Original Research Article

128 slices multidetector CT evaluation of Gastric carcinoma - Imaging and histopathological correlation

S. Yogaraj[1], M. Senthil Kumar[2*]

[1,2]Assistant Professor, Department of Radiology and Imaging Sciences, Velammal Medical Collage Hospital and Research Institute, India

[*]Corresponding author email: **senz1986@gmail.com**

International Archives of Integrated Medicine, Vol. 6, Issue 4, April, 2019.

Available online at http://iaimjournal.com/

ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**

Received on: 14-03-2019 **Accepted on:** 19-03-2019

Source of support: Nil **Conflict of interest:** None declared.

How to cite this article: S. Yogaraj, M. Senthil Kumar. 128 slices multidetector CT evaluation of Gastric carcinoma - Imaging and histopathological correlation. IAIM, 2019; 6(4): 60-63.

Abstract

Background: Multi-detector CT (MDCT) of the stomach is the first-line imaging for patients with suspected gastric pathologies. Hence, the study was conducted to explore the characteristics of variously differentiated gastric cancers on 128 slices multi-detector computed tomography (CT).

Material and methods: This prospective observational study was approved by our institutional review board, and informed consent was waived from January 2016 to January 2017. All the patients were selected by convenience sampling. All patients underwent an endoscopic biopsy that provided histologic confirmation carcinoma in the remnant stomach. CT examinations on a 128 slice CT scanner with a 0.7-second tube rotation (GE OPTIMA CT 660) were performed. The fasting time of at least six hours was recommended to patients for complete gastric emptying.

Results: A total of 26 people were included in the final analysis**.** The mean age was 56 ± 11.96 in the study population. 13(50%) participants were male and remaining 13(50%) were female. Most cancers were Adenocarcinomas and diffuse of higher grade and nodal involvement. Among the study population, 3(11.54%) participants were with T3 tumor stage, and 23(88.46%) were with T4 tumor stage. 13(50%) participants had nodal stage1, 10(38.46%) had nodal stage 2 and remaining 3(11.54%) had nodal stage 3. 15(57.69%) had M0 metastasis, and 11(42.31%) had M1 metastasis. 23(88.46%) Participants had overall stage 1V and remaining 3(11.54%) participants had stage IIIC as detected in CT. 18(69.23%) participants had surgery and the remaining 8(30.77%) underwent chemotherapy.

Conclusion: Stomach Multi-detector CT imaging is a functional imaging technology with potential clinical applications.

Key words

Gastric cancer, Computed Tomography, Operative staging, Histopathology, TNM.

Introduction

Gastric cancer is the second most common cause of cancer death globally, and fifth most common cancer among males and seventh most common cancer among females in India [1, 2]. For a complete cure of gastric cancer, complete surgical resection of the tumor at laparotomy has been the therapeutic method of choice [3]. Surgical resection is dependent on the GC stage at presentation, which incorporates the depth of tumor invasion, the extent of lymph node and distant metastases [3].

Multi-detector computed tomography (MDCT) with its ability to assess tumor depth, nodal disease and metastases is the preferred technique for staging GC and assessing treatment response for GC. MDCT has become a powerful imaging tool for non-invasive evaluation of the stomach and can assess locoregional and metastatic staging simultaneously [4]. This study was done with the aim of evaluation of Gastric carcinoma by Imaging and histopathological correlation.

Materials and methods

This prospective observational study was approved by our institutional review board, and informed consent was waived from January 2016 to January 2017. All the patients were selected by convenience sampling. All patients underwent an endoscopic biopsy that provided histologic confirmation carcinoma in the remnant stomach.

We performed CT examinations on a 128 slice CT scanner with a 0.7-second tube rotation (GE OPTIMA CT 660). To acquire a near-isotropic data set, we chose 4×1-mm collimation and reconstructed 0.625 mm-thick sections every 0.5 mm. An optimum CT technique requires high spatial resolution, proper gastric distension, and proper timing of contrast media injection to detect subtle changes in the gastric wall and to accurately stage tumors. A casting time of at least six hours was required for complete gastric emptying. For diagnostic viewing, we reconstructed 0.625 mm-thick axial sections either directly from the scanning data or the thin-section volumetric data set (the secondary raw data set) using the multi-planar reformation function of the scanner console. Also, we routinely performed coronal and sagittal reformation in the region of the stomach. Contrast material injection for the stomach was timed in a manner that ensured the arterial phase, portal phase imaging. In such cases, the scanning range included only the liver and stomach in the arterial phase and the upper abdomen down to the iliac crest for the portal venous phase.

We used 120kVp and 350-500 me like the exposure settings. The resulting volume CT dose index, as an indicator of average local dose, was~ 10.1 mGy for each multi-detector acquisition. This number may be varied with patient size: 125 kVp and 10 mGy appear sufficient for slim patients, but for very obese patients, 140 kVp and up to 30 mGy should be used for optimal image quality. Descriptive analysis was carried out by the mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Non-normally distributed quantitative variables were summarised by median and interquartile range (IQR).

Results

A total of 26 people were included in the final analysis**.** The mean age was 56 ± 11.96 in the study population. Among the study population, 13(50%) participants were male and remaining 13(50%) were female. The histopathological findings were as per **Table - 1**. Most cancers were Adenocarcinomas and diffuse of higher grade and nodal involvement. Among the study population, 3(11.54%) participants were with T3 tumor stage, and 23(88.46%) were with T4 tumor stage. 13(50%) participants had nodal stage 1, 10(38.46%) had nodal stage 2 and remaining

3(11.54%) had nodal stage 3. 15(57.69%) had M0 metastasis, and 11(42.31%) had M1 metastasis. 23(88.46%) Participants had overall stage 1V and remaining 3(11.54%) participants had stage IIIC as detected in CT (**Table - 2**). Among the study population, 18(69.23%) participants had surgery, and the remaining 8(30.77%) underwent chemotherapy.

Table - 1: Descriptive analysis of Histopathology in the study population (N=26).

HPE	Summary
HPE classification	
Adenocarcinoma	22(84.62%)
Signet Ring Cell Carcinoma	2(7.69%)
Metastatic adenocarcinoma	1(3.85%)
Carcinomatous	1(3.85%)
Type	
Mixed	1(3.85%)
Diffuse	23(88.46%)
Intestinal	2(7.69%)
Histologic Grade	
Grade ii	5(19.23%)
Grade iii	21(80.77%)
HPE Differentiation	
Moderate	11(42.31%)
Poor	15(57.69%)
Pathologic staging	
pT3 pN1	2(7.69%)
PT3PN2	1(3.85%)
PT4 endoscopy specimen	15(57.69%)
pT4 pN3	1(3.85%)
pT4 pN3b	1(3.85%)
pT4a pN1	1(3.85%)
pT4a pN3a	1(3.85%)
PT4APN2	1(3.85%)
pT4bN3aM1	1(3.85%)
PT4PN1	2(7.69%)
HPE Nodal Involvement	
Yes	10(38.46%)
No	16(61.54%)

Discussion

MDCT with isotropic volumetric imaging and various 3D images has increased the accuracy of T and N staging in patients with gastric cancer. Volume-rendering images including transparent or surface-rendering images enable radiologists to detect subtle mucosal abnormalities and provide an overview of the lesion in the stomach. Coronal and sagittal multi-planar reformatted images permit radiologists to select the optimal imaging plane to accurately evaluate tumor invasion depth of the gastric wall and perigastric infiltration and to differentiate lymph nodes from small perigastric vessels [5]. Another advantage as stated by Chen, et al. [6] was that MDCT is less skill-dependent, with less discomfort to the patient and thus more tolerable.

Table - 2: Descriptive analysis of CT in the study population (N=26).

CT	Summary
CT tumor stage	
T3	3(11.54%)
T4	23(88.46%)
CT nodal stage	
N1	13(50.00%)
N2	10(38.46%)
N3	3(11.54%)
CT metastasis	
M0	15(57. 69%)
M1	11(42.31%)
CT overall stage	
Stage IV	23(88.46%)
Stage IIIC	3(11.54%)

As in our study, it was seen that the histological findings correlated well with the CT findings which showed that Multi-detector CT was a good gastric imaging modality. Our study findings were in accordance to the study by Barros R.H., et al. [7] where it was found that 64-channel multi-detector computed tomography demonstrated clinically relevant accuracy in the preoperative staging of gastric adenocarcinoma as regards invasion depth (T) and metastatic involvement (M). Sharara S.M., et al. [8] found that MDCT T staging compared to pathological staging was highly significant and was better determined by Multi-detector Computed Tomography (MDCT). Lee, et al. [9] reported that three-dimensional imaging with the surface-

shaded display technique improved early gastric cancer detection rates from 64.5% to 93.5%.

Even though our study suggested that Multi-detector CT 3D imaging software is a great device in detecting gastric cancer, our study had certain limitations. First, statistical power was limited because the sample was relatively small. Furthermore, our study was done in a single centre. However, this study contributes to the literature that there could be a new treatment modality. Further multi-institutional studies with a large number of patients and prospective design are strongly warranted to confirm our study results and to generalise the study findings.

Conclusion

Multi-detector CT 3D imaging software and cheaper data storage capacities have allowed faster, simpler, and more accurate gastric imaging.

References

1. Sharma A, Radhakrishnan V. Gastric cancer in India. Indian J Med Paediatr Oncol., 2011; 32(1): 12-6.
2. Rao DN, Ganesh B. Estimate of cancer incidence in India in 1991. Indian J Cancer, 1998; 35(1): 10-8.
3. Blakely AM, Miner TJ. Surgical considerations in the treatment of gastric cancer. Gastroenterol Clin North Am., 2013; 42(2): 337-57.
4. Choi JI, Joo I, Lee JM. State-of-the-art preoperative staging of gastric cancer by MDCT and magnetic resonance imaging. World J Gastroenterol., 2014; 20(16): 4546-57.
5. Ahn HS, Kim SH, Kodera Y, Yang HK. Gastric cancer staging with radiologic imaging modalities and UICC staging system. Dig Surg., 2013; 30(2): 142-9.
6. Chen C-Y, Hsu J-S, Wu D-C, Kang W-Y, Hsieh J-S, Jaw T-S, et al. Gastric cancer: preoperative local staging with 3D multi–detector row CT—correlation with surgical and histopathologic results. Radiology, 2007; 242(2): 472-82.
7. Barros RH, Penachim TJ, Martins DL, Andreollo NA, Caserta NM. Multidetector computed tomography in the preoperative staging of gastric adenocarcinoma. Radiol Bras., 2015; 48(2): 74-80.
8. Sharara SM, Nagi MA, Soliman SS. Multidetector computed tomography in the evaluation of gastric malignancy; A multicenteric study. Egypt J Radiol Nucl Med., 2018; 49(2): 304-9.
9. Lee DH, Kim SH, Joo I, Han JK. CT Perfusion evaluation of gastric cancer: correlation with histologic type. Eur Radiol., 2018; 28(2): 487-95.