Staging of Gastric Carcinoma with Multidetector Computed Tomography

Essay

Submitted for Partial Fulfillment of Master Degree in Radiodiagnosis

Presented by

Waleed Mohammed Mahmood Mohammed
Resident of Radiodiagnosis
Sohag Cancer Institute

Under Supervision of

Prof. Dr. Abeer Abd El Maksoud Hafez
Professor of Radiodiagnosis
Faculty of Medicine - Ain Shams University

Dr. Amir Louis Louka
Lecturer of Radiodiagnosis
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain Shams University
2011

List of Contents

List of Figures

List of Figures (Cont.)

List of Figures (Cont.)

List of Figures (Cont.)

Fig. No	Title	Page

List of Figures (Cont.)

List of Figures (Cont.)

List of Abbreviations

AGC ..... Advanced Gastric Cancer

CT ..... Computed Tomography

CTA ..... Computed Tomographic Angiography

2D ..... Two Dimentional

3D ..... Three Dimentional

EGC ..... Early Gastric Cancer

EUS ..... Endoscopic Ultrasonography

GISTs ..... Gastrointestinal Stromal Tumours

MALT ..... Mucosa-Associated Lymphoid Tissue

MDCT ..... Multi Detector Computed Tomography

MDCTA ..... Multi Detector Computed Tomography Angiography

MEN ..... Multiple Endocrine Neoplasia

MIP ..... Maximum Intensity Projection

MPR ..... Multi Planner Reconstruction

MSCT ..... Multi Slice Computed Tomography

NET ..... Neuro Endocrine Tumour

PGC ..... Poorly Differentiated Gastric Carcinoma

SSD ..... Shaded Surface Display

VP ..... Vessel Probe

VR ..... Volume Rendering

WGC ..... Well Differentiated Gastric Carcinoma

Introduction

Throughout the 20th century, gastric cancer has been one of the two leading causes of cancer mortality worldwide .In the United States, gastric cancer ranks 14th in the number of cancer related mortality ***(Kim et al., 2006).***

The majority of patients present with advanced disease and symptoms such as weight loss, vomiting, anorexia, abdominal pain, haematemesis, melaena and pallor ***(Alatise et al., 2007).***

To reduce mortality, it is essential to choose an optimal therapeutic approach, and this in turn depends on early detection and accurate preoperative staging. Early detection is hindered by the relatively non specificity of symptoms in patients with gastric neoplasm ***(Kim et al., 2006).***

Conventional endoscopy is the established primary diagnostic investigation for patients suspected to have gastric malignancy. However, conventional endoscopy has limited value for accurate staging of gastric cancer especially the determination of depth of infiltration, and does not contribute to nodal staging ***(Bhandari et al., 2007).***

In deed, prognosis is related to the depth of invasion of the gastric wall and lymph node involvement ***(Chen et al., 2007).***

With the advent of multidetector computed tomography and endoscopic ultrasound (EUS); the ability to detect, diagnose and characterize disease has improved. These two imaging methods have complementary roles ***(Hargunani et al., 2007).***

Multidetector computed tomography offers new opportunities in imaging of the gastrointestinal tract.When thin collimation is used, near isotropic imaging of the stomach is possible, allowing high quality multiplanar reformation (MPR) and three dimensional (3D) reconstruction of gastric images. Proper distension of the stomach and optimally timed administration of intravenous contrast material are required to detect and characterize disease ***(Bas-Salamah et al., 2003).***

Simple two dimensional multiplanar reformatted images of the CT data allow quick visualization of the stomach in axial, sagittal and coronal planes .It is often helpful to start with two dimensional multiplanar reformations and then proceed to three dimensional volume rendering imaging ***(Horton et al., 2003).***

Multiplanar reconstruction images provide an overall accuracy significantly better than that of transverse images for tumor staging ***(Chen et al., 2007).***

Aim of the Work

The aim of the work is to emphasize the role of multi-detector computed tomography in staging of gastric cancer.

Anatomical Considerations

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 et al., 1994).***

The stomach was anatomically divided into the proximal portion (fundus), the middle portion (body), the distal portion (antrum) and the most distal portion (pylorus) ***(Fielding and Hallissey, 2005).***

The stomach has two orifices, the cardiac orifice at esophago-gastric junction and the pyloric orifice. It has two curvatures, the greater curvature and lesser curvature. The incisura is an angulation of the lesser curve. The part of the stomach above the cardia is called the fundus. Between the cardia and incisura is the body of the stomach and distal to the incisura is the antrum .The cardiac orifice and fundus are relatively excursion of the diaphragm **(Fig.1)** ***(Cunningham and Romanes, 1986).***

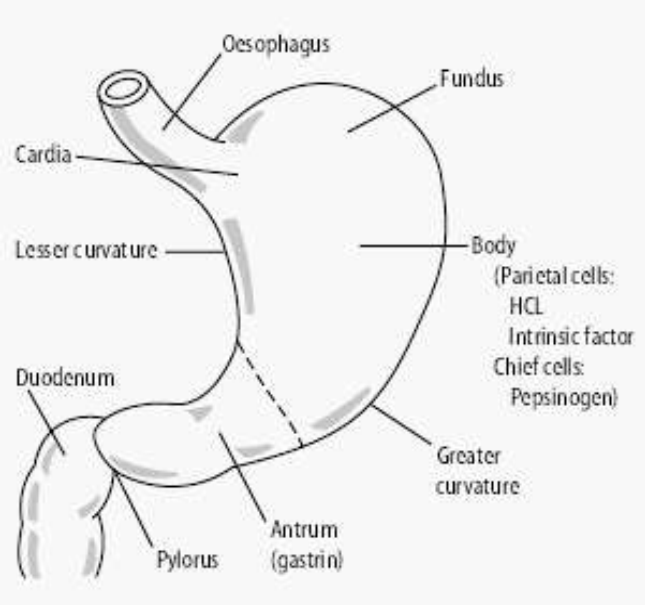

Figure (1): The regions of the stomach ***(Fielding and Hallissey, 2005).***

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 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).***

The stomach wall, like the wall of most other parts of the digestive canal, consists of three layers: the mucosal (the innermost), the muscularis and the serosal (the outermost). The

mucosal layer itself can be divided into three layers: the mucosa (the epithelial lining of the gastric cavity), the muscularis mucosa (low density smooth muscle cells) and the submucosal layer (consisting of connective tissue interlaced with plexi of the enteric nervous system). The second gastric layer, the muscularis, can also be divided into three layers: the longitudinal (the most superficial), the circular and the oblique **(Fig.2)**. The longitudinal layer of the muscularis can be separated into two different categories: a longitudinal layer that is common with the esophagus and ends in the corpus, and a longitudinal layer that originates in the corpus and spreads into the duodenum ***(Gopu et al., 2008).***

Gastric Curvatures: (Fig.2)

The lesser curvature extends between the cardiac and pyloric orifices. The lesser omentum is attached to the lesser curvature and contains the right and left gastric vessels adjacent to the line of the curvature ***(Healy, 2005)***.

The greater curvature is directed anteroinferiorly and is four or five times as long as the lesser curvature. It starts from the cardiac incisura and arches upwards, posterolaterally, and to the left. Its highest convexity is at the funds then it turns right to end at the pylorus ***(Healy 2005).***