



Role of Perfusion C.T. in Colorectal Cancer

an Essay

Submitted for Partial Fulfillment of the Master Degree
In Radiodiganosis

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2018

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَأَنْزَلَ اللَّهُ عَلَيْكَ الْكِتَابَ

وَالْحِكْمَةَ وَعَلَّمَكَ مَا لَمْ

تَكُنْ تَعْلَمُ وَكَانَ فَضْلُ

اللَّهِ عَلَيْكَ عَظِيمًا

صَدَقَ اللَّهُ الْعَظِيمُ

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. Randa Hussein Abdallah**, Professor of Radiodiagnosis, Faculty of Medicine, Ain shams University, who gave me the chance to continue my post graduate studies.*

*Special thank to **Dr. Remon Zaher Elia**, Assitant professor of Radiodiagnosis, Faculty of Medicine, Ain shams University, for his kind supervision, illuminating discussion and adding valuable suggestions and remarks.*

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

Ibrahim Wasfy

(2018)



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.*

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ABBREVIATIONS

AJCC	American Joint Committee on Cancer.
CRC	Colorectal carcinoma.
CRT	Chemoradiotherapy.
CT	Computed tomography.
DCE-CT	Dynamic contrast-enhanced computed tomography.
FAP	Familial adenomatous polyposis coli.
MDCT	Multi detector computed tomography.
ROI	Region of interest.
UICC	Union International Contre Le Cancer.
WHO	World health organization.
MIP	Maximum intensity projection.
TTP	Time to peak

Introduction

Colorectal cancer is the third most common cause of cancer death in the western world in both males and females, with a high lifetime incidence of 5%. The prognosis of colorectal cancer - like other tumors - is staging dependent and the 5-years relative survival rate lies around 60% (*Alteri et al., 2011*).

Imaging plays an important role in the assessment of colorectal cancer, including diagnosis, staging, selection of treatment, assessment of treatment response, surveillance and investigation of suspected disease relapse (*Goh and Glynne-Jones., 2014*).

Due to optimization of surgical techniques, introduction of neoadjuvant therapies and recent developments in diagnostic imaging modalities, the mortality rate has decreased significantly by 20 % in the last years (*Kekelidze et al., 2013*).

Utilization of different imaging modalities in diagnosing colorectal cancer vary between countries and institutions. While computed tomography is a validated tool in the primary diagnosis of colorectal cancer in the United States, it is used with caution in many European countries due to radiation exposure and is thus not included as a screening modality in asymptomatic patients (*Kekelidze et al., 2013*).

Perfusion CT is an attractive technique that integrates excellent anatomic detail with assessment of vascular physiology that allows clinicians to combine functional assessment of the vasculature with anatomical assessment (*Figueiras et al., 2010*).

Aim of work

The aim of this work is to show the value of CT perfusion in diagnosis and management of colorectal cancer.

Anatomy of the Colon and Rectum

Large Intestine anatomy

The large intestine extends from the end of the ileum to the anus. It is about 1.5 meters long. It differs from the small intestine in its greater caliber, its more fixed position, its sacculated form, and in possessing certain appendages to its external coat, the appendices epiploicae. The large intestine is divided into the cecum, colon, rectum, and anal canal (*Healy and Borley, 2008*).

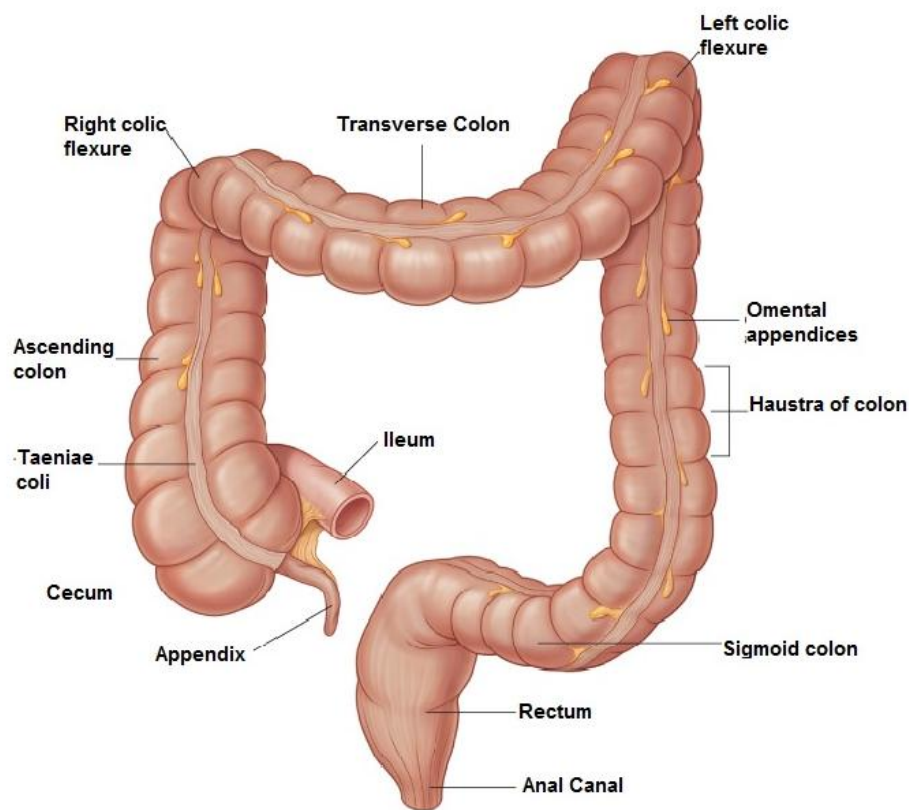


Figure (1): Large intestine (*Quoted from Drake et al. 2007*)

I-The Cecum:

It is attached to the ileum and extends approximately two and one-half inches below it. The cecum in an adult usually is adherent to the posterior wall of the peritoneal cavity and has a serosal covering on its anterior wall only. The cecum forms a blind pouch from which the appendix projects (*Healy and Borley, 2008*).

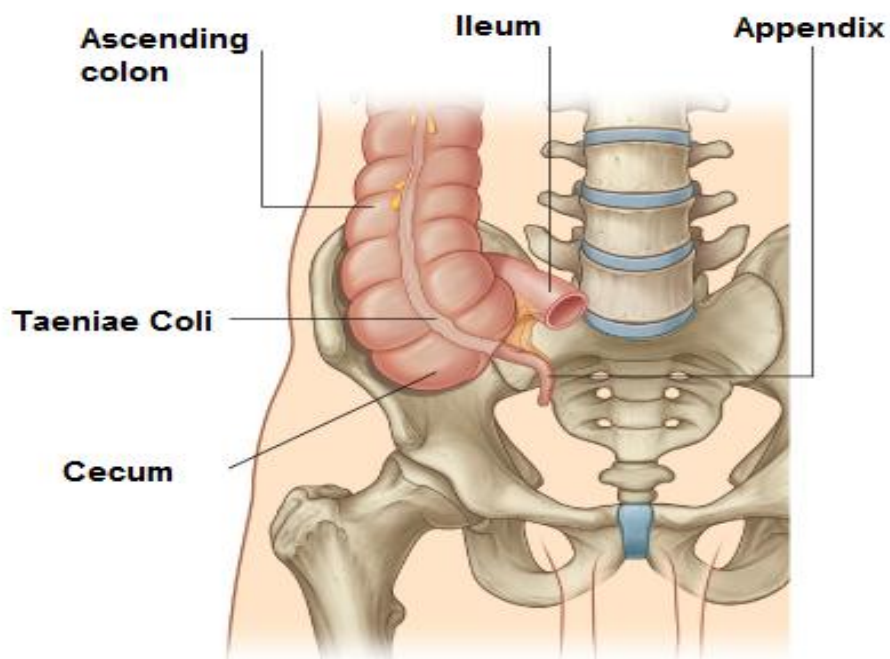


Figure (2): Cecum (*Quoted from Drake et al. 2007*)

Its size is variously estimated by different authors, but on an average it may be said to be 6.25 cm in length and 7.5 cm in width. It is situated in the right iliac fossa above the lateral half of the inguinal ligament. It rests on the iliacus & psoas major muscles, usually in contact with the anterior abdominal wall. However; the greater omentum and, if the cecum be empty, some coils of small intestine may lie in front of it (*Healy and Borley, 2008*).

II-The colon:

The colon functions as a reservoir moving its contents caudally toward the anal canal. As the intestinal contents travel distally, water and electrolytes are absorbed, and some substances are secreted into the lumen.

It is divided into four parts: the ascending colon, the transverse colon, the descending colon, and the sigmoid colon. For most of its path, the colon lies against the posterior abdominal wall, forming a frame around the loops of small intestine (*Fenoglio et al., 2008*).

□ **Ascending colon:**

It is approximately six inches long and extends upward from the ileocecal valve to the hepatic flexure. The upper portion of the ascending colon lies behind the right lobe of the liver, in front of the anterior surface of the right kidney and lies retro-peritoneally against the right posterior abdominal wall (*Cox et al., 2001*).

□ **Transverse colon:**

It is the longest segment of the large intestine. It is approximately 20 inches long, begins at the hepatic flexure and ends at the splenic flexure. It lies below the stomach and is attached to the transverse mesocolon (*Cox et al., 2001*).

It attaches to the stomach by the gastro-colic ligament and contacts the second part of the duodenum, the pancreas, and the spleen. The position of the transverse colon can vary since it is suspended by the mesocolon

and it is a very mobile part of the large intestine. The omentum is attached to its anterior surface (*Fenoglio et al., 2008*).

The left colic or splenic flexure is situated at the junction of the transverse and descending parts of the colon, in relation with the lower end of the spleen and the tail of the pancreas; the flexure is so acute that the end of the transverse colon usually lies in contact with the front of the descending colon. It lies at a higher level than, and on a plane posterior to, the right colic flexure, and is attached to the diaphragm, opposite the tenth and eleventh ribs, by a peritoneal fold, named the phrenico-colic ligament, which assists in supporting the lower end of the spleen (*Healy and Borley, 2008*).

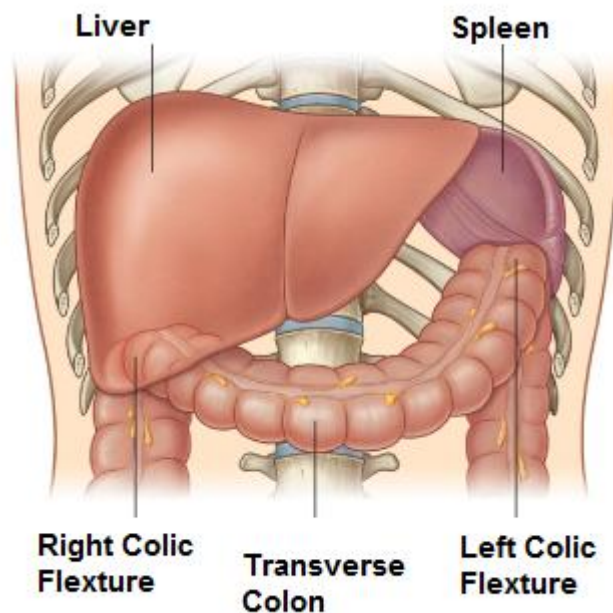


Figure (3): Transverse colon (*Quoted from Drake et al., 2007*)