



MRI Versus MDCT for Staging of Gastric Tumors Preoperatively

Essay

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ABSTRACT

Accurate preoperative staging of gastric cancer is important for treatment planning and prognosis prediction. Due to the development of less invasive treatment options, gastric cancer should be preoperatively staged with accuracy.

The technical progress of MDCT and the continuous development of 3D imaging processes have improved MDCT performance in the preoperative staging of gastric cancer.

The EGC detection rates can be improved through the use of virtual gastroscopy and CTgastrography. MPR images of MDCT can provide coronal or sagittal images and increase the accuracy of the tumor depth diagnosis. With the development of high speed techniques, MRI evaluation of gastric cancer is now feasible, and some studies have reported results that are comparable to or better than MDCT.

Keywords: Multi Planar Reconstruction - Hounsfield unit - Hematoxylin and eosin stain



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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سببنا انك لا تعلم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

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List of Abbreviations

Abb.	Full term
2D	Two dimensional
3D	Three dimensional
AGC	Advanced Gastric Carcinoma
AJCC	American Joint Committee on Cancer
DWIs	Diffusion weighted images
EGC	Early Gastric Carcinoma
EGC	Early Gastric Carcinoma
EUS	Endoscopic Ultrasound
Fig	Figure
H&E stain	Hematoxylin and eosin stain
HU	Hounsfield unit
LN	Lymph Nodes
MDCT	Multi Detector Computed Tomography
MPR	Multi Planar Reconstruction
MRI	Magnetic resonance imaging
PET/CT	Positron Emission Tomography-Computed Tomography
SI	Signal intensity
T1 WIs	T1 weighted images
T2 WIs	T2 weighted images
WHO	World Health Organization

INTRODUCTION

Gastric cancer is the 4th most common malignancy in men after lung, prostate & colorectal cancer, and the 5th common malignancy in women after breast, colorectal, cervical and lung cancer (*Guggenheim and Shah, 2013*).

Gastric cancer is the 2nd leading cause of cancer related deaths worldwide after lung cancer. The incidence of gastric cancer is particularly common in Asia (*Choi et al., 2014*).

The early detection and accurate preoperative staging (EGC) are very important because these patients may be ideal candidates for laparoscopic or minimally invasive surgery. Patients with advanced gastric cancer (AGC) have a 5 year survival rate 7-27%, whereas those with early gastric cancer (EGC) have a 5 year survival rate 85-100% (*Shen et al., 2011*).

It is now clear that there is heterogeneity in the epidemiology of gastric cancer according to its location within the stomach, the most important risk factor is bacterial infection by *Helicobacter pylori* (*Martel et al., 2013*).

The tumor-node metastasis (TNM) staging system is one of the most commonly used staging systems. The TNM system is well known to effectively predict the prognosis of gastric cancer patients (*Choi et al., 2014*).

MDCT is a widely accepted imaging modality for preoperative staging of gastric cancer that can simultaneously assess locoregional staging, including the gastric mass, regional lymph nodes and distant metastasis, Although MRI was not previously used to evaluate gastric cancer due to the modality's limitation, the development of high-speed sequences has made MRI a feasible tool for the staging of gastric cancer (*Choi et al., 2014*).

This study mainly compares between MDCT and MRI in preoperative staging of gastric carcinoma.

AIM OF THE WORK

The aim of this work is to compare the accuracy of MDCT and MRI in staging of gastric tumors.

Chapter 1

ANATOMY OF THE STOMACH

The stomach is the most dilated organ of the body. It lies in the epigastric, umbilical, and left hypochondrial areas of the abdomen (*Healy, 2005*).

It is J- Shaped but varies in size and shape with the volume of its contents with erect and supine position and even with inspiration and expiration (*Ryan and Mc-Nicholas, 1994*).

Parts of the Stomach:

A plane passing through the incisura angularis on the lesser curvature and the left limit of the opposed dilatation on the greater curvature divides the stomach into a left portion or **body** and a right or **pyloric portion**. The left portion of the body is known as the **fundus**, and is marked off from the remainder of the body by a plane passing horizontally through the cardiac orifice. The pyloric portion is divided by a plane through the sulcus intermedius at right angles to the long axis of this portion; the part to the right of this plane is the **pyloric antrum** (Fig.1) (*Gray, 1918*).

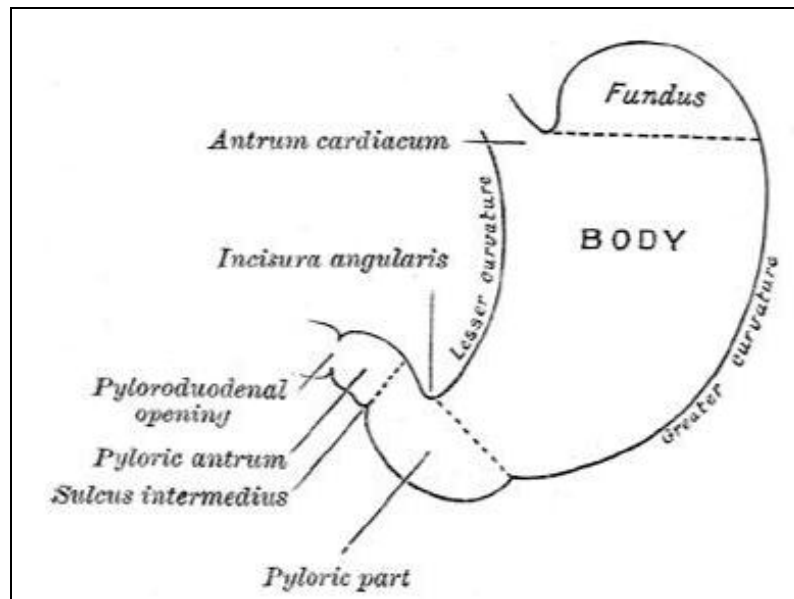


Fig. (1): Outline of stomach, showing its anatomical parts (*Gray, 1918*).

Gastric Orifices:

The opening from the esophagus into the stomach is the cardiac orifice situated to the left of the midline behind the seventh costal cartilage. The cardia is the region immediately adjacent to the cardiac orifice. The part of the stomach above the level of the cardiac orifice is the fundus. The pyloric orifice, the opening into the duodenum, is usually indicated by a circular pyloric constriction of the surface of the organ, indicating the pyloric sphincter (*Healy, 2005*).

Gastric Sphincters:

The pyloric sphincter is a muscular ring formed by a marked thickening of the circular gastric muscle, some longitudinal fibers also interlacing with it.