

PROSPECTIVE COMPARATIVE STUDY BETWEEN CECT STAGING AND SURGICAL STAGING IN CARCINOMA OF STOMACH WITH PARTICULAR REFERENCE TO PANCREATIC, COLONIC INVASION AND SECONDARIES IN LIVER

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ABSTRACT

BACKGROUND

Carcinoma of Stomach is the fourth most common malignancy. Before planning an operation, correct staging of the disease is important. Contrast Enhanced Computerized Tomography (CECT) is considered to be important for this purpose. Much controversies exist as to the value of CECT in the preoperative staging of carcinoma of stomach.

The objective of the present study was to compare the efficiency of CECT with the operative findings in cases of carcinoma of stomach.

MATERIALS AND METHODS

This study included 64 patients, 42 males and 22 females in the age group 30 to 70 year. All the patients had carcinoma stomach diagnosed by upper GI endoscopy and biopsy and preoperatively staged by CECT. All these patients underwent laparotomy and surgically assessed as to invasion of pancreas and transverse colon by the primary tumour and secondaries in liver. In doubtful cases, tissue samples were harvested for pathological confirmation.

RESULTS

In detecting invasion of pancreas, CECT was found to be 40.9% sensitive; 85% specific. In detecting colonic invasion, CECT was 64% sensitive and 100% specific. For detection of secondaries in the liver, CECT was 54% sensitive and 92% specific.

CONCLUSION

Thus, this study proved that CECT is not a good investigation to detect invasion of pancreas and transverse colon by the carcinoma of stomach but CECT is a dependable investigation to detect secondaries in the liver from carcinoma of the stomach.

KEYWORDS

Carcinoma of stomach, CECT, Secondaries, Pancreas, colon.

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BACKGROUND

Carcinoma of stomach is the fourth most common cancer and the second leading cause of death from cancer.¹ An accurate evaluation of local and distant extent of the disease is essential for planning an optimal treatment. Local extent of the primary tumour, involvement of lymph nodes and distant metastases are the most important prognostic factors in gastric cancer. Complete resection of all gross disease with negative microscopic resection margin provides a better long-term survival and the overall 5-year survival rate is approximately 20%.^{2,3,4} Carcinoma of stomach has a

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poor prognosis. A cure rate of 5%- 10% can be obtained in better centres. Better results are obtained in some centres of Japan. It rarely disseminates widely before regional lymph nodes are involved. There is an opportunity of cure of the disease provided it is diagnosed early. Earlier diagnosis and earlier treatment are the key to success with the disease.⁵ Computerised Tomography (CT) is an X-ray that produces detailed cross-sectional images of part of the body. A CT scanner takes many pictures. A computer then combines these pictures and produces images of the part of the human body under study. Much controversies as to efficacy of CECT in the preoperative evaluation of carcinoma of stomach exist because of its limited ability to identify correctly invasion of adjacent organs, lymph node metastases and metastases to liver and peritoneum.⁶ This study was designed to assess the dependability of CECT in preoperative staging of carcinoma of stomach.



MATERIALS AND METHODS

Between May 2014 and April 2015, 80 cases of carcinoma stomach were admitted in surgical ward of North Bengal Medical College & Hospital. We selected 64 patients of carcinoma of stomach, 40 males and 24 females in the age group 30 years to 70 years. These 64 cases of carcinoma stomach underwent laparotomy. 16 cases of carcinoma of stomach were kept out of the study because these cases could not undergo formal laparotomy either due to malignant ascites or very poor general condition. Each of these 64 patients was diagnosed by upper GI endoscopy and biopsy and was preoperatively staged by CECT. During laparotomy every patient was assessed surgically as to invasion of pancreas and transverse colon by the primary tumour and secondary deposit in the liver. In doubtful cases suitable tissues were harvested for histopathological confirmation. Finally, findings of CECT and those of surgery were compared.

RESULTS

Any finding detected by CECT and confirmed on laparotomy is taken as True Positive. A finding detected by preoperative CECT but not confirmed on laparotomy is considered as Positive. A sign neither found on preoperative CECT nor on laparotomy is treated as True Negative. Similarly, a sign seen on preoperative CECT but not confirmed by laparotomy is taken as False Negative.

Efficiency of CECT will be using the parameters of Sensitivity, Specificity, Positive Predictive Value and Negative Predictive value. These parameters are calculated as per the following formulae:

$$\text{Sensitivity} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Negative}} \times 100$$

$$\text{Specificity} = \frac{\text{True Negative}}{\text{True Negative} + \text{False Positive}} \times 100$$

$$\text{Positive Predictive Value} = \frac{\text{True Positive}}{\text{True Positive} + \text{False positive}} \times 100$$

$$\text{Negative Predictive Value} = \frac{\text{True Negative}}{\text{True Negative} + \text{False Negative}} \times 100$$

Evaluation of CECT in detection Pancreatic Invasion: 64 patients were studied. On surgical exploration pancreatic invasion was found in 44 patients. But CECT could indicate pancreatic invasion only in 18 cases. Again, CECT falsely showed pancreatic invasion in 3 cases, while on exploration no invasion to pancreas was found.

Pancreatic invasion on Surgical Exploration			
Pancreas invaded = 44		Pancreas not invaded = 20	
CECT staging		CECT Staging	
Pancreas invaded = 18 (True Positive)	Pancreas not invaded = 26 (False Negative)	Pancreas invaded = 3 (False Positive)	Pancreas not invaded = 19 (True Negative)
Table 1A. Pancreatic Invasion in 64 Cases of Carcinoma of Stomach Operated			

Sensitivity	40.9%
Specificity	85%
Positive Predictive Value	85.7%
Negative Predictive Value	39.5%
Table 1B. Efficiency of CECT in Detection of Pancreatic Invasion	

Evaluation of CECT in detection of transverse colon invasion: Out of 64 cases of carcinoma stomach studied, on laparotomy 28 cases were found to have invasion of transverse colon. But CECT could detect invasion of transverse colon in 18 patients only.

Colonic invasion on Surgical Exploration			
Colonic invaded = 28		Colon not invaded = 36	
CECT staging		CECT Staging	
Colon invaded = 18 (True Positive)	Colon not invaded = 10 (False Negative)	Colon invaded = 0 (False Positive)	Colon not invaded = 36 (True Negative)
Table 2A. Colonic Invasion in 64 Cases of Carcinoma of Stomach Operated			

Sensitivity	64%
Specificity	100%
Positive Predictive Value	100%
Negative Predictive Value	78.2%
Table 2B. Efficiency of CECT in Detecting Colonic Invasion	

Secondaries in Liver

Out of 64 patients, 37 patients had evidence of secondaries in the liver. CECT could detect hepatic metastases in 20 patients. In 2 patients there was no metastasis in the liver in spite of the fact that CECT indicated it.

Secondaries in liver found at the time of operation			
Secondaries found = 37		Secondaries in liver not found = 27	
CECT staging		CECT Staging	
Secondaries detected = 20 (True Positive)	Secondaries not detected = 17 (False Negative)	Secondaries detected = 2 (False Positive)	Secondaries not detected = 25 (True Negative)
Table 3A. Secondaries in the Liver from 64 Cases of Carcinoma of Stomach Operated			

Sensitivity	54%
Specificity	92%
Positive Predictive Value	90.9%
Negative Predictive Value	59.5%

Table 3B. Efficiency of CECT in Detection of Secondaries in Liver from Carcinoma of Stomach



Figure 1. Pancreatic Invasion on CECT



Figure 2. Pancreatic Invasion



Figure 3. Secondary in the Liver

DISCUSSION

In a routine clinical setting, patients with carcinoma of stomach undergo preoperative staging by CECT. Endoscopic ultrasonography can be used for assessment of primary tumour of stomach and involvement of perigastric lymph nodes. Endoscopic Ultrasonography is also used for diagnosis of early carcinoma of stomach. Usefulness and limitations of CECT in preoperative staging of carcinoma of stomach are discussed in the current literature.⁷⁻¹¹ For an advanced case of carcinoma of stomach, a preoperative CECT can prevent an open-close surgical procedure and its attendant morbidity-mortality. Preoperative knowledge of extent of primary tumour, invasion of adjacent organs and distant metastases are important for planning an operative procedure and predicting an overall survival and disease-free survival. Curative treatment of carcinoma of stomach can be achieved by complete surgical removal of all tumour tissue. Prognosis of carcinoma of stomach depends on the extent of stomach wall penetration, invasion of adjacent organs, involvement of lymph nodes and distant metastases.

Invasion of Pancreas is very difficult to be assessed on preoperative imaging. One study has reported that sensitivity of CECT in detecting pancreatic invasion varies from 27% to 95%.¹² In this present study, CECT proves to be poor in detecting invasion of pancreas having a sensitivity of 41% and a specificity of 85%. Out of 44 cases of invasion of pancreas, only 18 cases of invasion were picked up by CECT. Visualisation of pancreas by CECT can be difficult because, the patients of carcinoma of stomach are commonly nutritionally poor. As a result, visceral fat between the organs are depleted.¹³ The absence of fat plane between stomach and pancreas does not mean invasion but maintenance of fat plane can reliably be taken as non-invasion of the organ.¹⁴

Compared to CECT spiral CT scanning seems to be more sensitive and specific than CECT in detecting invasion of transverse mesocolon and transverse colon. In this study CECT could detect 18 cases transverse colon invasion out of 28 cases of actual invasion which were detected on laparotomy. When calculated CECT proved to be 64% sensitive and 100% specific in detecting invasion of transverse colon having no false positive finding. In contrast one study found that CECT was 25% sensitive in demonstrating invasion of transverse colon.¹⁵

In a study conducted by Davies et al, CECT was 57% sensitive in detecting secondaries in liver. In the present study, out of 37 cases of secondary deposits in the liver 17 cases of secondary deposits in the liver were diagnosed by preoperative CECT. Preoperative CECT failed to diagnose 17 cases of actual secondary in the liver. This may be due to a fact that CT density of secondary deposit in liver from carcinoma of stomach may be very close to that of liver tissue. 2 cases of secondary deposits in liver proved too false on laparotomy. Thus, sensitivity of CECT is found to be 54% which is almost identical to the published article and a specificity of 92%.

Typically, metastases to liver from carcinoma of stomach are small (less than 10 mm).¹⁶ There may be small

intrahepatic metastases which are not visible during laparotomy. This may cause false negative results in surgical staging. In this study 2 cases of intrahepatic deposits were missed during surgery. Intraoperative ultrasonography can be used to resolve the issues intrahepatic secondary deposits and confirmed by ultrasound guided Fine Needle Aspiration Cytology.

CONCLUSION

According to this study, CECT has not been proved to be a dependable preoperative investigation to detect secondaries in liver from carcinoma of stomach having a sensitivity of 54%, but it has been a highly specific investigation to detect secondaries in liver (specificity of 92%). Again, CECT is not a very sensitive investigation to diagnose invasion of pancreas having a sensitivity of 41% but it is highly specific (specificity=85%). Preoperative CECT investigation to detect invasion of transverse colon by the carcinoma of stomach is a sensitive (sensitivity=64%) investigation and it is 100% specific.

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