The Correlation between Stool Exams and Abdominal Computed Tomography (CT) Findings in the Patients with Acute Diarrhea Visiting Emergency Department (ED)

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Purpose: Stool exams are a useful tool for the early presumptive diagnosis of infectious bacterial diarrhea in the Emergency Department (ED). CT scans are often used to increase the physician’s level of certainty and to facilitate patient triage by identifying the source of pain in most patients with an acute abdomen in the ED. This study was designed to investigate the correlation between stool exams and abdominal CT in patients with acute diarrhea visiting the ED.

Methods: We conducted a retrospective study in the emergency department of a national university hospital from January 1, 2012 to June 30, 2013. The subjects consisted of 156 patients with acute diarrhea and abdominal pain who had stool exam results and abdominal CT findings. We divided the patients into three groups according to the stool exam results. Simultaneously, we evaluated their CT findings of the bowel and adjacent structures.

Results: A total of 156 patients were enrolled. Frequency of abnormal CT findings showed statistically significant correlation with stool exams (p-value <0.001). Abnormal CT findings increased as WBCs and RBCs in stool increased (p-value <0.001).

Conclusion: The stool exam was a statistically significant predictive variable in indirectly determining the severity of acute diarrhea and it showed correlation with the frequency of abnormal CT findings. It is suggested that stool exams can be used as a susceptible marker for predicting the probability of severe infectious colitis, and for making an early decision regarding close medical attention.

Key Words: Acute diarrhea, Stool WBC, Stool RBC, Abdominal computed tomography

What is already known in the previous study

CT patterns of bowel wall thickening showed correlation with inflammatory activity. However, no studies evaluating the correlation between stool exams and computed tomography patterns in patients with acute diarrhea in the ED have been reported.

What is new in the current study

The results of this study suggest that the number of bowel lesions with abnormal CT findings increases with the number of WBCs and RBCs in stool. The stool exam was a statistically significant predictive variable for indirectly determining the severity of acute diarrhea and it showed correlation with the frequency of abnormal CT findings.

Introduction

Many patients come to the emergency department (ED) complaining of “diarrhea” when what they really have is soft stools or two stools per day compared with their usual one. Acute diarrhea is the sudden onset of an increase in the normal water content of stool. Strictly speaking, diarrhea is defined as an increased frequency of defecation, usually greater than three bowel movements per day for a daily stool weight exceeding 200 grams. Practically speaking, however, diarrhea is present when the patient is producing more stools of lesser consistency more frequently.

Although diarrhea is no longer a significant cause of mortality in the United States, it remains one of the leading causes of death worldwide. Diarrhea is thought to account for up to 5% of ED visits, more commonly in fall and winter. It is the second most common reason for work absenteeism and is estimated to cost 608 million
dollars in lost productivity per year. Patients with severe abdominal pain, fever, and diarrhea that are voluminous, purulent, or bloody may have acute infectious diarrhea associated with the following pathogens: Salmonella, Campylobacter, Shigella, Shiga toxin-producing *Escherichia coli* (*E. coli*), Yersinia, Vibrios, or *C. difficile*.

Tests specific to the ED evaluation of a patient with diarrhea include: Wright stain for fecal leukocytes; stool culture for bacteria, ova, and parasites; and stool analysis for *Clostridium difficile* toxin. When applied to a stool sample, Wright stain allows detection of fecal leukocytes. A positive Wright stain has a sensitivity of 82% and a specificity of 83% for the presence of bacterial pathogen by stool culture. DuBois et al. showed that the Wright’s stain is a useful tool for the early presumptive diagnosis of infectious bacterial diarrhea in the ED.

In the ED, CT scans are often used to increase the physician’s level of certainty and facilitate patient triage by identifying the source of pain in most patients with an acute abdomen. Computed tomography of patients with inflammatory bowel disease such as Crohn’s disease plays an important role in the accurate detection of abnormalities of the bowel as well as adjacent structures, including inflammation or fibro-fatty proliferation in the mesentery, abscess and fistulae. In patients with Crohn’s disease, CT patterns of bowel wall thickening correlated with inflammatory activity.

However, no studies have evaluated the correlation between stool exams and computed tomography patterns in patients with acute diarrhea in the ED.

The purpose of this study was to evaluate the correlation between stool exam results and CT patterns in patients with acute diarrhea at the ED.

**Materials and Methods**

This retrospective study was conducted from January 1, 2012 to June 30, 2013 at the ED of a national university hospital with annual census of 35,000.

The subjects enrolled in this study consisted of 156 patients with acute diarrhea and abdominal pain who had stool exam results and abdominal CT findings. After all the treatments were completed, we divided the patients into 3 groups according to stool exam results. Those groups are patients whose WBC and RBC counts are negative, whose WBC and RBC counts are less than 50/high power field (HPF), and whose WBC and RBC counts are more than 50/HPF. Simultaneously, we evaluated their CT findings of the bowel and adjacent structures. We defined stool exam result negative when stool WBC and RBC counts were below 5, and considered CT findings positive when the bowel wall thickness was more than 5 mm.

![CT scans](image)

**Fig. 1. Abdominal computed tomography.** Computed tomography (CT) shows edematous wall thickening of bowels. (A) Small bowel. (B) Ascending colon. (C) Transverse colon. (D) Descending colon. (E) Entire colon.