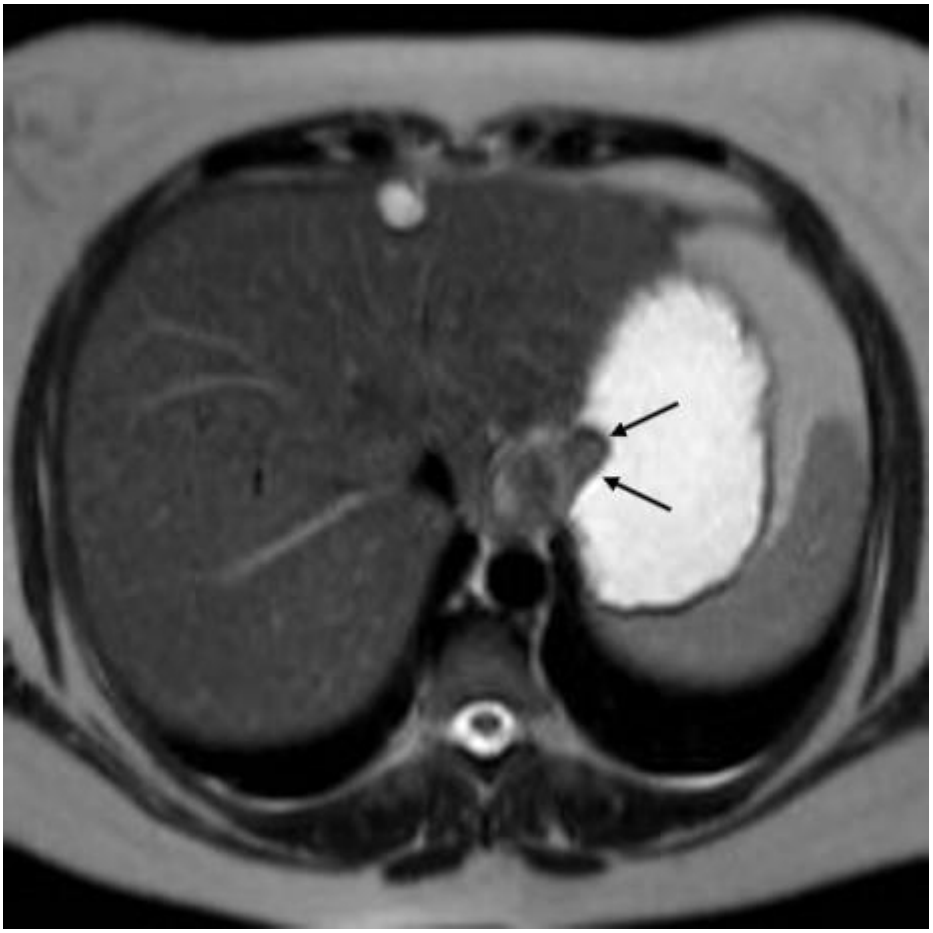
c

Description: The known submucosal lesion adjacent to the gastroesophageal junction (thin arrows) showed intermediate signal intensity on precontrast T1-weighted sequences, without signal drop in out-phase imaging (d). **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

d

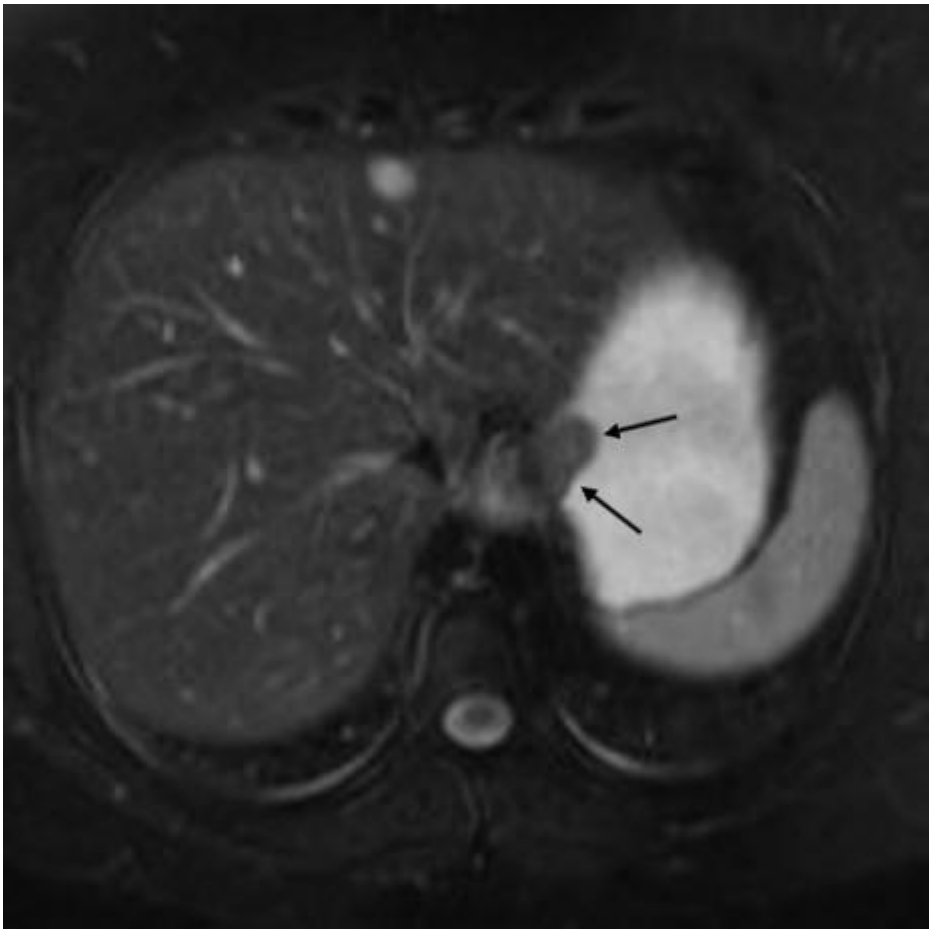
Description: The known submucosal lesion adjacent to the gastroesophageal junction (thin arrows) showed intermediate signal intensity on precontrast T1-weighted sequences, without signal drop in out-phase imaging (d). **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

e



Description: Axial and coronal T2-weighted images (image f with fat suppression) showed well-demarcated protruding lesion (thin arrows) with homogeneous low signal intensity, without signs of necrosis and haemorrhage, transmural or exoenteric growth. **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

f



Description: Axial and coronal T2-weighted images (image f with fat suppression) showed well-demarcated protruding lesion (thin arrows) with homogeneous low signal intensity, without signs of necrosis and haemorrhage, transmural or exoenteric growth. **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

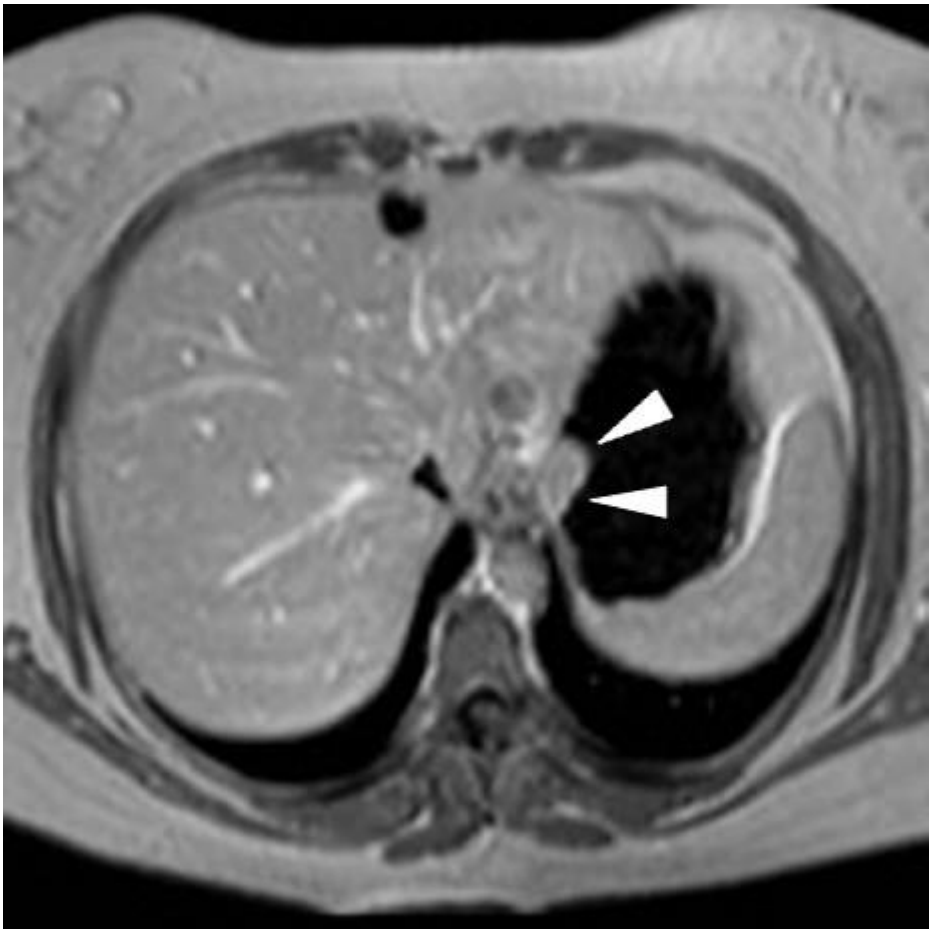
g

Description: Axial and coronal T2-weighted images (image f with fat suppression) showed well-demarcated protruding lesion (thin arrows) with homogeneous low signal intensity, without signs of necrosis and haemorrhage, transmural or exoenteric growth. **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

h

Description: After intravenous gadolinium contrast, the submucosal lesion (thin arrows) showed poor enhancement in the portal venous phase (h), progressive in the delayed acquisition (i). **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

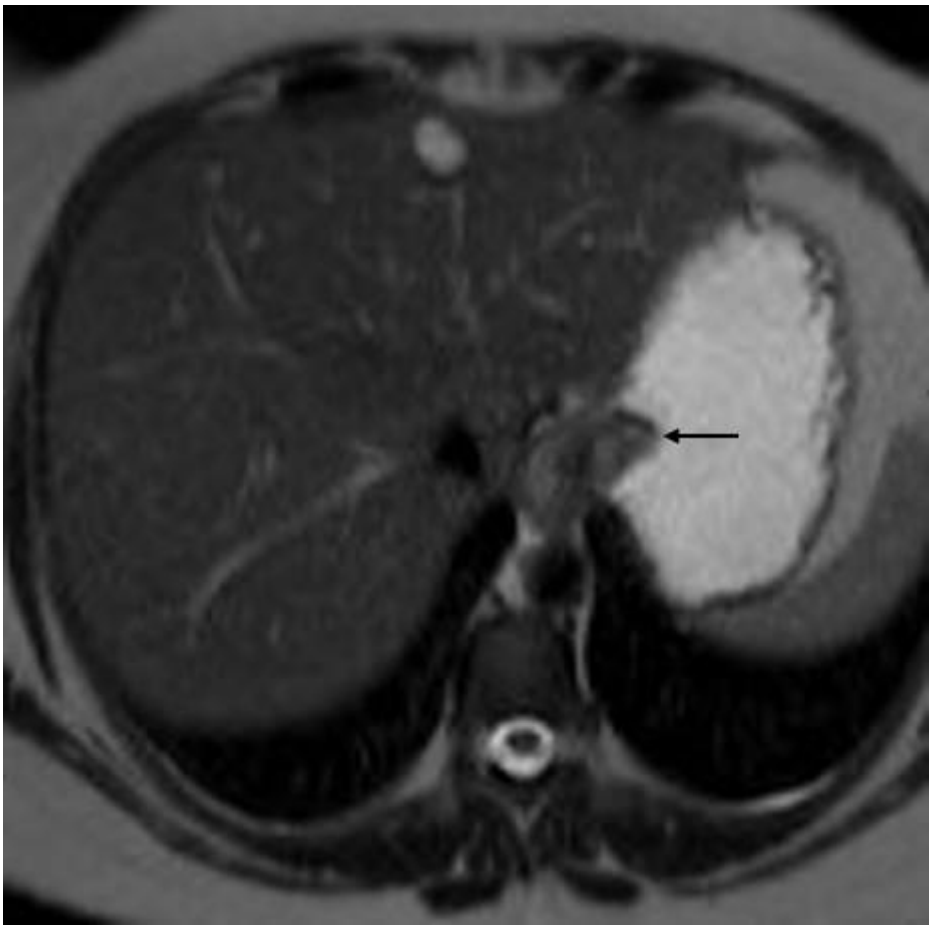
i



Description: On repeated T1-weighted acquisitions after intravenous gadolinium contrast medium, the submucosal lesion (thin arrows) showed poor enhancement in the portal venous phase (h), progressive in the delayed phase (i). **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

Figure 4

a

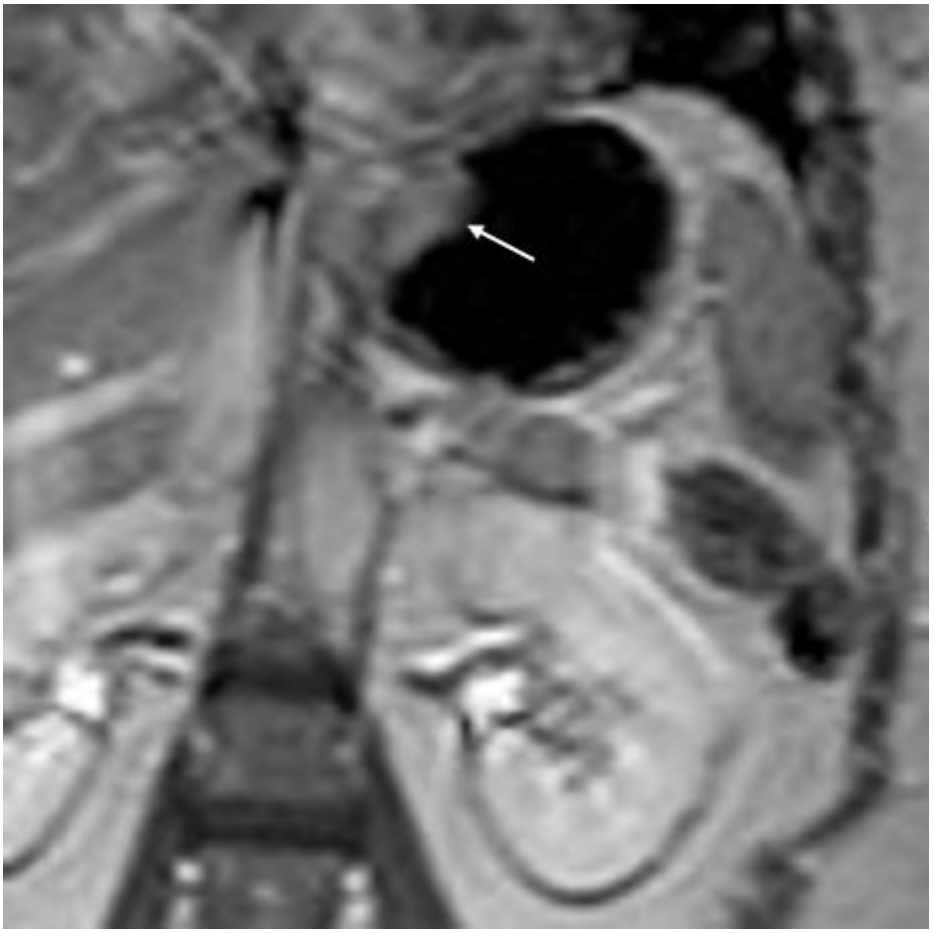


Description: Repeated MRI using the same technique tailored to the stomach, including T2-weighted (a,b) and post-contrast T1-weighted (c) images, confirmed unchanged size, growth, signal and enhancement features of the cardial lesion (thin arrows). **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

b

Description: Repeated MRI using the same technique tailored to the stomach, including T2-weighted (a,b) and post-contrast T1-weighted (c) images, confirmed unchanged size, growth, signal and enhancement features of the cardial lesion (thin arrows). **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)

c



Description: Repeated MRI using the same technique tailored to the stomach, including T2-weighted (a,b) and post-contrast T1-weighted (c) images, confirmed unchanged size, growth, signal and enhancement features of the cardial lesion (thin arrows). **Origin:** Tonolini Massimo, Department of Radiology, “Luigi Sacco\" University Hospital – Milan (Italy)