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Multimodal Diagnostic Approach To Gastric Lesions: A Case Series Correlating Cect Imaging And Histopathology

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Abstract:
Gastric lesions display a wide variety of conditions, extending from harmless ulcers to cancerous growths. We report here a case series of patients who have gastric lesions on CECT. Biopsy and histopathology confirmed the diagnosis in lesions like, gastric duplication cyst, Menetrier's disease, linitis plastica, and squamous cell carcinoma. Combining imaging modalities with histopathological evaluation further improves the diagnosis and management of gastric lesions, in offering a complete strategy to patient treatment. Through this case series presentation, we would like to highlight the importance of CECT imaging and histopathology as a routine protocol in the diagnosis of gastric lesions. The case series illustrates the critical role of CECT and histopathology in the diagnosis of gastric lesions.
Keywords: *Gastric lesions, Gastric duplication cyst, Menetrier's disease, Linitis plastic, Squamous cell carcinoma, Computed tomography (CT), Contrast-enhanced CT (CECT), Histopathology, Immunohistochemistry (IHC).*

INTRODUCTION:

Gastric lesions represent a wide range of stomach illnesses that go from benign and malignant neoplasms, ulcers, and inflammatory diseases, which must be diagnosed and treated by a doctor[1-3]. Accurate diagnosis to distinguish between benign lesions, which will likely require conservative treatment, and malignant processes, which need aggressive therapy, influences treatment and patient outcome[4]. CT, MRI, and upper GI endoscopy are valuable imaging tests in the diagnostic evaluation of gastric lesions with accurate visualization of the stomach and the adjacent tissue to assist in diagnosis and staging[5,6]. Histopathological diagnosis, microscopic examination of tissue biopsies, is the standard of accurate diagnosis, providing critical information about cellular architecture and potential for malignancy, guiding treatment[7,8].
This case series illustrates five various gastric lesions, gastric duplication cyst, Menetrier's disease, linitis plastica, and squamous cell carcinoma. All diagnosed on the basis of combined CECT imaging and histopathology. Through this case series, we want to highlight the significance of imaging and histopathology in diagnosing gastric lesions.

Case series:

Case 1

A 45-year-old male experienced nausea, bloating, and a full upper belly. These symptoms had intensified during the last three months. The patient did not have any significant medical history or previous abdominal surgery. Physical examination showed no signs of discomfort or abdominal tumours. All laboratory tests, including the CBC and LFT, fell within the normal range. The CECT of the abdomen showed a clearly defined, thick-walled cystic lesion located in the perigastric region (Figures 1A and 1B). The lesion was approximately 5 cm in diameter and was placed near the stomach's lesser curvature, resulting in anterosuperior displacement of the gastric wall. No solid enhancing component or signs of rupture were noted. These imaging characteristics were suggestive of a gastric duplication cyst. Histopathological examination of the resected specimen confirmed gastric mucosal congestion (Figure 1C). The muscularis mucosae appeared slightly thickened with submucosal edema and areas of hemorrhage (Figure 1D). No evidence of dysplasia or malignancy was observed. The gastric duplication cyst was surgically removed via laparoscopy, and the patient's recovery proceeded smoothly. He was discharged on the third post-operative day and remained symptom-free at follow-up.

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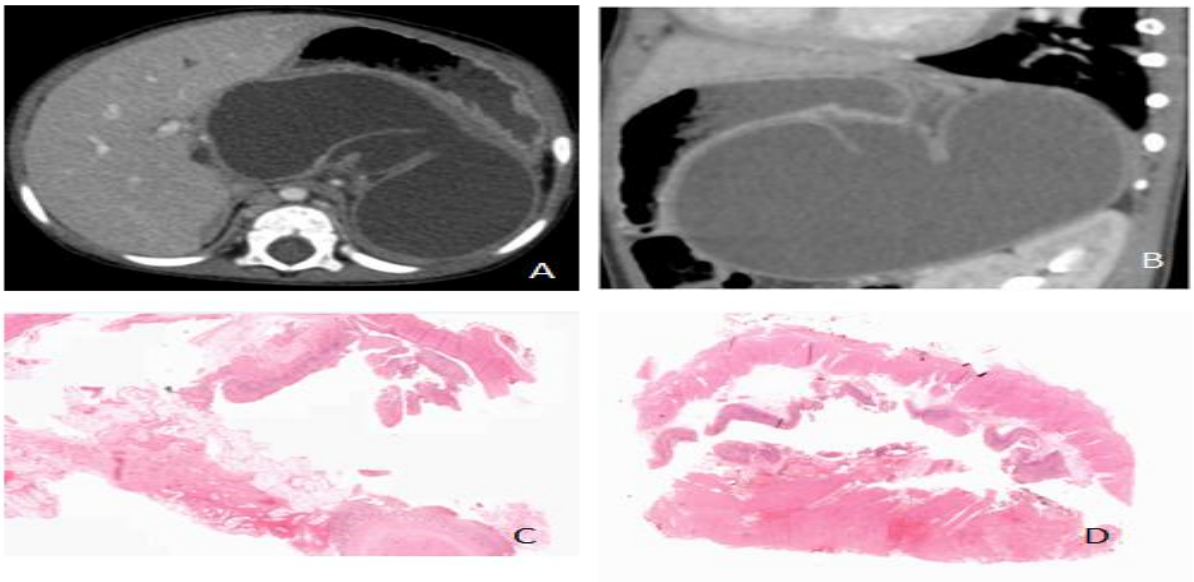

Figure 1: CECT Imaging and Histopathology results for a 45-year-old male reported experiencing nausea, bloating, and a feeling of fullness in the upper abdomen. A, B: Axial and reformatted sagittal view of the abdomen in venous phase at the level of the stomach shows a thick walled cystic lesion in the perigastric region abutting the lesser curvature of the stomach and displacing the stomach anterosuperiorly. C: Portions of gastric mucosa showing congestion. D: Muscularis mucosae appears slightly thickened with submucosal edema and areas of hemorrhage

Case 2

A 52-year-old male presented with progressive weight loss, abdominal distension, early satiety, and generalized fatigue over four months. He also reported intermittent nausea but denied vomiting, hematemesis, or melena. The physical examination showed slight tenderness in the epigastric region and swelling in both feet, indicating a possible deficiency in albumin levels. Laboratory tests revealed serum albumin levels at 2.1 g/dL, mild anaemia with haemoglobin at 10.2 g/dL, and normal results for liver and renal function tests. The CECT scan of the abdomen revealed widespread thickening of the rugal folds, primarily affecting the fundus, body, and pylorus of the stomach. The gastric wall appeared rigid but without discrete mass lesions or evidence of obstruction (Figure 2A & B). There was no lymphadenopathy or distant metastasis. These imaging findings strongly suggested Menetrier's disease. Histopathological examination of the duodenal mucosa showed preserved architecture with Brunner gland hyperplasia and dilated lymphatics in the lamina propria (Figure 2C). Gastric mucosal biopsies revealed chronic gastritis with prominent lymphoid aggregates and foveolar hyperplasia (Figure 2D), consistent with Menetrier's disease. There was no evidence of dysplasia or malignancy. The patient diagnosed with Menetrier's disease with secondary protein-losing gastropathy. He was initiated on proton pump inhibitors (PPIs) and a high-protein diet to manage hypoalbuminemia. Given the association between Menetrier's disease and gastric adenocarcinoma, he was advised to undergo regular endoscopic surveillance.

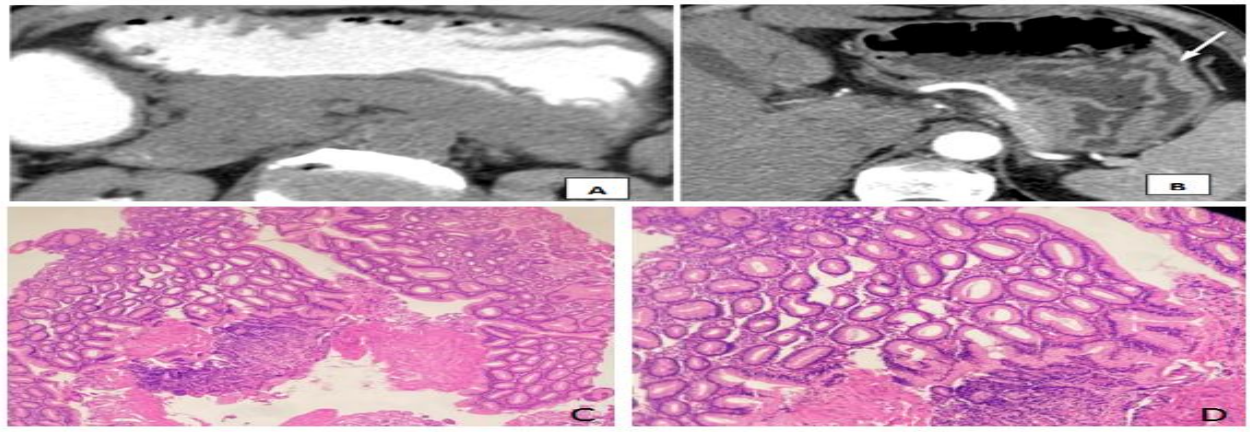

Figure 2: CECT Imaging and Histopathology results for 52-year-old male presented with progressive weight loss, abdominal distension, early satiety, and generalized fatigue over four months. A and B : Axial

view of the abdomen after administering oral contrast and in arterial phase at the level of the stomach shows diffuse rugal fold thickening involving the fundus, body and pylorus of the stomach. C: Duodenal mucosa with preserved architecture showing Brunner gland hyperplasia and dilated lymphatics in lamina propria. D: Chronic gastritis with lymphoid aggregates.

Case 3

A 64-year-old female arrived with gradual weight loss, early satiety, and upper abdomen pain that persisted for six months. The physical examination indicated slight epigastric pain but no palpable tumour. Laboratory testing revealed moderate anaemia (Hb = 9.8 g/dL) with normal liver and renal function tests. CECT of the abdomen revealed extensive circumferential gastric wall thickening over the full length of the stomach (Figures 3A and 3B). The stomach appeared non-distensible, consistent with a "leather bottle" appearance, a hallmark feature of linitis plastica. Multiple enlarged perigastric lymph nodes were also noted, raising suspicion of an advanced malignant process. Histopathological examination demonstrated superficial fragments of esophageal and gastric mucosa with atypical cells exhibiting increased nucleocytoplasmic ratio and a few signet-ring-like cells (Figure 3C). Immunohistochemistry (IHC) was performed, revealing epithelial membrane antigen (EMA) positivity in the signet-ring cells, confirming the diagnosis of signet-ring cell carcinoma of the stomach, consistent with linitis plastica. The patient was diagnosed with advanced-stage gastric adenocarcinoma. She was referred for multidisciplinary oncologic evaluation, where systemic chemotherapy was initiated as a palliative measure, given the extensive gastric involvement and nodal metastasis.

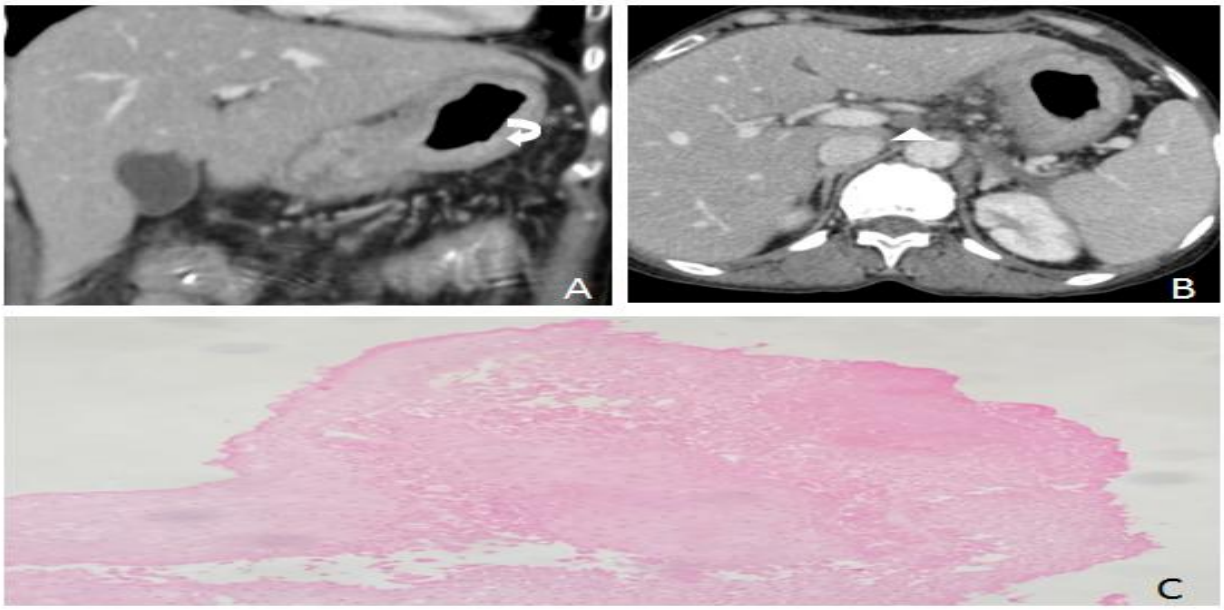

Figure 3: CECT Imaging and Histopathology results for 64-year-old female presented with progressive weight loss. A and B: Reformatted coronal and axial view of the abdomen in venous phase at the level of the stomach shows diffuse circumferential wall thickening seen involving the entire length of the stomach. Multiple perigastric lymphnodes seen. C: Superficial fragments of esophagus with sub epithelium showing atypical cells with increased nucleocytoplasmic ratio and few signet ring like cells.

Case 4

A 58-year-old male presented with a history of progressive dyspepsia, weight loss, and early satiety for four-months. He also reported occasional vomiting and mild epigastric pain, which worsened over time. There was no history of tobacco or alcohol usage, and no previous gastrointestinal procedures. Physical examination indicated moderate epigastric pain with no palpable lump. Laboratory testing revealed slight anaemia (Hb: 9.5 g/dL), but LFT and RFT were within normal ranges. CECT of the abdomen (Figure 4A & 4B) revealed extensive asymmetrical wall thickening of the stomach's pyloric antrum, which resulted in gastric outlet blockage. Multiple necrotic perigastric lymph nodes were also observed, raising suspicion of malignancy. Histopathological analysis revealed multiple fragments of gastroesophageal junctional tissue with areas of SCC (Figure 4C), Auperficial esophageal tissue fragments showing moderately differentiated SCC (Figure 4D). Immunohistochemistry (IHC) was positive for p40 and CK5/6, supporting squamous differentiation. The patient was staged as T3N1M0. A patient was suggested for neoadjuvant chemotherapy followed by subtotal gastrectomy with lymphadenectomy.

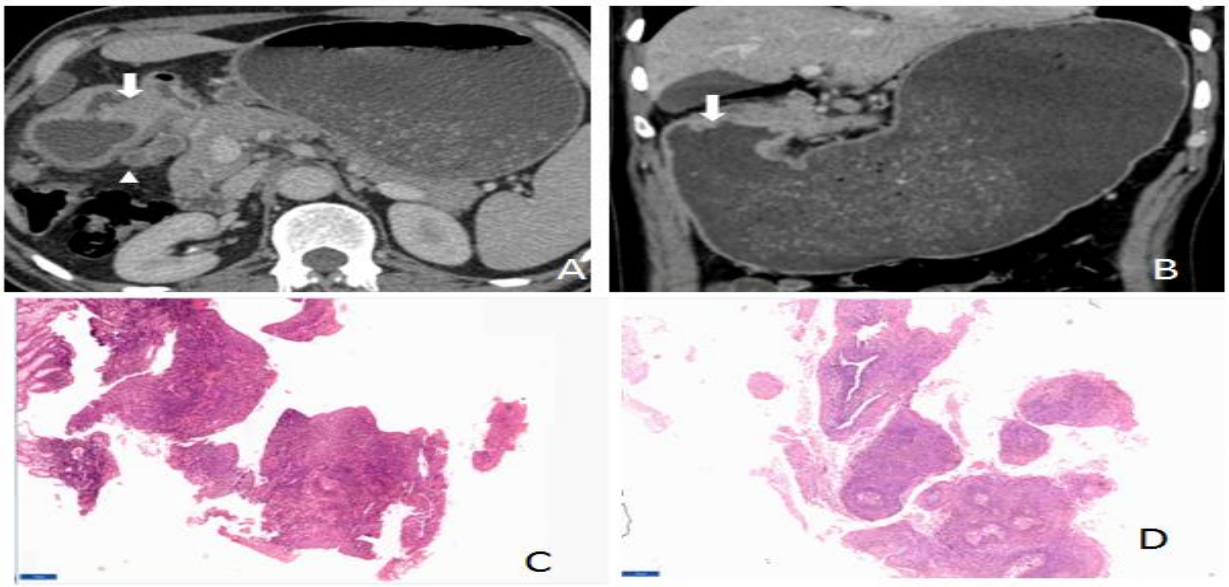

Figure 4: CECT Imaging and Histopathology results for 58-year-old male presented with progressive dyspepsia, weight loss, and early satiety. A and B: Axial view and reformatted coronal view of the abdomen in venous phase at the level of the stomach shows diffuse asymmetrical wall thickening involvingthe pyloric antrum of the stomach causing gastric outlet obstruction. Multiple necrotic perigastric lymph nodes seen. C: Multiple fragments of gastroesophageal junctional tissue with one area showing moderately differentiated squamous cell carcinoma. D: Multiple superficial fragments of esophageal tissue showing features of moderately differentiated squamous cell carcinoma.

Discussion:

The diagnostic approach for gastric lesions requires an interdigitation of imaging modalities and histopathological analysis in differentiating between benign and malignant disorders. The role of Correlation between Radiology and Histopathology for this case series details the utility of Contrast-Enhanced Computed Tomography (CECT) and histopathological examination to detect varied gastric pathologies and demonstrates the importance of correlation between microscopic and radiological examination.

In our case series, Contrast-Enhanced Computed Tomography (CECT) was able to identify and characterize a variety of gastric lesions, results which were consistent with literature. CECT revealed a thick-walled cystic lesion with well-defined perigastric location and no enhancing solid component. This imaging characteristic is in agreement with the literature reports, where gastric duplication cysts are characterized in the literature as rare congenital anomalies typically presenting as spherical, non-communicating cystic masses around the stomach, typically without solid enhancement[9]. CECT showed diffuse rugal fold thickening with predominant involvement of the fundus and body of the stomach without discrete mass lesions. Imaging presentation is typical of Menetrier's disease, which is known to be related to hypertrophic gastric folds with predominant involvement of the proximal stomach[10]. Similarly, linitis plastica is characterized by diffuse circumferential gastric wall thickening, leading to a "leather bottle" appearance, as detailed in studies analyzing CT features of this condition[11]. In our case series, Contrast-Enhanced Computed Tomography (CECT) identified asymmetrical thickening of the pyloric antrum accompanied by necrotic perigastric lymph nodes, leading to gastric outlet obstruction. A case reported described a 47-year-old male presenting with a large exophytic gastric mass and liver metastasis, where CECT revealed a lobulated, heterogeneously enhancing lesion in the lesser sac, closely associated with the stomach's lesser curvature and adjacent structures[12]. These cases underscore the pivotal role of CECT in the initial detection and characterization of gastric lesions, providing diagnostic insights that are corroborated by existing medical literature.

Histopathological examination serves as the definitive diagnostic tool for various gastric lesions, providing critical insights that complement imaging findings. In our study, we observed a strong correlation between imaging characteristics and histopathological features. Specifically, the gastric duplication cyst was confirmed by findings of gastric mucosal congestion with thickened muscularis mucosae and submucosal edema. This aligns with case reports in the literature where histopathological analysis revealed similar features. This case report described a gastric duplication cyst with a cyst wall composed of mucosa,

submucosa, and muscularis propria, with the mucosa predominantly of gastric type, consistent with our findings[13]. In our study, the diagnosis of Ménétrier's disease was established through biopsy findings of foveolar hyperplasia and lymphoid aggregates, correlating with imaging features of diffuse rugal fold thickening predominantly involving the fundus and body of the stomach, without discrete mass lesions. This aligns with case reports in the literature that describe similar histopathological and imaging characteristics. A case report detailed a 52-year-old female presenting with abdominal pain and vomiting. Imaging revealed circumferential gastric wall thickening involving the fundus and body, while histopathology demonstrated significant foveolar hyperplasia with tortuous glands and cystic dilation, consistent with Ménétrier's disease[14]. In linitis plastica, the presence of signet-ring cells with positive epithelial membrane antigen (EMA) staining is a characteristic finding, while in primary gastric SCC, the identification of moderately differentiated squamous cells with p40 and cytokeratin 5/6 (CK5/6) positivity on immunohistochemistry confirms the diagnosis. A case report detailed a patient with linitis plastica where histological examination revealed poorly differentiated adenocarcinoma with signet-ring cells. Immunohistochemistry demonstrated CDX2 positivity in tumor cells, supporting the diagnosis of primary gastric adenocarcinoma[15]. A case report has described a patient with squamous cell carcinoma where tumor cells were p40 positive and diffusely positive for Epstein-Barr virus-encoded RNA (EBER) in situ hybridization, implying a possible association with Epstein-Barr virus[16].

There have been high correlations in some studies between Contrast-Enhanced Computed Tomography (CECT) findings and histopathologic examination in the characterization and detection of gastric lesions. Incremental dynamic CT findings were compared to histopathological results and were noted to be highly accurate for diagnosis and classification of gastric cancers and therefore highlighting the use of CT in preoperative staging[17]. Research has examined the relationship between CT texture characteristics and IHC biomarkers in gastric cancer. The research showed robust correlations, suggesting that CT texture examination can non-invasively predict histological characteristics and allow for measurement of tumor biology and, as a result, influence personalized treatment plans[18]. A study of the pneumo-CT gastric distention method proved its efficiency in detecting and morphologically describing subepithelial gastric lesions. The research pointed out a high correlation between pneumo-CT results and histopathological findings, showing its potential as a non-invasive imaging technique for comprehensive gastric lesion evaluation[19]. Collectively, these studies confirm the decisive role played by CECT in the proper detection, characterization, and preoperative assessment of gastric lesions with results closely parallel to histopathological findings.

Aside from Contrast-Enhanced Computed Tomography (CECT), there are multiple other imaging methods that serve valuable roles in assessing gastric lesions, each having something to bring in terms of specificity and association with histopathologic finding. PET/CT with ^18F-fluorodeoxyglucose (^18F-FDG) is used to assess the metabolic activity in gastric carcinomas. The ^18F-FDG uptake in primary gastric tumors has been linked to certain histopathological features. It has been reported in research that those tumors with greater FDG uptake tend to represent certain histological subtypes, like the intestinal type by the Lauren classification, while diffuse types tend to show reduced uptake. This correlation is helpful in forecasting tumor behavior and possible prognosis[20]. EUS-guided fine-needle aspiration (FNA) improves diagnostic sensitivity by enabling tissue sampling for histopathological study, thus allowing for a more specific diagnosis[21]. Combining these imaging modalities with histopathological evaluation further improves the diagnosis and management of gastric lesions, in offering a complete strategy to patient treatment.

CONCLUSION:

This series of cases highlights the irreplaceable role of CECT and histopathology in the diagnosing gastric lesions. Although imaging yields important morphological information, histopathology provides definitive characterization, which impacts clinical management and prognosis. Combining these diagnostic modalities increases accuracy, enables early intervention, and enhances patient outcome. Future research could investigate the potential for more sophisticated imaging modalities like PET-CT and endoscopic ultrasound to further refine diagnosis of gastric lesions.

Ethical approval:

Approval from the Institutional Ethics Committee was secured before proceeding with this case series.

Declaration of patient:

All patients gave their written informed consent for participation and publication, ensuring confidentiality was upheld.

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