Role of Dual energy CT in diagnosis and preoperative staging of gastric carcinoma

Essay

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In Radiodiagnosis

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Abstract

Introduction: Gastric cancer is one of the most common cancers worldwide with approximately 989,600 new cases and 738,000 deaths per year, accounting for about 8 percent of new cancers. A good prognosis for patients with this disease requires choosing the correct therapy, and making the right therapeutic choice requires accurate preoperative staging. The recent development of multi-detector row CT (MDCT) scanner has allowed imaging with a thinner section collimation, translating into increased quality on transverse computed tomography scans and multiplanar reconstruction, contributing to the improved accuracy of TNM staging. Nowadays MDCT has been widely used in preoperative staging of gastric cancer. However there are still some controversial problems.

Aim of the Work: The aim of the study is to evaluate the clinical utility of dual energy spectral CT (DEsCT) in detection and pre-operative staging of gastric carcinoma.

Methodology: Gastric carcinoma is still considered the second most frequent cause of cancer death worldwide, though the incidence and mortality decreased remarkably over the former 50 years.

Conclusion: Stomach cancer has a multifactorial etiology whether dietary, genetic, environmental and behavioral where Helicobacter pylori (H. pylori) infection plays the major role in the pathogenesis. On the other hand; balanced diet comprising fruits and vegetables, improved sanitation and hygiene, screening and treatment of H. pylori infection, and follow- up of precancerous lesions are considered preventive tools

Keywords: Role of Dual energy CT in diagnosis and preoperative staging of gastric carcinoma.

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List of Abbreviations

ABBREVIATION	NAME
AD	Autosomal dominant
AMEIs	advanced monoenergetic images
BMI	Body mass index
CC	Costal cartilage
CNR	Contrast noise ratio
C.T	Connective tissue
DEsCT/DECT	Dual energy spectral CT
DJ flexure	Duodeno-jejunal flexure
DS-DECT	Dual-source dual-energy
EMR	Endoscopic mucosal resection
EUS	Endoscopic ultrasound
FAP	Familial adenomatous polyposis
FDA	Food and Drug Administration
FOV	Field of view
GC	Gastric carcinoma
GDA	Gastroduodenal artery
GEJ	Gastro-oesophageal junction
GERD	Gastro-oesophageal reflux disease
HNPCC	Hereditary non-polyposis colorectal cancer
HU	Hounsfield unit
LGA	left gastric artery
MAC	Mucinous adenocarcinoma
MD	Material decomposition images
MDCT	Multi-detector computed tomography
MRI	Magnetic resonance imaging
nIC	Normalized iodine concentration
PEIs	poly-energetic images
PET	Positron emission tomography
PV	Portal vein
RGA	Right gastric artery
SMV	Superior mesenteric vein
SRC	Signet ring cell carcinoma
SS-DECT	Single-source dual-energy CT

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INTRODUCTION

Gastric cancer is one of the most common cancers worldwide with approximately 989,600 new cases and 738,000 deaths per year, accounting for about 8 percent of new cancers ***(Bohle et al., 2011)***. A good prognosis for patients with this disease requires choosing the correct therapy, and making the right therapeutic choice requires accurate preoperative staging ***(Kwon, 2011)***. The recent development of multi-detector row CT (MDCT) scanner has allowed imaging with a thinner section collimation, translating into increased quality on transverse computed tomography scans and multiplanar reconstruction, contributing to the improved accuracy of TNM staging ***(Li et al., 2012).*** Nowadays MDCT has been widely used in preoperative staging of gastric cancer. However there are still some controversial problems.

Regarding the T-staging, the results from previous reports on the usefulness of CT for T-staging of gastric cancer have shown large variations (overall accuracy rates of 43–82% ***(Shimizu et al., 2005).*** Over-diagnosis sometimes happens when the interface of the lesion and peripheral tissue is blurred by an inflammatory reaction.

Aside from tumor location and depth of infiltration, lymph node status is of particular interest in the pretherapeutic staging of tumors, especially to establish different therapeutic strategies. In early gastric cancer the presence or absence of lymph-node metastases is a critical determinant of whether less invasive treatment, such as endoscopic mucosal resection, can be performed ***(Jemal and Bray, 2011)***.

In advanced carcinoma, lymph node status is an important prognostic factor not only regarding long-term survival, but also planning the optimal