

The Role of MDCT in Diagnosis of Gastric Carcinoma

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A B S T R A C T

Introduction: The multidetector computed tomography is widely used imaging technique to assess preoperative staging of gastric carcinoma as well as regional lymph nodes, distant metastasis and gastric mass. The aim of this study was to evaluate the role of multidetector computed tomography in the diagnosis of tumor invasion depth and lymph node and metastatic involvement, in patients with gastric adenocarcinoma.

Material and methods: 50 patients with biopsy-confirmed gastric cancer underwent preoperative staging with multidetector computed tomography. The accuracy, specificity and sensitivity of MDCT were calculated.

Results: T categories accuracy falls between 80%-90%. The kappa index for the weighted was 0.75. The N category accuracy was between 65% to 80%. 89.6% accuracy showed in case of metastatic involvement.

Conclusion: The present study demonstrates that MDCT performed better in evaluation of preoperative staging of gastric adenocarcinoma and metastatic involvement.

Keywords: Computed Tomography, Gastric Carcinoma, Cancer Stages

INTRODUCTION

The gastric carcinoma is the worldwide health problem due to higher mortality rate. Although the mortality rate is decreasing in western countries, after that also gastric carcinoma remains the second most common cause of cancer related death.¹ Gastric cancer can be found most commonly in Asian countries like, Japan, South Korea and China.^{2,3} The prognostic factors of gastric cancer mainly depends on the stage of lymph node metastasis and depth of tumor invasion.^{2,3} Kim et al. study showed that deeper the tumor invasion lower the survival rate.² 95% cases of gastric cancer because of adenocarcinoma, others are like lymphomas, stromal tumor and rarely neuroendocrine cancer. Formerly surgical resection thought to be only option to cure gastric cancer.³ But development of imaging technique helps us to assess the preoperative staging of gastric carcinoma. Furthermore advancement of chemotherapeutic agents can prolong the survival rate of patients suffering from gastric carcinoma. To evaluate the stages of cancer tumor/node/metastasis (TNM) is used frequently.^{4,5} Examine the preoperative staging ultrasonography, computed tomography and endoscopy are used frequently.⁶ Endoscopic ultrasonography is performed better to diagnose the degree of tumor stages.^{7,8} Although endoscopy technique is better but adopting MDCT for the diagnosis of cancer staging increases the accuracy of the technique.⁸⁻¹¹ Also MDCT can diagnose the tumor invasion in lymph nodes and other organs.¹² The recently developed

multidetector row computed tomography (MDCT) with 16 or more channels and thin collimation can give 1mm thick and higher imaging resolution. All these advancement increases the diagnostic performance of MDCT while diagnose the stages of gastric carcinoma. The performance of magnetic resonance imaging over computed tomography in gastric cancer evaluation need to be studied in detail.¹³⁻¹⁵ Therefore the aim of this present study is to evaluate the accuracy, sensitivity and specificity of MDCT in staging of gastric adenocarcinoma.

MATERIAL AND METHODS

The study was conducted during the period of 2 years from March 2017 and April 2019. A total of 50 patients with gastric adenocarcinoma without any prior treatment were examined by multidetector row computed tomography. Among all, 5 patients were excluded from the study because all of them clinically studied with metastatic disease. The total of 45 patients, 28 (62%) were men and 17 (38%) were female. During surgery time the patient's age ranges between 33-84 years. Adenocarcinoma cases were included and lymphomas were excluded from this study. 64-detector row computed tomography was used to get the radiograph from patients in 8 hrs prior fasting. Informed consent was collected from all the participants in the present study. The radiographs were compared with surgical and pathological data. Table 1 showed the details about tumor and pathological staging.

Category T (6th ed.)	Category T (7th ed.)	Histological criteria	Tomographic criteria
T1	T1	Invasion of the lamina propria (T1a) or submucosa (T1b)	Lesion non detectable at CT Focal thickening or abnormal enhancement of the gastric mucosa, with a preserved hypodense strip deep to the lesion, corresponding to the submucosal layer
T2	T2 or T3	Muscularis propria (T2) or subserosal layer (T3) invasion	Thickening and abnormal enhancement involving the whole thickness of the gastric wall, with smooth external contour of the stomach
T3	T4A	Extraserosal extension (invasion of the visceral peritoneum)	Thickening and abnormal enhancement involving the whole thickness of the gastric wall, associated with linear or reticular striations extending towards the perigastric fat
T4	T4B	Invasion of adjacent organs/structures	The above described alterations extend to adjacent organs/structures

Table-1: Histopathological staging and tomographic criteria

Category T (6th ed.)	Category T (7th ed.)	Sensitivity & Specificity
T1	T1	63% & 93%
T2	T2 or T3	60% & 76%
T3	T4A	70% & 84%
T4	T4B	82% & 98%

Table-2: Results of T staging of gastric cancer.

Category N (7th ed.)	Sensitivity & Specificity
N0	90% & 75%
N1	12% & 67%
N2	20% & 85%
N3	37% & 100%

Table-3: Results of N staging of gastric cancer

Category M (7th ed.)	Sensitivity & Specificity
M0	100% & 72%
M1	70% & 100%

Table-4: Results of M staging of gastric cancer

RESULTS

In this study table 2 demonstrated the gastric carcinoma T staging. The MDCT showed sensitivity and specificity for T1 staging was 63% and 93%. Similarly for T2 or T3 staging sensitivity was 60% but specificity was 76%. The sensitivity and specificity of MDCT was 70% and 84% in the case of T4A staging. MDCT reported 82% and 98% sensitivity and specificity for T4B staging. The table 3 showed the data about gastric cancer N staging. In case of N0 staging, sensitivity of MDCT was higher around 90% and specificity was 75%. But MDCT showed very lower sensitivity for N1, N2 and N3 staging which was 12%, 20% and 37% respectively. MDCT reported highest specificity of 100% for staging of N3. The specificity of N1 and N2 was moderate about 67% and 85%. Subsequently table 4 tells regarding cancer staging M. Where MDCT sensitivity was 100% for M0 staging and specificity was 72%. For M1 staging MDCT sensitivity and specificity was totally opposite to M0 staging, 70% and 100%. During preoperative finding all three cases were defined as M0 and peritoneal metastasis was found intraoperatively and further

confirmed by histopathological report.

DISCUSSION

In this study computed tomography performed well with higher accuracy rate in T staging cancer. 88-92% accuracy showed in the case of early gastric tumor stage. 86-96% accuracy rate revealed in the case of adjacent organ invasion. Although CT reported lower accuracy in differentiation between T2 and T3 categories but it could not create any problem to manage these categories. Several studies reported accuracy rate between 66% to 88% for staging tumor invasion.¹⁶⁻²¹ The present study reported more numbers of advanced tumors. 20% of cases showed T1 stage cancer. The study done by Yang et al. reported 40% T1 staging.²¹ According to that the accuracy is higher in T1 category, in turn which reduces the global accuracy of staging. Several studies done based on the 6th edition of TNM staging system. In current scenario 7th edition showed better performance in categorization of T than 6th edition. In other way for the categorization of N staging 7th edition failed subsequently. There is need of more clinical studies to evaluate the performance of 7th edition in preoperative staging. There are several studies which reported false positive result for the interpretation as tumor extension category T4A. Our study also reported 3 cases of T of T than 6th edition. In other way for the categorization of N staging 7th edition failed subsequently. There is need of more clinical studies to evaluate the performance of 7th edition in preoperative staging. There are several studies which reported false positive result for the interpretation as tumor extension category T4A. Our study also reported 3 cases of T4A instead of T3 staging. For the evaluation of lymph node involvement it showed worst result. But in these cases CT showed accuracy of 79% with 90% and 74% sensitivity and specificity in categorization of N0. Therefore the CT method can demonstrate the absence of secondary lymph node involvement with better accuracy.²⁴ Although CT results can correlate nicely between lymph node and neoplastic involvement but it has few limitations in demonstration of lymph node enlargement due to inflammation or normal size lymph node metastasis. CT showed 89.6% accuracy in categorization of metastatic disease. The metastasis can be due to lymphatic, haematogenous or peritoneal spread. There

is limitation of CT in detection of secondary peritoneal tumor invasion.²⁵ The present study showed M0 stage in preoperative staging with smaller secondary peritoneal implants. Another study by Yajima et al. reported the presence of ascities can tell about peritoneal carcinomas with 97% specificity and 51% sensitivity.²⁶ Computed tomography has disadvantages like ionizing radiation exposure. Several CT performed in preoperative staging of gastric cancer in due radiation exposure rate is higher. Therefore more studies require proving the accuracy and usefulness of MDCT in gastric cancer staging.

CONCLUSION

In recent scenario MDCT proved to be a better method to diagnose preoperative staging of gastric cancer. It has better accuracy rate in staging depth of tumor invasion and metastatic neoplastic cancer.

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