Gastroduodenal Masses: Multidetector Computed Tomography (MDCT) Findings And Differential Diagnosis With Pathologic Correlation

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Abstract: To study the role of multidetector CT for the evaluation of gastroduodenal masses and differential diagnosis. All patients in the present study (25 patients) were examined with dual slice CT GE using diluted gastrografin oral intake and IV contrast injection of non-ionic contrast agent. The study was included 25 patients suffered from gastroduodenal masses undergoing abdominal US, endoscopic examination, multidetector computed tomography (MDCT) as well as biopsy and histopathological examinations. 20 patients were diagnosed as gastric lesions and 5 patients were diagnosed as duodenal lesions. The patients examined were 17 males and 8 females with the age ranging from 32 to 79 years and the mean age 55 years ± 2SD. Conclusion: Multidetector Computed Tomography (MDCT) has a great value for evaluation and differential diagnosis of gastro duodenal masses with well correlation with histopathological findings.
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1. Introduction:

Recent three-dimensional multidetector row computed tomography (3D MDCT) can provide detailed images of gastro intestinal tumors, including its general contour, location and depth [1].

MDCT may be a reliable means of noninvasive diagnosis in the care of patients with endoscopically detected giant gastric folds and may be useful for differentiating benign from malignant disease[2].

Recent advances in multidetector computed tomography (CT) with multiplanar reformation (MPR) provide a powerful tool for identifying gastric wall invasion and the perigastric extent of gastric cancer. In addition, MPR images confer advantages in the assessment of both intra- and extraluminal processes of the gastric wall and the evaluation of more distant regions, such as the paraaortic lymph nodes and other abdominal organs [3].

The assessment of direct transmural and extraserosal spread of disease (T staging) and nodal involvement (N staging) has improved markedly with the advent of 3D MDCT with its excellent spatial and temporal resolution and its ability for multiplanar image reconstruction[4].

The aim of this work to study the role of multidetector CT in the evaluation of gastroduodenal masses and differential diagnosis with histopathological findings correlation.

2. Patients and Methods
Patients:

The study included 25 patients with the age ranging from 32 – 79 years and the mean age 55 years ± 2SD. 17 patients (68%) were males and 8 patients (32%) were females.

All the patients were complained from different gastrointestinal manifestations diagnosed by endoscopy (25 patients) in addition to abdominal US (25 patients) with biopsy and histopathological examinations.

CT imaging technique:

The study was performed on CT scan Hispeed Dual slice GE, USA.

The patients were given 750 ml of diluted gastrografin 20 minutes before scanning for gastric duodenal distension and opacification.

In addition to the oral contrast agent (750 ml gastrografin), 100 ml of non-ionic contrast material (Optray 350) were injected intravenously at rate of 3ml/second.

3. Results

Twenty patients were diagnosed as gastric lesions and five patients were diagnosed as duodenal lesions. Gastric carcinoma patients were 12 patients divided into two categories:

Early adenocarcinoma: no local invasion or metastases.

Advanced adenocarcinoma: with local invasion or metastases.

MDCT detection rate for early adenocarcinoma was 40% (2/5) and 100% (7/7) for advanced adenocarcinoma with the all detection rate

was 75 % with statistically significant difference (P less than 0.05) for early and advanced adenocarcinoma detection rate.

Gastric adenocarcinoma findings were mass lesions appeared as focal defects at contrast filled stomach (Figs. 1 , 2).

Fig.(1): 41 years old women with gastric mass lesion proved histopathologically as gastric adenocarcinoma.

Fig.(2): 50 years old man with advanced gastric mass lesion proved as gastric adenocarcinoma by biopsy.

Gastric lymphoma: detection rate by MDCT was 75% (3/4) and one patient from the four patients demonstrated no abnormality at MDCT, the abnormality in the three patients were diffuse or segmental gastric thickening , however, from the three patients only two patients demonstrated

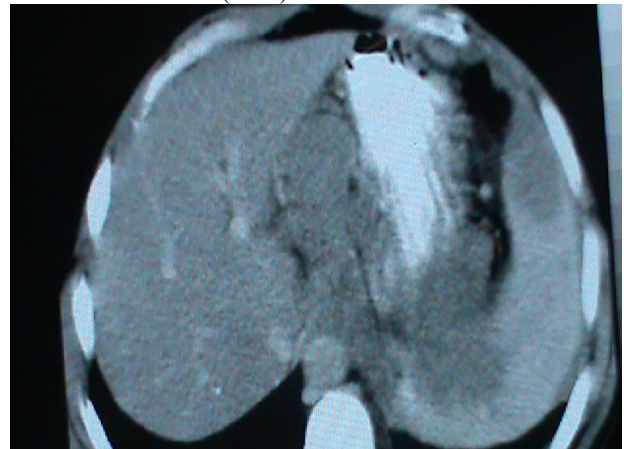lymphadenopathy (50%) (fig. 3 &4) and one patient demonstrated ulcer (25%).

Fig. (3 A): 63 years old man with gastric diffuse mural thickening proved as gastric lymphoma.
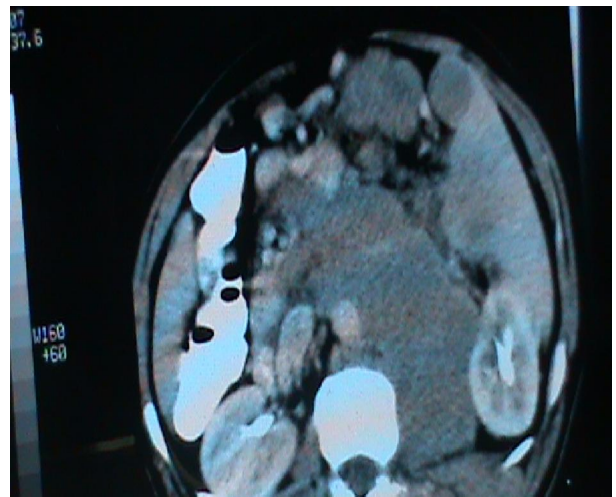

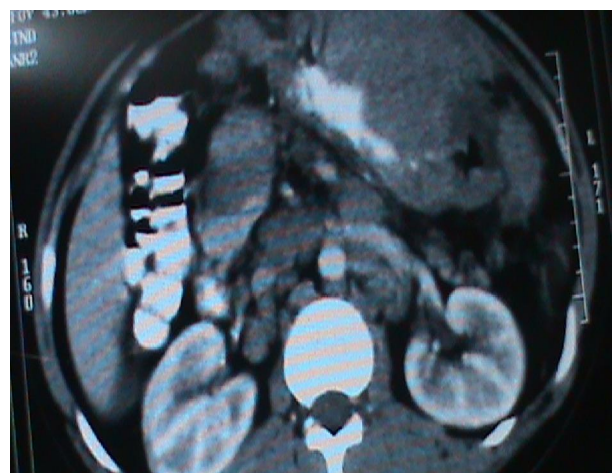Fig.(3 B):The same previous patient with paraaortic extensive lymphadenopathy.
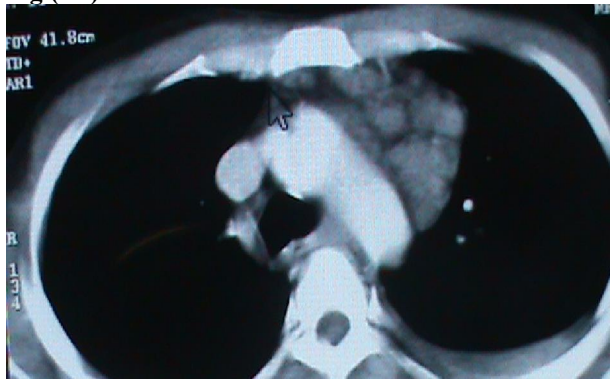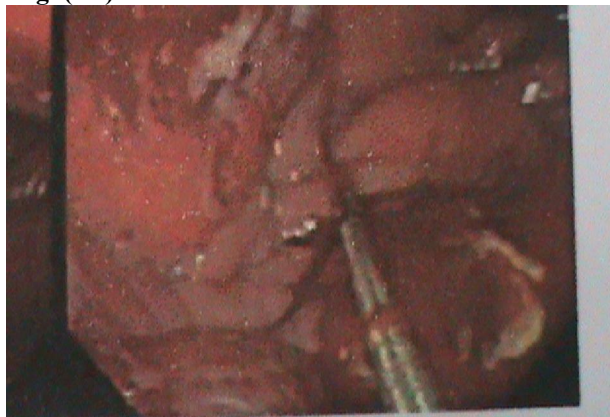

Fig. (4A):

Fig.(4B)

Fig. (4C)

Fig, (4D)

Fig.(4): 36 years old man with extensive gastric mural thickening (A), paraaortic lymphadenopathy (B), mediastinal lymphadenopathy (C) and endoscopy findings (D) proved as gastric lymphoma by biopsy.

Gastro intestinal stromal tumors (GIST): the abnormality noted in the 3 patients (detection rate 100%) with one small size appeared as mass with homogenous attenuation and other two patients appeared as large masses one of them showed heterogeneous pattern and cystic changes due to necrosis and hemorrhage (Fig. 5).

Masses of GIST appeared project exophytically and/or intraluminally with no evidence of mucosal ulceration at our study.
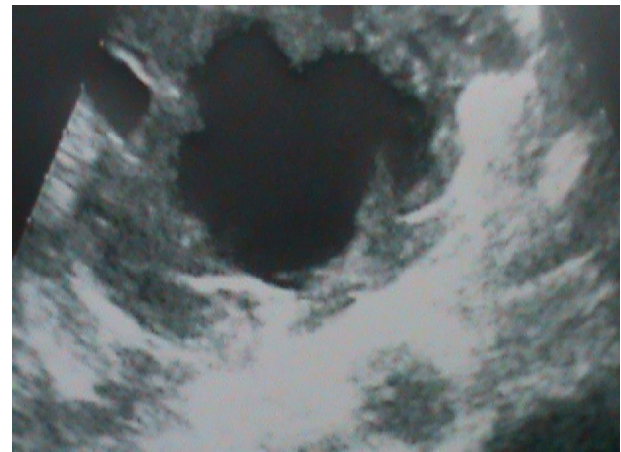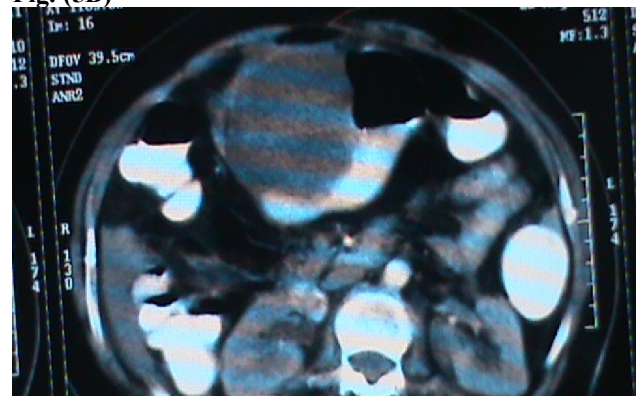
Fig. (5A)

Fig. (5B)

Fig. (5C)

Fig. 5: 64 years old women with mural gastric mass projected exophytically and intraluminally with cystic component at US (A), MDCT (B) and homogenous enhancing lesion at (C) proved histopathologically as GIST.

Gastric leiomyoma: only one patient presented with well-defined homogenous mass proved by histopathological examination as leiomyoma (Fig. 6).
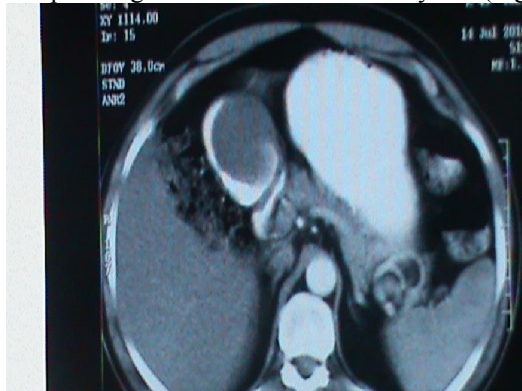
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Fig. (6) 41 years old man with gastric well-defined homogenous submucosal mass proved histopathologically as leiomyoma.
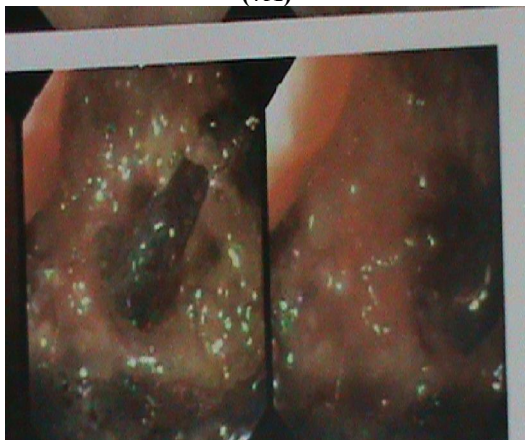

Fig. (7A)

Fig. (7B)

Fig. (7): 76 years old man with duodenal mass at MDCT (A) and endoscopy (B) proved histopathologically as duodenal adenocarcinoma.

Fig. (8A)

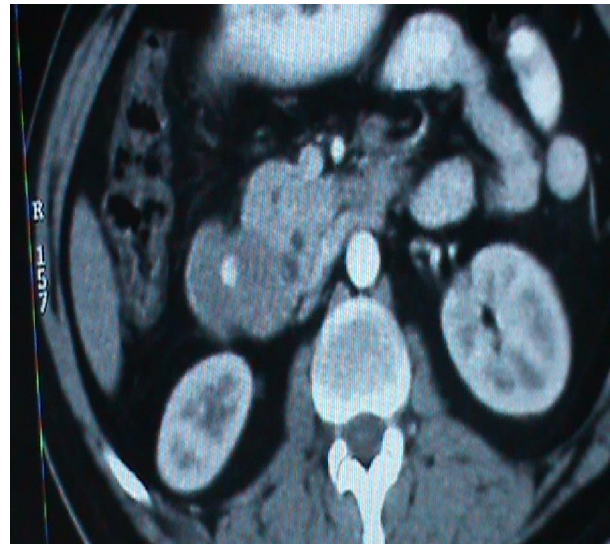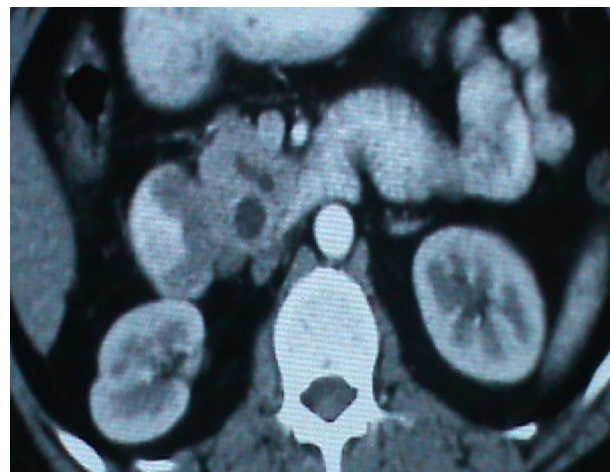**Fig. (8B)**

Fig. (8):50 years old man with duodenal mass extending to pancreatic head proved as duodenal carcinoma by biopsy.

Patients with duodenal masses were detected by MDCT and diagnosed as suspicious of carcinomas (Fig. 7) with one patient there is extension of the mass to pancreatic head (Fig. 8) and proved histopathologically as duodenal carcinomas aside from one carcinoid (Fig. 9).

Fig. (9A)

Fig. (9B)

F   **Fig. (9C)**

Fig. (9): 65 years old man with MDCT showed duodenal mass (A) exhibits contrast filling defect (B) as well as endoscopic findings (C) proved by biopsy as duodenal carcinoid.

Based on histopathological examinations the results were:
- 12 cases gastric adenocarcinoma.
- 4 cases gastric lymphoma.
- 3 cases gastro intestinal stromal tumors (GIST).
- One case gastric leiomyoma.
- 4 cases duodenal carcinoma.
- One case duodenal carcinoid.

4. Discussion

(Dicken and others 2005)[6] mentioned ninety percent of all tumors of the stomach are malignant, and gastric adenocarcinoma comprises 95% of the total number of malignancies .

In our study adenocarcinoma represented about 60% from total number of gastric masses (12/20) likely related to the relative small number of cases in this study.

Detection rates for adenocarcinoma in this study were 40% for early adenocarcinoma which considered early if there is no evidence of local invasion or metastases and 100% for advanced adenocarcinoma where there is local invasion or metastases, these findings are relatively comparable to previous study by (Kensaku *and others 2005*) [7] which reported 41% and 96 % for detection rate of early and advanced gastric adenocarcinoma, respectively by MDCT.

As regarding to gastric lymphoma detection rate was 75% as diffuse or segmental thickening with 40% showed lymphadenopathy and 25% showed ulcer, these findings are relatively correlated with previous study (Dongil *and others 2002)* [8] which reported 69% detection rate, lymphadenopathy 40% and ulcer 22% in study included 58 patients with gastric lymphomas.

Gastrointestinal stromal tumors (GIST) showed well demarcated masses project exophytically and/or intraluminally as expressed in (Miettinen and Lasota study 2001) (9), these findings were noted in all patients (100%) detection rate in our study, on the other hand, (Pidhorecky and others 2000) (10) reported detection rate 87%.

(Coulier *and others 2007)*[11] reported the primary carcinoid tumor clearly appeared as a contrast-enhancing intraluminal lesion in all cases except in one case in which the primary lesion remained unlocalized and in another in which the primary tumor finally appeared infracted at gross anatomy. The maximal tumoral enhancement was obtained in 3 patients imaged during the acute arterial phase. 6/7 patients had multiple prominent mesenteric nodal metastases, all also appearing as hypervascularised enhancing masses. In 4/7 patients the nodal metastases represented the major finding being much prominent and larger than the primary

tumour. Signs of retractile mesenteritis with soft tissue stranding, retraction and stellate pattern of the mesentery were found around the mesenteric metastases in 5/7 patients and direct incarceration of vessels were found in 3 cases, these findings can't correlated with carcinoid findings in our study for the very small number of carcinoid patients in this study (one patient).

Conclusion

Recent advances in CT technology and 3D imaging software have sparked renewed interest in using CT to evaluate gastroduodenal masses. Detailed CT examinations of the stomach and duodenum can routinely be performed with oral contrast intake, along with a rapid intravenous contrast material bolus and the thin collimation that is possible with new multidetector row CT scanners. MDCT is a valuable tool for the evaluation and differential diagnosis of gastro duodenal masses with high correlation with histopathological findings aside from early gastric carcinoma which showed relative low detection rate that open the way for more studies and research in the future to try find a way to solve this problem.

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