Accuracy of MDCT in preoperative local staging of colorectal carcinomas

THESIS

Submitted for partial fulfillment of the master degree in radio-diagnosis

By

MOHAMMED MAHJOUB BAKRI MOHAMMED
M.B.B.Ch.
Faculty of medicine
Upper Nile University

Under Supervision of

Prof. HAMED SAMIR HAMED EL-GHAWABY
Professor of radio-diagnosis
Faculty of medicine
Cairo University

Dr. MARWA SHAKER ABD EL-FATAH
Lecturer of radio-diagnosis
Faculty of medicine
Cairo University

Dr. MOHAMMED FAISAL IBRAHIM
Lecturer of Pathology
Faculty of medicine
Cairo University

2014

Abstract

In this study Preoperative staging of colorectal cancer using MDCT has good accuracy in the prediction of T stage and good accuracy for N staging. Although there are internal limitations in detecting microscopic invasions.

Our study results show our results suggest that the preoperative staging of colorectal cancer using MDCT has good accuracy in the prediction of T stage which had been found as 80% for T2, 80% for T3 and 100% for T4 and low accuracy for nodal staging which had been found as 90% for N0 stage, 60% for N1 stage, and 70% for N2A stage. The accuracy rate for CT staging in our study was within the range reported in the literature: 41%-83% for T-staging and 22%-80% for N-staging **.**

Keyword: N2A- MDCT- TNM-CT

ACKNOWLEDGMENT

*Firstly, I thank **ALLAH** for granting me the power to accomplish this work.*

*I would like to express my deep thanks and profound gratitude and sincere to **Prof. Dr. Hamed Samir Hamed El-Gawaby** , Professor of Radiodiagnosis, Faculty of Medicine, Cairo University, and **DR. MOHAMMED FAISAL IBRAHIM**, Lecturer of , pathology faculty of medicine, Cairo university who gave me the chance to continue my post graduate studies.*

*Special thank to **Dr. Marwa Shaker Abd EL-Fatah**, Lecturer of Radiodiagnosis, Faculty of Medicine, Cairo University, for herkind supervision, illuminating discussion and adding valuable suggestions and remarks.*

*Finally, special thank to **my family and my closed friends** for their helpful efforts and encouragement during the research period.*

Mohammed Mahjoub Bakri Mohammed

(2014)

Dedication

I would like to dedicate this study to my family for their great help; continuous support and encouragement which were essential for the completeness of this work.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF CHARTS

ABBREVIATIONS

AJCC	American Joint Committee on Cancer.
CRC	Colorectal carcinoma.
CRM	Circumferential resection margin.
CRT	Chemoradiotherapy.
CT	Computed tomography.
DCE-CT	Dynamic contrast-enhanced computed tomography.
DNA	Deoxy ribonucleic acid.
EMVI	Extramural vascular invasion
FAP	Familial adenomatous polyposis coli.
FDG	Fluorodeoxyglucose.
HCC	Hepatocellular carcinoma.
HNPCC	Hereditary non polyposis colorectal cancer.
IEN	Intraepithelial neoplasia.
IMV	Inferior mesenteric vein.
L1	Lumber vertebra number 1.
MDCT	Multi detector computed tomography.
MPR	Multi planar reformation.
MR	Magnetic resonance.
MSI-H	High-frequency microsatellite instability.
PET	Positron emission tomography.
ROI	Region of interest.
S4	Sacral vertebra number 4.
UICC	Union International Contre Le Cancer.
WHO	World health organization .

Introduction

Colorectal cancer is the third most common cancer and the fourth most frequent cause of cancer deaths worldwide. The WHO estimates that 945,000 new cases occur each year, and colon cancer is responsible for 490,000 deaths annually in the world ***(Weitz et al, 2005)***.

In Egypt, the Cancer Pathology Registry of National Cancer Institute of Cairo University showed that during the years 2003-2004, colorectal cancer occupied the first rank among digestive system's malignancies (15.78%) and the fifth rank among all total cancers (4.34%) ***(Mokhtar et al, 2007)***.

Preoperative evaluation of the extent of colorectal carcinoma spread indicates the expected prognosis and also assists management ***(Sun et al,2005).*** The depth of bowel wall invasion, presence of lymph node metastases and distant metastases are the major factors that affect the prognosis of the patient ***(Flippone et al,2004).*** Accurate staging of colorectal cancer is important to provide the optimal treatment strategy. Despite preoperative evaluation and staging of colorectal cancer patient is difficult, computerized tomography (CT) scanning has been very often used in preoperative staging of colorectal cancer as a non-invasive instrument with the development of high resolution scanners, technical refinements in obtaining better quality as a result. CT is an excellent imaging tool for screening the distant metastases (***Burton et al,2008)(Ju et al, 2009).***

Advances in CT technologies have increased interest in the potential role of multi-detector computerized tomography (MDCT) for detection and staging of colorectal cancer ***(Shin et al, 2008).***

Aim of work

The aim of this study To evaluate tumor invasion (T staging) and lymph node metastasis (N staging) of colorectal cancer preoperatively by using multi-detector computerized tomography (MDCT) and to compare with the histopathology for accuracy.

LARGE BOWEL

ANATOMY

The large intestine is a hollow muscular organ that begins at the ileocecal valve and ends at the anus. It includes the cecum, with the attached vermiform appendix; the ascending, transverse, descending, and sigmoid colon; and the rectum (Figure 1). It measures approximately 150 cm (5 feet) in length ***(Fenoglio-Preiser et al, 2008)***.

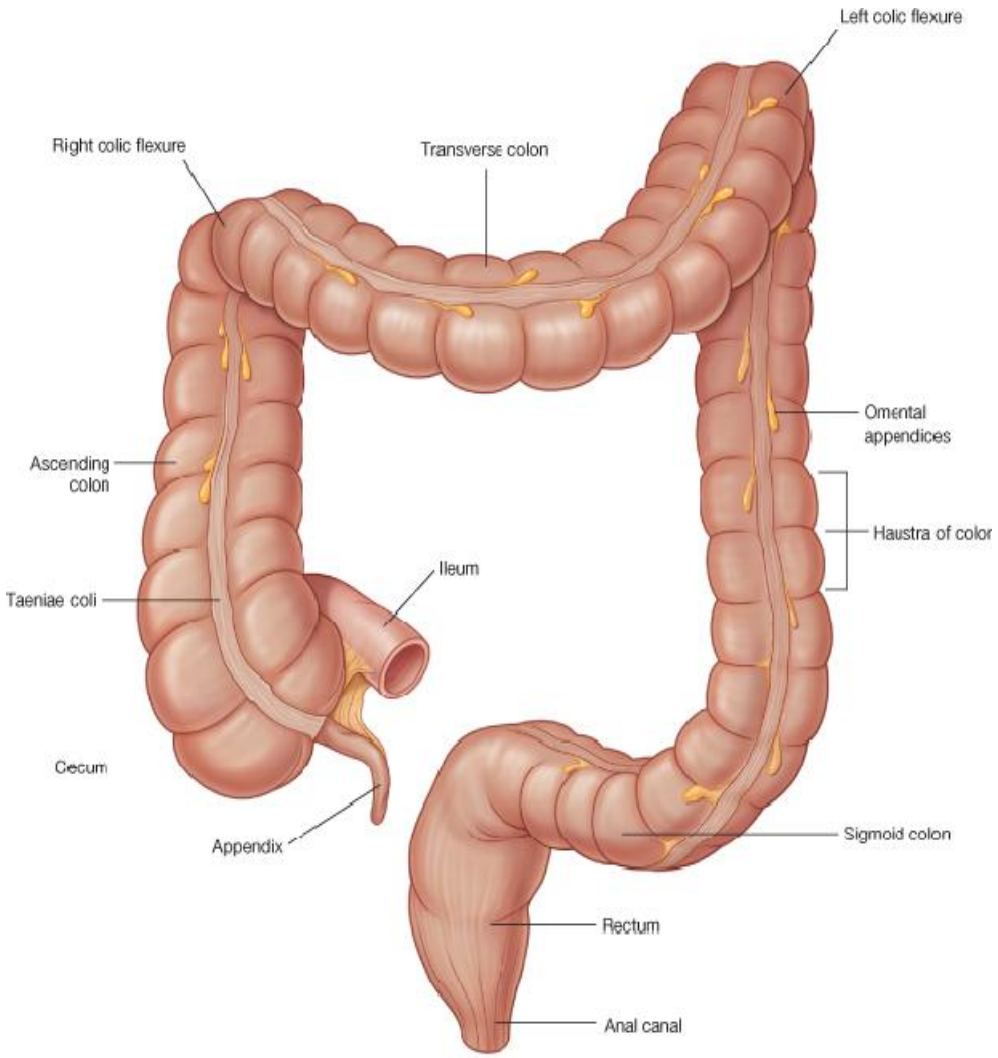

Figure 1: Anatomy of the large intestine ***(Elsevier et al., 2007)***

Beginning in the right groin as the cecum, with its associated appendix, the large intestine continues upward as the ascending colon through the right flank and into the right hypochondrium. Just below the liver, it bends to the left, forming the right colic flexure (hepatic flexure), and crosses the abdomen as the transverse colon to the left hypochondrium. At this position, just below the spleen, the large intestine bends downward, forming the splenic flexure, and continues as the descending colon through the left flank and into the left groin.

It enters the upper part of the pelvic cavity as the sigmoid colon, continues on the posterior wall of the pelvic cavity as the rectum, and terminates as the anal canal ***(Elsevier et al., 2007).***

The general characteristics of most of the large intestine are:

- its large internal diameter compared to that of the small intestine.
- peritoneal-covered accumulations of fat (the omental appendices) are associated with the colon;
- the segregation of longitudinal muscle in its walls into three narrow bands (the taeniae coli), which are primarily observed in the cecum and colon and less visible in the rectum;
- the sacculations of the colon (the haustra of colon).

Cecum and appendix

The cecum is the first part of the large intestine . It is inferior to the ileocecal opening and in the right iliac fossa. It is an intraperitoneal structure because of its mobility not because of its suspension by a mesentery.

The cecum is continuous with the ascending colon at the entrance of the ileum and is usually in contact with the anterior abdominal wall. It may cross the pelvic brim to lie in the true pelvis. The appendix is attached to the posteromedial wall of the cecum, just inferior to the end of the ileum (Figure 2). ***(Elsevier et al., 2007).***

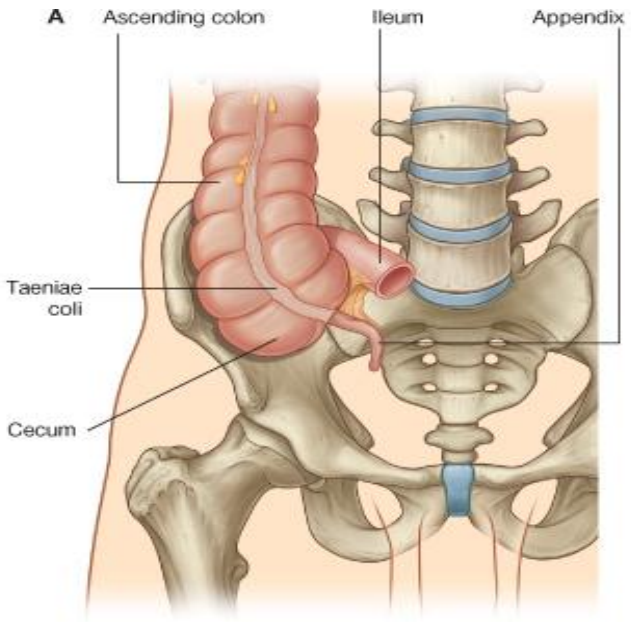

Figure 2: Cecum and appendix **(*Elsevier et al., 2007)***

The appendix is a narrow, hollow tube connected to the cecum. It has large aggregations of lymphoid tissue in its walls and is suspended from the terminal ileum by the mesoappendix, which contains the appendicular vessels. Its point of attachment to the cecum is consistent with the highly visible free taenia leading directly to the base of the appendix, but the location of the rest of the appendix varies considerably. It may be:

- posterior to the cecum or the lower ascending colon, or both, in a retrocecal or retrocolic position;
- suspended over the pelvic brim in a pelvic or descending position;