Role of CT Enterography in the Assessment of Small Bowel Crohn's Disease

Thesis

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بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

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Rania Mohammed Abd el-Rasool

Contents

List of Abbreviations

Abbrev.	Full term
CD	: Crohn's disease
CM	: Contrast media
CT	: Computed Tomography
CTE	: Computed tomogrsphy enterography
DVT	: Deep venous thrombosis
IV	: Intra venous
MDCT	: Multi-detector Computed Tomography
MRE	: Magnetic resonance enterography
MRI	: Magnetic Resonance Imaging
MSCT	: Multi slice Computed Tomography
SBO	: Small bowel obstruction
SI	: Small intestine
SSFP	: Steady-state free precession
TSE	: Turbo Spin-Echo
VOL	: Volume
WI	: Weighted image
WT	: Weight
3D	: Three dimension

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Abstract

Background: Crohn's disease is a multifactorial chronic inflammatory disease characterized by non caseating granuloma formation with a tendency toward remission and relapse, it affects any part of the GIT from mouth to anus with 80% small bowel involvement, most commonly the terminal ileum, with characteristic multiple discontinuous sites involvement (skip lesions) and transmural inflammation. **Aim of the Work:** The purpose of this study is to highlight the value of CT in diagnosis of (CD) and its ability to assess the degree of activity and its complications. **Patients and Methods:** This prospective study was conducted on 87 patients with GIT symptoms where CTE was performed to evaluate its possible impact on accurate diagnosis, detection of complications and consequent guidance for management planning. It was performed in radiological department of Ain –Shams University hospital: CT Unit in the period from "July 2017 to April 2018. The patients' age ranged between (24 – 72 years) with a mean of 48 years. **Results:** Of the 87 patients with GIT symptoms that were highly suggestive of inflammatory bowel disease evaluated, 32 were UC, 21 were CD, 9 were other types of IBD and 25 were normal. Of the 21 CD patients evaluated, 7 were male and 14 were female. **Conclusion:** The role of MDCT in the diagnosis of Crohn's disease and its complications is undeniable, with a proven efficacy in identifying the enteric and extra-enteric manifestations of the disease. However, advancements in CT E protocol design have allowed increasing accuracy in diagnosis, and the acquisition of studies at a much lower radiation dose. **Recommendations:** Further studies on a larger scale of patients are needed to confirm the results obtained by this study.

Key words: CT enterography, small bowel, Crohn's disease

Introduction

Crohn's disease (CD) is an idiopathic chronic inflammatory disease of the gastrointestinal tract that has varying levels of severity, diverse manifestations, and an unpredictable course. It may affect any part of the gastrointestinal tract from mouth to anus. Signs and symptoms often include abdominal pain, diarrhea (which may be bloody if inflammation is severe), fever, and weight loss ***(Baumgart et al., 2012)***.

The etiology of (CD) is complex and likely multifactorial, with genetic, immunologic, infectious, microvascular, and possibly environmental and lifestyle factors contributing ***(Hertough, 2008).***

Enteric involvement tends to be segmental, and inflammation often is transmural. Superficial mucosal (aphthous) and deep linear ulcers may be present, separated by segments of uninvolved mucosa, depending on the severity and chronicity of (CD) ***(Gramlich and Petras, 2007).***

Barium small bowel follow-through (SBFT) studies and enteroclysis have been the traditional radiologic standards of reference for assessment of the small bowel. However, both techniques may fail to clearly depict extraluminal complications such as fistula and abscess formation, and both have limited

sensitivity, particularly when there are overlapping pelvic loops. In addition, there is a radiation burden with both techniques ***(Jaffe et al., 2007).***

Conventional Enteroclysis (CE):(CD) has been traditionally investigated with the use of small bowel barium enteroclysis, which detects early mucosal disease (sens. 69.6%, spec. 95.8%)as well as complications such as strictures, fistulae, and abscesses (diagnostic accuracy 80.3%) ***(Gatta Gianlucaet al., 2012).***

Computed tomography enterography (CTE) is undoubtedly a superior imaging test compared with SBFT. It is more sensitive and reproducible, can detect extraluminal complications, and is faster and better tolerated. A potential downside of CTE is that the radiation doses are higherthan SBFT. The radiation dose from a single CTE is not particularly concerning, and newer CT techniques have shown a significant decrease in radiation dose using modified protocols and reconstruction algorithms ***(Grand & Mayo-Smith, 2011).***

CT Enterography plays an invaluable role in the evaluation of acutely ill patients with (CD), particularly when there is concern for high-grade obstruction, perforation, or abscess. The combination of a short examination time, single-breath-hold scanning, and widespread availability ensures that CT will continue to play an important role in the care of these

individuals. However, CT enterography has a high radiation burden, especially in young patients, who may require multiple examinations over several years ***(Jaff et al., 2007).***

MR imaging of the small bowel combines a high-tissue-contrast examination with multiplanar interrogation of the abdomen and pelvis. There is no ionizing radiation burden, a major advantage in young patients. Furthermore, like CT enterography, MR imaging allows excellent depiction of the complications of inflammatory bowel disease ***(Wiarda et al., 2006).***

The speed of CTE is its greatest advantage over MRE. Due to short acquisition times, images are free of motion artifacts caused by normal intestinal peristalsis even without administration of antiperistaltic agents (e.g., glucagon). Clear, motion-free images allow confident assessment of hyperenhancement and bowel wall thickening, with excellent interobserver agreement.

Multi detector row CT scanners allows high spatial resolution imaging of the entire abdomen and pelvis in just a few seconds, generating isotopic images that can be reconstructed in multiple planes to facilitate visualization of subtle abnormalities. CT scans are typically informed for IBD evaluation of both oral and IV contrast to detect bowel wall abnormalities and abnormal enhancement ***(World Gastroenterol, 2016).***