The role of abdominal CT in the diagnosis, differential diagnosis and clinical assessment of usual and unusual gastric tumours: a comprehensive imaging review

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Learning objectives

1. To show radiologic features of usual and unusual gastric tumours on multidetector computed tomography (MDCT).

2. To describe the most consistent imaging findings relative to histopathology.

3. To help ensure correct diagnosis and proper management differentiating a normal stomach or gastritis from malignant or potentially malignant lesions.
Background

Cancers figure among the leading causes of morbidity and mortality worldwide. Gastric carcinoma, one of the most deadly diseases with a significant poor prognosis, is still discovered when therapeutic approach is limited.

The current best imaging modality for stomach evaluation is conventional endoscopy. Since MDCT has been established for the evaluation of abdominal pain, gastrointestinal haemorrhage, bowel obstruction, and intra-abdominal inflammation, the incidental detection of gastric lesions during routine MDCT examination is rather common. Furthermore, recent advances in CT technology as three-dimensional (3D) imaging software provide rapid and powerful stomach evaluation identifying wall invasion and local extent. MDCT allows thinner collimation, which improves the visualization of subtle tumours as well as the quality of the 3D data sets.

Adequate distension of the stomach by using water as a negative contrast agent and thin collimation acquisition with near-isotropic MDCT imaging, are important prerequisites for assessing the gastric wall. In some cases, the addition of air may also be helpful. It may now be possible to detect cases of only minimal thickening of the gastric wall, especially when a rapid contrast material bolus is intravenously administered.

The diagnosis of gastric tumours may be challenging due to their clinically silent evolution and similar radiologic characteristics to other stomach diseases. Therefore, although the overlap of radiologic findings in many gastric tumours makes differentiation difficult, it is important to recognize the most characteristic radiologic features of stomach lesions to allow an early diagnosis and a higher survival rate.

This pictorial essay aimed to describe and illustrate imaging appearance and diagnostic clues of usual and unusual gastric tumours that may suggest a specific diagnosis.
Findings and procedure details

Gastric tumours may be classified as benign or malignant on the basis of their biologic nature.

Specific topics included in this exhibit are as follows:

1. Benign Gastric Tumours

1.1 Non-Neoplastic

- Hyperplastic polyps
- Fundic gland polyps
- Inflammatory fibroid polyp
- Duplication cysts
- Gastric heterotopic pancreas

1.2. Neoplastic:

- Gastric adenomas
- Gastric haemangiomas
- Gastrointestinal stromal tumours
- Lipomas
- Leiomyomas
- Schwannomas
- Plexiform fibromixomas

2. Malignant Gastric Tumours

- Adenocarcinomas
- Gastrointestinal lymphoma
- Gastrointestinal stromal tumours
- Gastric leiomyoblastomas
- Gastric neuroendocrine tumours (carcinoids)
- Metastases
- Secondary neoplastic involvement of the stomach by continuous tumour invasion
1.1. Non-Neoplastic

1.1.1. Hyperplastic Polyps

Aetiology, Pathophysiology, and Relevant Characteristics

Hyperplastic (metaplastic) polyps are the most common benign tumours of the stomach. The stimuli responsible for the development of hyperplastic polyps are unknown. They are generally thought to result from excessive regeneration following mucosal damage and, consequently, commonly occur in chronic Helicobacter pylori-associated gastritis, pernicious anaemia, adjacent to ulcers and erosions, or at gastroenterostomy sites. Hyperplastic polyps arise from excessive cellular proliferation in the crypts of Lieberkhün but maintain their cellular proliferation and have no dysplastic features. These lesions can regress or increase in size over time. They are usually found incidentally: polyps are present in 2% of patients who undergo gastric endoscopy, most of them (70%) corresponding to hyperplastic polyps. They can become inflamed and eroded, but bleeding is rare. Large polyps near antrum can cause gastric outlet obstruction. Malignancy rarely develops in hyperplastic polyps through a dysplasia/carcinoma sequence, although 1-20% of hyperplastic polyps have been reported to harbour foci of dysplasia. The risk of malignancy in hyperplastic polyps is supposed to increase in polyps >1 cm, pedunculated in shape, increase with patient age and location in the more distal stomach. Although these polyps have no malignant potential, patients with hyperplastic polyps are at increased risk for harbouring separate, coexisting gastric carcinomas. Hyperplastic polyps measuring >0.5 cm should be resected completely and, if dysplasia or carcinoma beyond the confines of the polyp are found, a subtotal gastrectomy or endoscopic mucosal resection should be performed.

Imaging Features Fig. 1 on page 22 Fig. 2 on page 22 Fig. 3 on page 23 Fig. 4 on page 24 Fig. 5 on page 25

At CT, most hyperplastic gastric polyps are focal epithelial proliferation of gastric mucosa that appears as a smooth sessile mucosal elevation smaller than 1 cm in diameter. They usually occur as multiple lesions of similar size, clustered in the gastric body or fundus on the posterior gastric wall.

1.1.2 Fundic Gland Polyps

Aetiology, Pathophysiology, and Relevant Characteristics
Sporadic fundic gland polyps are more frequent in females and usually occur in the middle age. Up to 40% of patients have multiple polyps.

In Western countries, where proton pump inhibitor use is quite common, fundic gland polyps are relative frequently found. This type of polyps is usually sporadic, although they can be associated with polyposis syndromes as familial adenomatous polyposis or Peutz-Jeghers syndrome. Hypergastrinemia secondary to gastrinoma or Zollinger-Ellison syndrome. The incidence of \textit{H. pylori} infection is very low in patients with fundic gland polyps and infection may be protective (regression has been reported following an \textit{H. pylori} infection).

Histopathologically, fundic polyps represent epithelium-lined cystically dilated glands. They are usually asymptomatic, since they are typically small (0.1-0.8 cm), but large polyps can cause obstruction, abdominal pain or vomiting. Sporadic fundic gland polyps have virtually no malignant potential, but may rarely show low-grade dysplasia. They are usually found with accompanying dysplasia at the incidence of 0% to 5%, but it is not related to malignant transformation. Polyps greater than 1 cm, ulcerated or located in the antrum should be resected to confirm the diagnosis and rule out dysplasia or neoplasm. Patients with familial adenomatous polyposis have an increased risk that the polyps harbour dysplasia.

**Imaging Features** [Fig. 6 on page 26][Fig. 7 on page 27]

At CT, fundic gland polyps are seen as sessile or polypoid mild enhancing lesions, sometimes with a visible enhancing vascular pedicle. Topographically, fundic gland polyps usually occur in the body or fundus and adenoma usually occurs in the antrum.

1.1.3. **Inflammatory Fibroid Polyp (Eosinophilic Granuloma-Vanek Tumour)**

**Aetiology, Pathophysiology, and Relevant Characteristics**

In 1949, Vanek described inflammatory fibroid polyp as "gastric submucosal granuloma with eosinophilic infiltration". Inflammatory fibroid polyps account for about 3% of all benign gastric polyps, are more frequent in females, and occur in the fifth to sixth decades of life.

Although an allergic cause has been suggested to play a role in the development of these polyps, no specific cause has been identified.
Inflammatory fibroid polyps are usually centred on the submucosa, whereas purely mucosal lesions have been described. They are characterized by the proliferation of spindle cells, small blood vessels, and inflammatory cells, often dominated by eosinophils. At immunohistochemical analysis, the tumour stains for CD34 and is diffusely positive for vimentin.

Most patients are asymptomatic and are incidentally diagnosed. Pedunculated polyps in gastric antrum may cause intermittent gastric outlet obstruction. These polyps do not have a malignant potential and usually do not recur after resection. Therefore, local excision is an adequate treatment.

**Imaging Features** Fig. 8 on page 28

At CT, inflammatory fibroid polyps typically manifest as well-defined, round or ovoid, slightly lobulated-contoured masses with a purely endoluminal growth pattern and an overlying mucosal hyperenhancement. Lesion homogeneity and the degree of contrast enhancement normally varied.

### 1.1.4. Duplication Cysts

**Aetiology, Pathophysiology, and Relevant Characteristics**

Gastric duplication cysts are rare congenital foregut duplication cysts affecting the stomach. They account for less than 10% of all gastrointestinal duplications. It is usually diagnosed within the first year of life, and it is very uncommon to find it in adults. Most duplications cysts occur in the ileum, followed by the oesophagus, jejunum, colon, stomach, and appendix.

The origin of gastric duplication cysts remains uncertain. They can develop prior to complete differentiation of the gastrointestinal epithelium. Khoury and Rivera reported two cases where the gastric duplication cysts appear to originate from a respiratory diverticulum, which arises from the ventral foregut.

By definition, gastric duplication cysts have some defining characteristics as a well developed layer of smooth muscle, an epithelial lining represents some part of the alimentary tract, and are attached to some part of the stomach sharing a common muscle wall and blood supply. Duplication cysts may also contain heterotopic tissue, which can include gastric mucosa pancreas: ectopic pancreatic tissue lymphoid tissue respiratory epithelium. Sometimes small intestinal or colonic mucosa can also be found. Despite their common wall with the stomach, the duplications cysts usually fail to demonstrate a communication with the gastric lumen.
Clinical manifestations are dependent on location, size, and mucosal pattern. Symptoms usually appear before one year of age as an upper abdominal obstruction, abdominal pain or a palpable mass. Duplication cysts can be discovered incidentally on radiological examination or gastric endoscopy since these cysts are usually asymptomatic in adults. Complications such as bleeding, perforation, infection or malignant transformation are most frequent if duplication cysts contain gastric mucosa or ectopic pancreatic tissue. The treatment of choice is complete surgical resection.

Imaging Features Fig. 9 on page 29 Fig. 10 on page 30 Fig. 11 on page 31

At CT, gastric duplication cysts manifest as fluid-attenuation cystic masses in close contact with the stomach. They are usually single and, in general, do not communicate with gastric lumen, but produce gastric extrinsic compression, usually in the upper part of the stomach, at the level of the cardias or in the wall of the fundus. Ultrasound examination can demonstrate an echogenic inner mucosal layer and a hypoechoic outer muscular layer, which suggest the diagnosis. CT and magnetic resonance imaging (MRI) depict a well-circumscribed cystic mass in a submucosal location, with slight enhancing wall. T2-weighted images can demonstrate high signal intensity with heterogeneous content due to associated haemorrhage, mucous secretion or infection. Ultrasound is probably the best method for the diagnosis of subepithelial gastric lesions, and distinguish cystic from solid masses. The main differential diagnoses include pancreatic pseudocysts or pancreatic cystic tumours, and other submucosal tumours such as GIST, pancreatic heterotopia, and neuroendocrine or neurogenic tumours, especially when the lesion has a "solid" appearance.

1.1.5. Gastric Heterotopic Pancreas

Aetiology, Pathophysiology, and Relevant Characteristics

Ectopic pancreatic tissue (or heterotopic pancreatic tissue) refers to the relatively uncommon situation where rests of pancreatic tissue lie outside and separate to the pancreatic gland.

The origin of ectopic pancreatic tissue is unknown. It is possible that during rotation of the foregut and fusion of the ventral and dorsal parts of the pancreas in early fetal life, small pieces of tissue become detached from the forming organ leading to entrapment in different locations. It is usually found throughout the gastrointestinal tract, most commonly in the stomach, followed by the duodenum and jejunum. Other recognised locations for ectopic pancreatic tissue include gastric duplications cysts, Meckel's diverticulum, and ileum.
It has no connection to the normal pancreas, but provided with its own vascular and ductal systems. In vivo, resembles normal pancreas with firm, yellow, well-circumscribed, lobulated nodules. Histologically, it is situated in the submucosa with almost always-acinar cells and ducts, and may be pyloric-type mucous glands too. Gastric heterotopic pancreas is commonly located along the greater curvature of the gastric antrum within 6 cm of the pyloric canal, within the submucosa.

This condition is usually asymptomatic. Nevertheless, if the ectopic pancreatic tissue is functional, it is subject to the same variation of pathology that affects the normal gland, including, but not limited to pancreatitis and pancreatic tumours. Malignant transformation is not common. Laparoscopic wedge resection is usually successful in removing the ectopic tissue, although its success is dependent on the location.

**Imaging Features** Fig. 12 on page 32 Fig. 13 on page 33

Contrast material-enhanced CT may show a sharply defined, submucosal nodule that have a flat or ovoid shape, located in the prepyloric antrum. It appears as homogeneously enhancing tissue, sometimes with ill-defined margins due to the lobular structures of the acinous tissue (similar to normal pancreas) or cystic area (acinar component or pseudocyst). The overlying mucosa can show prominent enhancement probably secondary to repeated inflammatory changes caused by ectopic pancreas. The pancreatic duct of the heterotopic pancreas can be sometimes identified as a small hipodense tubular structure. MRI can depict a cystic lesion in a thickened gastric wall and occasionally identify a pancreatic duct within a solid submucosal nodule. The main differential diagnoses include GIST, although it has a round appearance, and an exophytic growth.

1.2. Neoplastic: Benign gastric tumours with a truly neoplastic behaviour and potential malignancy development

1.2.1. Gastric Adenomas

**Aetiology, Pathophysiology, and Relevant Characteristics**

Adenomatous gastric polyps are the most common gastric neoplastic polyps.

Adenomatous polyps of the stomach are rare in the general population. They may occur sporadically, but typically occur in a background of chronic atrophic gastritis. They
Adenomatous polyps arise in epithelium of mucosa and grow upwards into the lumen. The adenomatous proliferation is characterized by different degrees of cell dysplasia (cellular and architectural atypia): loss of normal differentiation of epithelium, irregular cells with hyperchromatic nuclei, (pseudo) stratified nuclei, nucleolus, decreased mucosecretion and mitosis. Microscopically, these lesions are similar to typical colonic adenomas. They may be tubular, tubulovillous, or villous (papillary), are sessile or stalked. They may have an intestinal or gastric phenotype or some may be mixed.

Adenomatous polyps are associated with a relatively low but real risk of progression to cancer. It is estimated that 8-59% of adenomas are associated with synchronous gastric carcinomas. The presence of invasive carcinoma in an adenoma correlates with increasing size, villous contour, and the degree of dysplasia. The risk of malignancy is lower in flat adenomas. High-grade dysplasia has been identified in close proximity to a high proportion of early gastric cancers. Given the increased risk of gastric cancer, all gastric adenomas should be resected. This can usually be accomplished endoscopically, but on occasion surgery may be required for lesions that contain invasive carcinoma or in patients with multiple adenomas.

**Imaging Features** [Fig. 14 on page 34] [Fig. 15 on page 35] [Fig. 16 on page 36]

At CT, they are larger (about 2 cm in diameter) than hyperplastic polyps, and occasionally reach large sizes (up to 15 cm). They may appear sessile or pedunculated and tend to have a more lobulated appearance than hyperplastic polyps. They are typically isolated and located in the antrum.

**1.2.2. Gastric Haemangiomas**

**Aetiology, Pathophysiology, and Relevant Characteristics**

Gastric haemangiomas are relatively rare benign gastric disease. They represent 1.6% of all benign gastric tumours.

Their pathogenesis is unknown, whether these lesions are true neoplasms or congenital malformations. Sporadically, gastrointestinal haemangiomas can be associated with cutaneous haemangioma or telangiectasia. The presence of multiple lesions is associated with syndromes such as Klippel-Trénaunay syndrome, Maffucci syndrome, blue rubber-bleb nevus syndrome, or Osler-Rendu-Weber disease.
These hemangiomas are composed of large dilated blood vessels and contain large blood-filled spaces that are caused by dilation and thickening of the walls of the capillary loops. Due to the thin walls of blood vessels, large gastric hemangiomas are prone to rupture with rapid blood flow.

Isolated gastric haemangiomas generally manifest in routine clinical practice as epigastric pain and upper gastrointestinal bleeding of occasional recurrence. They usually require no treatment but if they grow exceptionally large or cause symptoms they could be removed.

**Imaging Features Fig. 17 on page 37**

Contrast material-enhanced CT shows an avidly enhancing, often intraluminal mass. Phleboliths within the lesion are virtually pathognomonic. Hemangiomas are usually solitary, vascular tumours that may occur anywhere in the gastrointestinal tract. The differential diagnosis includes GIST, glomus tumour, and metastases.

**1.2.3. Gastrointestinal Stromal Tumours**

Stromal or mesenchymal neoplasms affecting the gastrointestinal tract typically present as subepithelial neoplasms, and they are divided broadly into two groups. They demonstrate variability in differentiation and are categorized based on findings from immunohistochemical and ultrastructural studies.

**1. Gastrointestinal stromal tumours (GISTs):**

It is the most common group. They are most often located in the stomach and small intestine, but can occur anywhere in the gastrointestinal tract and the intra-abdominal soft tissues. The current view is that the overwhelming majority of mesenchymal tumours arising in the gastrointestinal tract fall into the GISTs category, and they are identified mainly by expression of KIT protein; as a group, these tumours are more specifically defined by the presence of activating mutations in the KIT or platelet-derived growth factor receptor A (PDGFRα) genes.

**2. Other mesenchymal gastrointestinal tract neoplasms:**

It is a far less common group of mesenchymal GI tract neoplasms comprised of a spectrum of tumours that are identical to those that might arise in the soft tissues throughout the rest of the body. These include lipomas, liposarcomas, leiomyomas, true leiomyosarcomas, desmoid tumors, schwannomas, and peripheral nerve sheath tumors.
Stromal tumours can be classified histologically as myogenic tumours (arising from smooth muscle), neurogenic tumours (arising from neural elements), or less differentiated tumours (GISTs). Stromal tumours with smooth muscle differentiation were formerly called leiomyomas or leiomyosarcomas.

**Aetiology, Pathophysiology, and Relevant Characteristics**

GISTs have recently been recognized as the most common mesenchymal neoplasm of the gastrointestinal tract.

Affected individuals with no family history of GIST typically have only one tumour (called a sporadic GIST). People with a family history of GISTs (called familial GISTs) often have multiple tumours and additional signs or symptoms, including noncancerous overgrowth (hyperplasia) of other cells in the gastrointestinal tract and patches of dark skin on various areas of the body. Some affected individuals have a skin condition called urticaria pigmentosa (also known as cutaneous mastocytosis), which is characterized by raised patches of brownish skin that sting or itch when touched.

GISTs can show spindle cell or epithelioid morphology, and mitotic count and tumour size are most important prognostic parameters.

Malignant transformation is quite common. Malignant stromal tumours can invade adjacent organs and can metastasize hematogenously, usually to the lung or liver. Metastatic lesions may also appear low in attenuation due to necrosis. CT cannot usually help differentiate between malignant and benign gastric stromal tumours unless obvious local invasion or metastatic disease is seen. However, small tumours (4-5 cm) are usually benign. Resection and histologic analysis of mitotic activity and markers is necessary.

**Imaging Features**

At CT, GISTs vary in size and appearance. Small tumours appear as intramural masses. As the tumours grow, they stretch the overlying mucosa and can ulcerate. When large (up to 5 cm), the tumours often appear exophytic and may contain areas of central necrosis or calcification. When tumours are large and exophytic, it may be difficult to determine their site of origin, and in such cases 3D imaging can be helpful in better characterizing the mass and determining its origin. Associated adenopathy is uncommon, in contrast with gastric adenocarcinoma or lymphoma.

1.2.4. Lipomas
Aetiology, Pathophysiology, and Relevant Characteristics

Lipomas are benign, slow-growing tumours, and account for about 2%-3% of benign gastric tumours.

Even though the aetiology remains unknown, studies suggest that lipomas might be related to an embryological sequester of adipocytes or even be due to the natural process of aging.

They frequently originate from de submucosa whereas others are centred on the subserosa or intramural. Lipomas are composed of lobules of mature adipose tissue surrounded by a fibrous capsule.

Gastric lipomas are usually detected incidentally. However, the occurrence of symptoms depends on the size and location of the tumour. In patients with larger lesions, the most common symptoms are haemorrhage, abdominal pain, pyloric obstruction, and dyspepsia. Additional symptoms may include diarrhoea, constipation, and intussusception. Gastrointestinal bleeding is typically chronic and minimal and is able to cause anaemia.

Imaging Features Fig. 24 on page 44 Fig. 25 on page 45 Fig. 26 on page 46

At CT, they usually appear as well-circumscribed submucosal masses with uniform fat attenuation. Therefore, gastric lipomas can be definitively diagnosed with CT in most cases, and unnecessary endoscopy or surgery can be avoided. However, if the tumour has ulcerations, inflammation and scar may extend for a considerable distance into the tumour and mask the lipomatous characteristics at CT. Barium study typically reveals a smooth submucosal mass or an ulcerated lesion with a "bull's-eye" appearance that is indistinguishable from other mesenchymal tumors. They tend to occur as solitary lesions, most frequently in the gastric antrum.

1.2.5. Gastric Leiomyomas

Aetiology, Pathophysiology, and Relevant Characteristics

Leiomyomas are benign stromal neoplasms.

The cause of leiomyoma is unknown, but appears to be related to hormone imbalance.
Leiomyomas of the gastrointestinal tract arise within the muscularis mucosae (superficial) and muscularis propria (deep). They are smooth muscle differentiated tumours with minimal atypia, and no or rare mitosis.

They are usually asymptomatic, but present with anaemia in 50% of cases as a result of mucosal ulceration. Even when histopathologic tests are conducted, it is difficult to distinguish benign lesions from malignant ones, partly because leiomyomas are not encapsulated.

**Imaging Features** Fig. 27 on page 47 Fig. 28 on page 48

At CT, these tumours are normally characterised as solitary non-encapsulated masses in the lower half of the stomach but may also be seen in the fundus. They usually are smaller than 3 cm, but occasionally may be large at the time of diagnosis with ulceration of the mucosa overlying the tumour in 50 to 70% of the cases. Most gastric leiomyomas present as endogastric submucosal lesions and may be pedunculated but some, originating from the serosa, develop mainly as exogastric masses.

### 1.2.6. Schwannomas

**Aetiology, Pathophysiology, and Relevant Characteristics**

Neurogenic gastric tumours are rare, accounting for about 4% of all benign gastric tumours.

Schwannoma correspond to a benign nerve sheath tumor, and it is believed to arise from the myenteric plexus within the muscularis propria of the gastrointestinal tract, most frequently in the gastric wall (60-70%), followed by the colon and rectum.

Microscopically, it is an encapsulated biphasic nerve sheath tumor derived from Schwann cells with highly ordered cellular component that palisades (Verocay bodies), plus myxoid component.

Patients are usually asymptomatic or present with abdominal pain or upper gastrointestinal bleeding when the tumour is ulcerated. There is a female predominance.

**Imaging Features**

At CT, schwannomas appears as a solitary submucosal homogeneous mass, most often in the gastric body, and an exophytic or intramural pattern of growth,
frequently indistinguishable from other mesenchymal tumors. Nonenhanced CT shows a homogeneous low attenuation mass due to the dense spindle cell composition. Enhanced CT may show minimal enhancement during the arterial phase but delayed enhancement during the equilibrium phase. They can also undergo necrosis and ulceration.

1.2.7. Plexiform Fibromyxomas

Aetiology, Pathophysiology, and Relevant Characteristics

Plexiform fibromyxoma, also called plexiform angiomyxoid myofibroblastic tumour, is a relatively new pathological category that consists of a rare group of non-gastrointestinal stromal tumours. It has potential for misdiagnosis as a GIST.

It can be sporadic or hereditary.

Microscopically, these tumours exhibit a characteristic multinodular plexiform growth pattern of small-spindled cells in a myxoid or fibromyxoid stroma. They share a myofibroblastic immunophenotype with GISTs.

Patients with plexiform fibromyxoma usually present with gastrointestinal bleeding, an abdominal mass, or gastric outlet obstruction. It is crucial to differentiate from GISTs which are much more common with an estimated incidence of >150 cases for every 1 case of plexiform fibromyxoma. Tumour cells immunohistochemically expressed smooth muscle actin and CD10, but did not express CD117, discovered on GIST#1 or nuclear ##catenin. This distinction is important, as GISTs possess a greater potential for aggressive pathobiological behaviour, whereas plexiform fibromyxomas are considered to be largely benign.

Imaging Features Fig. 29 on page 49 Fig. 30 on page 50

At CT, the tumour demonstrates areas of low attenuation owing to presence of myxoid tissue, interspersed with foci of vascularity. It almost exclusively occurs in the gastric antrum. The differential diagnosis of plexiform fibromyxoma includes other myxoid spindle cell processes that involve the stomach. The myxoid variant of GISTs is the predominant entity to consider in the differential diagnosis.

2. Malignant Gastric Tumours:
2.1. Gastric Adenocarcinomas

Aetiology, Pathophysiology, and Relevant Characteristics

Adenocarcinoma is by far the most common gastric malignancy, representing over 95% of malignant tumours of the stomach.

Gastric adenocarcinoma has striking geographic variations, with the highest prevalence reported in Japan. Conditions that predispose patients to the development of gastric carcinoma include atrophic gastritis, pernicious anaemia, gastric polyps, partial gastrectomy, and Ménétrier disease.

Most gastric cancers are adenocarcinomas of mucous cell origin. Signet-ring cell carcinomas account for 5%-15% of all gastric cancers and typically cause scirrhous infiltration of the gastric wall. In early gastric cancers, malignant invasion is limited to the mucosa or submucosa, regardless of the presence of lymph node metastases. Advanced gastric cancer invades the muscularis propria.

They are aggressive tumours with a 5-year survival rate of less than 20%. Prognosis is correlated to the stage of the tumour at presentation. Therefore, accurate staging of gastric cancers is essential because surgical resection is the treatment for localized disease.

Imaging Features Fig. 31 on page 51 Fig. 32 on page 52 Fig. 33 on page 53 Fig. 34 on page 54 Fig. 35 on page 55

At CT gastric adenocarcinomas may manifest as a focal area of mural thickening with or without ulceration, as a polypoid lesion, or as generalized mural thickening, which is less frequent. Scirrhous carcinomas frequently involve the distal half of the stomach, arise near the pylorus, and gradually extend upward from the antrum into the body and fundus. In advanced cases, the entire stomach is infiltrated by tumour.

2.2. Gastrointestinal Lymphoma

Aetiology, Pathophysiology, and Relevant Characteristics

Lymphoma involves the stomach more frequently than any other portion of the gastrointestinal tract.
Primary gastric lymphomas are confined to the stomach and regional lymph nodes (about 35% of gastrointestinal lymphomas) and are predominantly non-Hodgkin lymphomas of B-cell origin. Mucosa-associated lymphoid tissue (MALT) lymphomas are a distinct type of extranodal lymphomas that are characterized by a relatively indolent clinical course and have a much better prognosis than gastric carcinoma, with higher overall 5-year survival rates. There is evidence linking *H. pylori* gastritis with the development of lymphomas of the MALT type. Burkitt lymphoma is not common: only 1 in every 30-50 people with a B-cell non-Hodgkin lymphoma will have this type of lymphoma. The endemic (African) type of Burkitt lymphoma is almost always linked to a previous infection with the Epstein-Barr virus (EBV) and *Plasmodium falciparum* malaria infections. In the sporadic type, the role of EBV is less certain. Immunodeficiency-associated Burkitt lymphoma occurs in patients with HIV, post-transplant or congenital immunosuppression.

Microscopically, they show diffuse polymorphous population of B-cells expanding the lamina propria with reactive lymphoid follicles. Numerous plasma cells are also noted, and some of these may have Dutcher bodies (true intranuclear inclusion made up of immunoglobulin). Small or medium sized irregular (centrocyte-like) cells forming lymphoepithelial lesions and destroy the epithelium, leaving epithelial remnants and sometimes invading the follicles. In some cases, the neoplastic cells resemble small lymphocytes or monocytoid B cells with abundant pale staining cytoplasm.

Because lymphoma is considered to be a "soft" tumour, it is less likely to result in gastric outlet obstruction than is gastric adenocarcinoma. In addition to helping detect gastric involvement by lymphoma, CT is useful in detecting complications such as perforation, extragastric extension, or fistulization.

**Imaging Features** Fig. 36 on page 56 Fig. 37 on page 57 Fig. 38 on page 58 Fig. 39 on page 59

At CT, primary gastric lymphoma typically appears as segmental or diffuse wall thickening. In contrast to gastric adenocarcinoma, lymphoma typically involves more than one region of the stomach. In many cases, MDCT will obviate other radiologic studies such as an upper gastrointestinal series. Perigastric adenopathy is common in patients with gastric lymphoma as well as in those with gastric adenocarcinoma. However, adenopathy that extends below the renal hila favours gastric lymphoma over adenocarcinoma as a diagnosis. Patients with MALT lymphoma, the most frequent finding was gastric wall thickening. Such wall thickening is usually minimal and may not be detected at CT, especially if the stomach is not maximally distended. Associated adenopathy or extragastric distention is uncommon. Burkitt lymphoma CT pattern includes solitary or multiple nodules, circumferential wall thickening with or without aneurysmal dilatation, and direct extension from mesenteric nodes.
2.3. Gastrointestinal Stromal Tumours (GISTs)

See above.

2.4. Gastric Leiomyoblastomas

Aetiology, Pathophysiology, and Relevant Characteristics

Gastric leiomyoblastomas are bizarre malignant stromal tumours.

The natural history of leiomyoblastomas appears to be different from other types of smooth muscle gastric tumours. The real aetiology is still unknown.

Histologically, they are moderately cellular tumours composed mainly of rounded or polygonal cells. The cytoplasms are very faintly granular and eosinophilic. The nuclei vary little in size and have a faint vesicular structure. Nucleoli are not prominent. No mitoses are seen. Many cells show a partial or completely clear zone around the nuclei. Many small vessels are present.

The relationship between leiomyoma, leiomyoblastoma and leiomyosarcoma is still unknown. The "enigma" of leiomyoblastoma is its unusual histology, coupled with a somewhat unpredictable clinical progression. Important in the assessment of the malignant potential of leiomyoblastoma is the mitotic count, with counts over 5 for 50 high power fields, implying the possibility of malignancy and subsequent metastasis. The accepted rate of malignant transformation is around 12%.

Imaging Features Fig. 40 on page 60

The radiological appearances are typically those of any intramural tumour, namely, a well-defined filling defect or a sharp mucosal angle at the edge of an intragastric protrusion. Should mucosal ulceration follow with necrosis of the tumour then the contrast media may enter the necrotic cavity producing a characteristic "bull's eye" pattern. In the majority of cases, unlike carcinoma, there is no disturbance of peristalsis. The most common location of the leiomyoblastoma is in the pyloric antrum, followed by the body of the stomach.

2.5. Gastric Neuroendocrine Tumours (Carcinoids)

Aetiology, Pathophysiology, and Relevant Characteristics
Gastric carcinoid tumours are rare neoplasms that develop within the gastric mucosa.

Gastric neuroendocrine tumours are subdivided into types 1 to 3 as they have different aetiologies, biologic behaviour, and prognoses. Type 1 tumours represent 70-80% of all gastric neuroendocrine tumours. They are associated with prolonged hypergastrinemia typically resulting from autoimmune (corpus-restricted) atrophic gastritis. Type 2 gastric neuroendocrine tumours account for 5-8% of gastric neuroendocrine tumours and result from prolonged hypergastrinemia from a gastrin-secreting tumour. Type 3 neuroendocrine tumours are sporadic and account for 20% of gastric neuroendocrine tumours.

Carcinoid tumours of the stomach originate from Kulchitsky cells in the crypts of Lieberkühn. Because the cytoplasm contains eosinophilic granules that have an affinity for silver stain, these lesions have also been called argentaffinomas.

Many patients are asymptomatic; however, others may present with abdominal pain, nausea, vomiting, weight loss, anorexia, or gastrointestinal bleeding. Unlike carcinoid tumours in the ileocecal area, gastric carcinoid tumours rarely produce carcinoid syndrome. They are low-grade malignancies that can eventually metastasize. Type 1 and 2 gastric neuroendocrine tumours usually have an indolent course. Type 3 is the most aggressive; local or hepatic metastases are present in up to 65% of patients who undergo resection. They can present as an isolated lesion or there can be multiple lesions. The tumour can invade locally into deeper structures of the gastrointestinal tract wall. Solitary gastric carcinoids have a greater chance for the development of malignancy and metastasis as compared to multiple gastric carcinoids due to hypergastrinemia. This difference in the biologic behaviour has challenged physicians for years.

**Imaging Features** Fig. 41 on page 61 Fig. 42 on page 62 Fig. 43 on page 63

At CT, gastric carcinoid tumours demonstrate a variety of radiologic findings. The majority of tumours manifest as one or more submucosal appearing masses ranging from 1 to 4 cm in size. When ulceration is present, the lesion may have a bull's-eye appearance. Gastric carcinoid tumours may also manifest as one or more sessile or pedunculated polyps that are indistinguishable from hyperplastic or adenomatous polyps. Other lesions may manifest with benign-appearing or malignant-appearing gastric ulcers. Less than 3% of gastrointestinal carcinoid tumours are located in the stomach. Most gastric carcinoid tumours are located in the distal antrum, often on the lesser curvature.

### 2.6. Metastases

Aetiology, Pathophysiology, and Relevant Characteristics
Metastatic disease involving the stomach is an unusual and difficult problem.

The majority of lesions are hematogenous metastases. The most common neoplasms metastasizing to the stomach are breast cancer, melanoma, and lung cancer. Furthermore, metastases from ovarian, esophageal, and hepatic carcinomas can occur.

Gastric metastases are found at autopsy in less than 2% of patients who die of carcinoma. Anatomopathological analysis shows the origin.

Modalities which may palliate metastatic disease are available so an early and accurate diagnosis should be made whenever possible. With a correct diagnosis and proper treatment, relief of symptoms and prolongation of life can sometimes be achieved.

**Imaging Features** Fig. 44 on page 64 Fig. 45 on page 65 Fig. 46 on page 66 Fig. 47 on page 67

At CT, some of them are not identifiable. Patients with identifiable abnormalities may have variation of radiographic appearance, as solitary polypoid lesions, with or without ulceration, lesions of an infiltrative type similar to a linitis plastica.

### 2.7. Secondary neoplastic involvement of the stomach by continuous tumour invasion

**Aetiology, Pathophysiology, and Relevant Characteristics**

Continuous tumour invasion into the stomach is not uncommon.

It may occur from tumours that arise in neighbouring structures, such as the pancreas, oesophagus, gallbladder, liver, colon, and kidney.

Anatomopathological analysis shows the origin of the tumour, which is involving the stomach.

The staging procedures in most cancers do not usually include the endoscopic examination of the gastroenteric tract; nevertheless the complaint of persistent gastric disorders in patients affected by metastatic cancers must not be underestimated. The finding of gastric neoplastic involvement led to effective treatment of the gastric disorders and consequently to an improvement in the patient’s quality of life.
Imaging Features

At CT, direct invasion of the stomach by a neighbouring tumour is seen.
Fig. 1: Hyperplastic Polyp. Abdominal intravenous contrast material-enhanced MDCT examination shows a pedunculated hyperplastic polyp in the gastric antrum (arrows). Microscopic image of gastric surgery sample stains with haematoxylin and eosin shows excessive cellular proliferation in the crypts of Lieberkhün without dysplastic features.

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**Fig. 2:** Hyperplastic Polyp. Abdominal intravenous contrast material-enhanced MDCT examination shows a pedunculated hyperplastic polyp with a length of 25 mm (arrows), inflamed and eroded at histopathologic analysis.

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Fig. 3: Hyperplastic Polyp. Abdominal intravenous contrast material-enhanced CT examination shows a hyperplastic polyp with a length of 13 mm in the posterior antral wall (arrows).

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Fig. 4: Hyperplastic Polyp. Abdominal intravenous contrast material-enhanced MDCT examination shows a pedunculated hyperplastic polyp with a length of 12 mm and a thickness of 11 mm (arrows) with focal low-grade dysplasia at histologic analysis.

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**Fig. 5:** Hyperplastic Polyps. Abdominal intravenous contrast material-enhanced MDCT examination shows a gastric hiatal hernia with multiple hyperplastic polyps with a length between 1.1 and 2 cm in the gastric body (arrows).

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**Fig. 6:** Fundic Gland and Hyperplastic Polyps. Abdominal intravenous contrast material-enhanced MDCT examination shows multiple polyps. White arrows show a hyperplastic polyp with a length of 10 mm and focal squamous metaplasia at histologic analysis. Yellow arrows show a pedunculated polyp with a length of 15 mm, fundic gland polyp was histologically proved.

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**Fig. 7:** Fundic Gland Polyp. Abdominal intravenous contrast material-enhanced MDCT examination shows a hypodense fundic gland polyp (cystically dilated glands) with a thickness of 3 cm (yellow arrows) and a vascular pedicle (white arrows).

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**Fig. 8:** Inflammatory Fibroid Polyp. Abdominal intravenous contrast material-enhanced MDCT examination shows a pedunculated inflammatory fibroid polyp in the gastric antrum that protrudes into the duodenum with an overlying mucosal hyperenhancement (arrows). Macroscopic image of the resected specimen shows an ovoid mass surrounded by an outer surface (connective tissue).

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Fig. 9: Gastric Duplication Cyst. Abdominal intravenous contrast material-enhanced MDCT examination shows a gastric duplication cyst as a fluid-attenuation cystic mass close to the gastric cardias (arrows).

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**Fig. 10:** Gastric Duplication Cyst. Abdominal intravenous contrast material-enhanced MDCT examination shows a gastric duplication cyst in 19-year-old female with a pulmonary sequestration located in the left lower lobe. It manifest as fluid-attenuation cystic, submucosal, and lobulated mass in the wall of the gastric fundus (arrows). First image shows an oral contrast material-enhanced CT (arrow), other images show adequate distension of the stomach by using water as a negative contrast agent with a well-circumscribed cystic mass in a submucosal location and slight enhancing wall (arrows).

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**Fig. 11**: Gastric Duplication Cyst. Abdominal intravenous contrast material-enhanced MDCT and MRI (T1 weighted image) examinations show a gastric duplication cyst that arises from the gastric cardias, located at the superior recess of the lesser sac (yellow arrows). At MDCT manifests as fluid-attenuation cystic mass and at MRI as slightly high signal intensity mass on T1-weighted images (white arrows).

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Fig. 12: Gastric Heterotopic Pancreas. Abdominal intravenous contrast material-enhanced MDCT examination shows an ovoid submucosal mass in the anterior wall of the gastric antrum (arrows). It was surgically resected and the pathological examination showed pancreatic tissue.

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Fig. 13: Gastric Heterotopic Pancreas. At MDCT, ectopic pancreatic tissue manifests as a submucosal nodule at the gastric antrum and MRI depicts a cystic lesion that arises from a thickened gastric wall (arrows).

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Fig. 14: Gastric Villous Adenoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a villous adenoma that arises from the lesser gastric curvature (arrows). Macroscopic image of the resected specimen shows a villous adenoma (arrows) with multiple foci of high-grade dysplasia at histologic analysis.

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**Fig. 15:** Gastric Villous Adenoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a villous adenoma as a polypoid mass with villous contour that arises from the greater gastric curvature (yellow arrows) and an enhanced vascular pedicle (white arrow).

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Fig. 16: Gastric Villous Adenoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a villous adenoma with a malignant transformation as a large polypoid mass in the gastric fundus (arrows).

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**Fig. 17:** Gastric Haemangiomas. Abdominal intravenous contrast material-enhanced MDCT examination shows multiple gastric haemangioma as avidly contrast enhancing masses (arrows). Low images correspond to contrast-enhanced coronal reformatted CT examination.

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Fig. 18: GIST. Abdominal intravenous contrast material-enhanced MDCT examination shows a GIST as an exophytic mass with a length of 3 cm and a thickness of 3 cm, endoluminal extension (yellow arrows), and ulcerated mucosa (white arrows), in a 50-year-old male with upper gastrointestinal bleeding. Macroscopic image of the resected specimen shows a GIST as an exophytic gastric mass (white arrows).

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**Fig. 19:** GIST. Abdominal intravenous contrast material-enhanced MDCT and virtual gastroscopy examinations show a GIST as an exophytic mass with a length of 7.5 cm, endoluminal extension (yellow arrows), and ulcerated mucosa. Red arrows show how left gastric artery (thick red arrow) and branches of the splenic artery (thin red arrow) supply the GIST. The tumour was histologically proved.

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Fig. 20: GIST. Abdominal intravenous contrast material-enhanced MDCT and MRI examinations show a GIST as a submucosal tumour with a length of 7.5 cm that arises from the greater gastric curvature (arrows). It was endoscopically biopsied but no resected due to its small size. Gastric endoscopy follow-up is necessary.

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Fig. 21: GIST. Abdominal intravenous contrast material-enhanced MDCT shows a GIST as a submucosal tumour with a length of 5 cm, endoluminal extension (yellow arrows), and calcifications (white arrows). The tumour was histologically proved.

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Fig. 22: GIST. Abdominal intravenous contrast material-enhanced MDCT shows a GIST as an exophytic mass that arises from the greater gastric curvature with cystic (yellow arrows) and solid (white arrows) material. It also shows peripheral calcifications (red arrows).

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**Fig. 23:** GIST. Abdominal intravenous contrast material-enhanced MDCT shows a GIST as an exophytic mass that arises from the lesser gastric curvature (yellow arrows) with an area of central necrosis (white arrow). Macroscopic image of the resected specimen shows a GIST as a large exophytic gastric mass.

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Fig. 24: Gastric Lipoma. Double-contrast barium study shows a well-circumscribed submucosal mass in the gastric antrum (yellow arrows) with limited ulceration (black arrow). Abdominal intravenous contrast material-enhanced MDCT shows the adipose tissue of the lipoma. Right images correspond to virtual gastroscopy and volume-rendered examination.

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**Fig. 25:** Gastric Lipoma. Abdominal intravenous contrast material-enhanced MDCT shows a submucosal lipoma that arises from the anterior antral wall (arrows). The hyperdense area corresponds to post biopsy changes (white arrow). It was biopsied with a previous diagnosis of GIST. With a correct CT interpretation, the biopsy could have been avoided.

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Fig. 26: Gastric Lipoma. Abdominal intravenous contrast material-enhanced MDCT and MRI examinations show a gastric lipoma. At CT, gastric lipoma manifests as a submucosal mass (yellow arrows), and at MRI, as a low signal mass in T1 weighted images (white arrows) and a high signal mass in T2 weighted images (red arrow).

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**Fig. 27:** Gastric Leiomyoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a gastric leiomyoma as a submucosal solitary non-encapsulated mass in the gastric fundus (arrows). MRI examination (T2 weighted image and diffusion weighted image) shows a low signal mass without restricted diffusion (arrows). Macroscopic image of the resected specimen shows an ovoid mass that corresponds to a gastric leiomyoma.

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**Fig. 28:** Gastric Leiomyoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a gastric leiomyoma as a homogeneous submucosal mass with slightly contrast enhancement that arises from the gastric fundus (arrows).

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Fig. 29: Plexiform Fibromyxoma. Abdominal intravenous contrast material-enhanced MDCT examination in a 48-year-old female with unspecific abdominal pain shows an exophytic mass (yellow arrows) with a length of 4 cm and a thickness of 4.5 cm and heterogeneous contrast enhancement that arises from the gastric antrum (white arrows). MRI examination shows a homogeneous low signal mass in T1 weighted images and a heterogeneous and slightly hyperintense mass in T2 weighted images (yellow arrows). Macroscopic image of the resected specimen corresponding to a gastric plexiform fibromyxoma.

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Fig. 30: Plexiform Fibromyxoma. Ultrasound examination in a 19-year-old female with epigastric pain shows a heterogeneous mass that arises from the stomach (yellow arrow). Abdominal intravenous contrast material-enhanced MDCT examination confirms the presence of a heterogeneous, exophytic gastric mass that arises from the gastric antrum (yellow arrows). Macroscopic image of the resected specimen shows a gastric large plexiform fibromyxoma.

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Fig. 31: Gastric Adenocarcinoma. Abdominal intravenous contrast material-enhanced MDCT examination shows an enhanced wall thickening that involves the posterior wall of the gastric antrum and protrudes into the lumen (arrows).

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**Fig. 32:** Gastric Adenocarcinoma. Abdominal intravenous contrast material-enhanced MDCT examination shows an enhanced thickening of the gastric wall that involves the upper wall of the gastric antrum (arrows).

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Fig. 33: Gastric Antral Adenocarcinoma with Linitis Plastica. Double-contrast barium study shows an irregular stenosis of the gastric antrum (arrows). Abdominal intravenous contrast material-enhanced MDCT examination confirms the presence of diffuse wall thickening in the antrum region with marked enhancement of the mucosal layer and luminal stenosis (arrows). Macroscopic image of the resected specimen shows a diffuse gastric wall thickening that corresponds to a gastric antral adenocarcinoma with linitis plastica.

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**Fig. 34:** Gastric Adenocarcinoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a scirrhous tumour of the stomach that leads to obliteration of gastric folds and diffuse thickening of the gastric wall with an enhancing polypoid lesion that is situated in the duodenal bulb (arrows). Macroscopic image of the resected specimen shows a diffuse gastric wall thickening that corresponds to a gastric antral adenocarcinoma with linitis plastica.

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Fig. 35: Mucinous Gastric Adenocarcinoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a hypodense thickening of the gastric wall due to the mucinous component (yellow arrows) with wall calcification (white arrows) and peritoneal carcinomatosis (arrowheads).

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Fig. 36: Gastrointestinal Lymphoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a nodular wall thickening in the distal gastric antrum (arrows).

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Fig. 37: MALT Gastrointestinal Lymphoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a homogeneous gastric wall thickening that corresponds to a MALT gastrointestinal lymphoma (arrows).

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**Fig. 38:** MALT Gastrointestinal Lymphoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a diffuse gastric wall thickening that corresponds to a MALT gastrointestinal lymphoma (arrows).

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**Fig. 39:** Burkitt Gastrointestinal Lymphoma. Abdominal intravenous contrast material-enhanced MDCT examination shows a diffuse gastric wall exophytic thickening in the lesser gastric curvature (yellow arrows) with a nodular gastric wall thickening (white arrows) that corresponds to a Burkitt gastrointestinal lymphoma. Positron emission tomography (PET)-CT scan shows a hypermetabolic gastric wall thickening and peritoneal carcinomatosis (red arrows).

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Fig. 40: Gastric Leiomyoblastomas. Abdominal intravenous contrast material-enhanced MDCT examination in a 17-year-old female with unspecific abdominal pain shows a heterogeneous enhancement multiple nodular gastric wall thickening in the lesser gastric curvature that correspond to gastric leiomyoblastomas (arrows). Macroscopic image of the resected specimen shows multiple gastric leiomyoblastomas with mucosal ulceration (white arrowheads).

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Fig. 41: Gastric Neuroendocrine Tumours. Abdominal intravenous contrast material-enhanced MDCT examination shows nodular and hypervascular gastric wall lesions that correspond to multiple gastric neuroendocrine tumours (arrows).

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**Fig. 42:** Gastric Neuroendocrine Tumour. Abdominal intravenous contrast material-enhanced MDCT examination shows a nodular and hypervascular gastric wall lesion that corresponds to a well-differentiated gastric neuroendocrine tumour (arrows). Macroscopic image of the resected specimen shows a gastric neuroendocrine tumour.

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**Fig. 43:** Gastric neuroendocrine tumour. Intravenous contrast material-enhanced MDCT examination shows a gastric wall thickening in the lesser gastric curvature with a length of 5.5 cm, that extends to hepatogastric ligament (white arrows). Virtual gastroscopy shows a gastric wall thickening that protrudes into the lumen (yellow arrows). Gammagraphy with octeotride shows gastric neuroendocrine tumour uptake (yellow arrows). Macroscopic image of the resected specimen shows a gastric neuroendocrine tumour type 3.

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**Fig. 44:** Gastric Metastatic Disease. Abdominal intravenous contrast material-enhanced MDCT examination shows a large mass in the anterior antral wall (arrows) in a 60-year-old female with ovarian carcinoma. Macroscopic image of the resected specimen shows gastric metastases from ovarian carcinoma.

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Fig. 45: Gastric Metastatic Disease. Abdominal intravenous contrast material-enhanced MDCT examination shows an enhanced thickening of the gastric wall at the gastroesophageal junction in a 70-year-old male with lung carcinoma (yellow arrows). PET-CT scan shows a hypermetabolic gastric wall thickening (yellow arrows). The tumour was histologically proved.

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**Fig. 46:** Gastric Metastatic Disease. Abdominal intravenous contrast material-enhanced MDCT and PET-CT examinations show a right hilar pulmonary mass that corresponds to the primary carcinoma (thick white arrows). They also show nodular gastric wall thickening (yellow arrows), a mass in the pancreatic head (arrowhead), and a left perirenal nodule (thin white arrow) that correspond to metastases.

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**Fig. 47:** Gastric Metastatic Disease. Abdominal intravenous contrast material-enhanced MDCT and PET-CT examinations show a heterogeneous enhancement gastric wall thickening (arrows). Macroscopic image of the resected specimen shows gastric metastases from epithelioid leiomyosarcoma of the uterus.

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Conclusion

Discussion

Gastric carcinoma, is still discovered when therapeutic approach is limited.

The incidental detection of gastric lesions during routine MDCT examination is rather common.

Recent advances in CT technology, including the development of real-time 3D imaging systems, have sparked renewed interest in using CT to evaluate the gastrointestinal tract.

The stomach should be maximally distended. With use of water as an oral contrast agent, it may now be possible to detect cases of only minimal thickening of the gastric wall, especially when a rapid contrast material bolus is intravenously administered. In some cases, the addition of air may also be helpful.

The diagnosis of gastric tumours may be challenging due to their clinically silent evolution and similar radiologic characteristics to other stomach diseases. Adenocarcinoma is the most common gastric malignancy and typically appears as focal or segmental wall thickening or a discrete mass. Gastric lymphoma can have a CT appearance similar to that of adenocarcinoma. Both gastric adenocarcinoma and lymphoma may be associated with adenopathy. GISTs tend to appear as well-defined masses that arise from the gastric wall and may be exophytic when large. GISTs are usually not associated with significant adenopathy. In addition to gastric malignancies, CT can also help detect inflammatory conditions of the stomach, including gastritis and peptic ulcer disease. Therefore, although the overlap of radiologic findings in many gastric tumours makes differentiation difficult, it is important to recognize the most characteristic radiologic features of stomach lesions to allow an early diagnosis and a higher survival rate.

Conclusions

1. MDCT is routinely used as first-line imaging tool in the diagnostic work-up in abdominal diseases or just as screening test to detect other potential health disorders. Therefore, the incidental detection of gastric lesions during conventional MDCT examination is rather often.
2. Familiarity with the radiologic features, of usual and unusual gastric tumours, can help ensure correct and proper diagnosis.

3. Early detection of stomach neoplasm is of great importance as it has a direct impact in the clinical management and outcome of both symptomatic and asymptomatic patients.
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Fig. 49: Vall d'Hebron Hospital. Barcelona, Spain.
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