SMALL INTESTINAL CAUSES OF ACUTE ABDOMEN

ESSAY

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

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2012

بسم الله الرحمن الرحيم

{قَالُواْ سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلا مَا عَلَّمْتَنَا إِنكَ أَنتَ الْعَلِيمُ الْحَكِيمُ}

صدق الله العظيم

سورة البقرةالاية (٣٢)

Abstract

Acute abdomen refers to any clinical condition characterized by severe abdominal pain that develops over a period of hours. Rapid, accurate diagnosis is essential if morbidity and mortality are to be significantly decreased. Small bowel pathologies involve a large number & a wide variety of causes of acute abdomen e.g. Small bowel obstruction, gastrointestinal perforation and small bowel ischemia.

Conventional radiography, ultrasonography (US), and helical computed tomography (CT) are frequently used in the diagnostic work-up of patients with acute abdominal pain. Magnetic resonance (MR) imaging is also available, but is used far less frequently for initial diagnostic work-up.

Keywords: Acute abdomen-small bowel-imaging methods

Acknowledgement

A word of thanks to *ALLAH*, the source of all knowledge, by whose abundant grace this work has come to fruition.

I would like to extend my deep gratitude and cordial thanks to everyone that helped, encouraged and believed in the value of this piece of work.

Foremost, I would like to express my appreciation for **Prof. Dr. Haney Ahmed Sami**, Professor of Diagnostic Radiology, Faculty of Medicine, Cairo University, for choosing this valuable topic and for his encouragement, support and kind advice that were of great value throughout the work.

I am grateful to **Prof. Dr. Omar Moawayh Osman**, Professor of Diagnostic Radiology, Faculty of Medicine, Cairo University, for his endless effort, continuous supervision and kind help.

I would like also to thank all my professors, senior staff members and my fellow colleagues for their help and cooperation throughout the conduction of this work.

I deeply thank my father and my mother for their support and encouragement to complete this work.

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List of Abbreviations

2D, 3D	Two dimensional, Three dimensional
CA	Celiac artery
CD	Crohn's disease
CE-MRA	Contrast enhanced Magnetic resonance Angiography
CT	Computed tomography
CTA	CT angiography
ED	Emergency Department
EDV	End diastolic velocity
FAME	Fast Acquisition with Multi-Phase Efgre3D
FIESTA	Fast imaging employing steady state acquisition
GIT	Gastrointestinal tract
GIST	Gastrointestinal stromal tumor
HASTE	Half fourier Acquisition Single Shot Turbo Spin Echo
IPFA	Intraperitoneal free air
IV	Intravenous contrast
MBF	Mean blood flow
MDCT	Multidetector Computed Tomography
MH	Megahertz
MI	Mesenteric ischemia
MIP	Maximum intensity projection
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
NEC	Necrotizing entercolitis
NOMI	Nonocclusive mesenteric ischemia
PC-MRA	Phase contrast Magnetic resonance Angiography
PV	Peak systolic velocity
RI	Resistive index
SBO	Small bowel obstruction
SMA	Superior mesenteric artery
TABS	Trans abdominal sonography
US	Ultrasonography

Introduction

Acute abdomen refers to any clinical condition characterized by severe abdominal pain that develops over a period of hours. Rapid, accurate diagnosis is essential if morbidity and mortality are to be significantly decreased. Small bowel pathologies involve a large number and a wide variety of causes of acute abdomen e.g. Small Bowel Obstruction which is a common cause of acute abdominal pain and includes several causes, the most common of which are adhesions followed by hernia and tumors. ***(Foster et al., 2006)***

Ischemic Bowel is present in about 1% of patients who present with acute abdominal pain***. (Levine., 1995)*** Predominant causes of intestinal ischemia include vascular occlusion or thrombosis, whether from arterial or venous disease, and hypoperfusion.

Gastrointestinal Perforation generally indicates a catastrophic complication that can result from a multitude of potential causes, including peptic ulcer disease, severe intestinal inflammation, diverticulitis, infarction, trauma, and closed-loop obstruction. Iatrogenic perforation is occasionally seen following endoscopic procedures, especially endoscopic biopsy or sphincterotomy. ***(Hainaux et al., 2006)***

Pediatric disorders of the small bowel e.g. congenital and developmental disorders which can present in the newborn or it may present later in life.

Inflammatory disorders of the small bowel which include either infectious disorders such as Meckel's diverticulitis or non infectious disorders such as Crohn's disease.

The use of different imaging modalities can change the leading diagnosis, increases diagnostic certainty, and changes potential patient management decisions.

Conventional radiography, ultrasonography (US), and helical computed tomography (CT) are frequently used in the diagnostic work-up of patients with acute abdominal pain. Magnetic resonance (MR) imaging is also available, but is used far less frequently for initial diagnostic work-up.

Conventional radiography is commonly the initial imaging examination performed in the diagnostic work-up of patients who present with acute abdominal pain to the emergency department. This examination is widely available, can be easily performed in admitted patients, and is used to exclude major illness such as bowel obstruction and perforated viscus. ***(Kellow et al., 2008)***

Ultrasonography (US) is another imaging modality commonly used in the diagnostic work-up of patients with acute abdominal pain. With ultrasound, the abdominal organs and the alimentary tract can be visualized. ***(Allemann et al., 1999)***

Helical computed tomography (CT) allows rapid, cost-effective evaluation of patients with acute abdominal pain. CT is the technique of choice for identification of the cause of acute abdominal pain. ***(Tsushima et al., 2002)***

MR imaging is not yet widely used in the diagnostic work-up of patients who present with acute abdominal pain however the high intrinsic contrast resolution in MR imaging is a major advantage, as intravenous contrast medium may not be required. ***(Stoker et al., 2008)***

Aim of the work

The aim of this study is to identify small intestinal causes of acute abdomen with the use of different imaging modalities for diagnosis & potential management decisions.

Radiological Anatomy of the Small intestine

The **small intestine** begins where the intestine assumes a mesentery at the duodenojejunal flexure and ends at the ileocecal junction. It varies in length from 3-10m, with an average length of 6m; the root of the mesentery extends from the left of L2 to the right sacroiliac joint and is only 15 cm long. The small intestine is very mobile coils in the central abdomen. The proximal two-fifth of the small intestine is called the jejunum and the distal three-fifth the ileum, although the boundary between these is not well defined. ***(Stephanie et al., 2004)***

Jejunum and ileum:

	Jejunum	**Ileum**
Diameter	Wider (3.0-3.5 cm)	Narrower (2.5 cm)
Wall thickness	Thicker	Thinner
Position	Left upper abdomen	Right lower abdomen
Valvulae Connivents	Thicker and more prominent	Thinner and less prominent
Peyer's patches	Fewer and bigger	More numerous
Arterial arcades	single	Four to five present

Table 1.Comparison between jejunum and ileum. ***(Stephanie et al., 2004)***

The ileocecal valve:

The distal ileum opens into the medial and posterior aspect of the large intestine at the junction of the cecum and the ascending colon. Two crescentic folds of mucosa and circular muscles project into the lumen, some thickening of the circular muscles of the ileum at the junction acts as a sphincter ***(Stephanie et al., 2004)***

Meckel's Diverticulum

This is a diverticulum that projects from the antimesenteric border of the lower ileum. It represents the persistent intestinal end of the vitellointestinal duct, Meckel's diverticulum is said to be 2 inches (5cm) long and situated 2 feet from the ileocecal valve. ***(Stephanie et al., 2004)***