

DETERMINATION OF CASES OF MESENTERIC ISCHAEMIA WITH MULTI- DETECTOR CONE BEAM TOMOGRAPHY

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Abstract

Background: To assess the cases of mesenteric ischemia with multi-detector cone beam tomography (MDCT). **Materials and Methods:** Eighty- five cases of mesenteric ischemia of both genders underwent MDCT examination using 128 detector rows Siemens definition AS scanner. Image acquisition parameters set were 5-mm reconstruction thickness and 5-mm intervals through the abdomen and pelvis. MDCT findings were recorded. **Result:** Out of 85 patients, males comprise 52 (61.1%) and females 33 (38.9%). Nature of mesenteric ischemia was acute in 46 (54.1%) and chronic in 39 (45.9%). The difference was non- significant ($P < 0.05$). Appearance of mesenteric ischemia on MDCT was bowel wall thickening in 34 (40%), bowel distention in 25 (29.4%) and pneumatosis in 8 (9.4%) cases and SMA dissection in 19 (22.2%) patients. The difference was significant ($P < 0.05$). **Conclusion:** Multi-detector CT is the reliable diagnostic aid for acute mesenteric ischemia. Multi-detector cone beam tomography is useful in making a prompt, more precise diagnosis of mesenteric ischaemia, as well as identifying the cause and potential complications.

INTRODUCTION

Acute intestinal ischemia is an abdominal emergency occurring in nearly 1% of patients presenting with acute abdomen. The causes can be occlusive or non-occlusive.^[1] Early diagnosis is important to improve survival rates. In most cases of late or missed diagnosis, the mortality rate from intestinal infarction is very high, with a reported value ranging from 60% to 90%.^[2]

Mesenteric ischemia can be chronic or acute at clinical manifestation. Chronic mesenteric ischemia is relatively rare and is considered imminent AMI is most commonly caused by atherosclerotic stenosis or occlusion of two or more major visceral arteries.^[3] Single arterial occlusion usually does not cause symptoms because of rich mesenteric collaterals that develop during the slow progression of the disease. Typically, patients over 60 years of age with female predominance present with characteristic symptoms that include postprandial abdominal pain (abdominal angina) and weight loss.^[4]

Multi-detector cone beam tomography (MDCT) technology has raised the performance of CT scan which acquires rapid volumetric data over a large anatomic volume. This allows retrospective multiplanar reformatted images and CT angiograms with 2-D and 3-D visualization.⁵ Considering this,

the present study was conducted to assess the cases of mesenteric ischemia with multi-detector cone beam tomography (MDCT).

MATERIALS AND METHODS

A sum total of eighty- five cases of mesenteric ischemia of both genders were included in this prospective, observational study. Ethical clearance was approved from institutional ethical committee. All enrolled patients were informed regarding the study and written consent was taken.

Demographic data of each patient was entered in case sheet form. A thorough clinical examination was performed. All patients underwent MDCT examination after explaining the procedure to the patients using 128 detector rows Siemens definition AS scanner. Image acquisition parameters set were 5-mm reconstruction thickness and 5-mm intervals through the abdomen and pelvis. CT signs of bowel obstruction and segmental ischemia included subjective presence of circumferential bowel wall thickening, presence of submucosal edema with a visible target or halo sign, presence of any intramural gas and extra-alimentary air etc. Results were subjected to statistical analysis using Mann Whitney U test. SPSS version 21.0 was used for analysis. P value less than 0.05 was considered significant.

RESULTS

Out of 85 patients, males comprise 52 (61.1%) and females 33 (38.9%) [Table 1].

Nature of mesenteric ischemia was acute in 46 (54.1%) and chronic in 39 (45.9%). The difference was non-significant ($P < 0.05$) [Table 2, Figure 1].

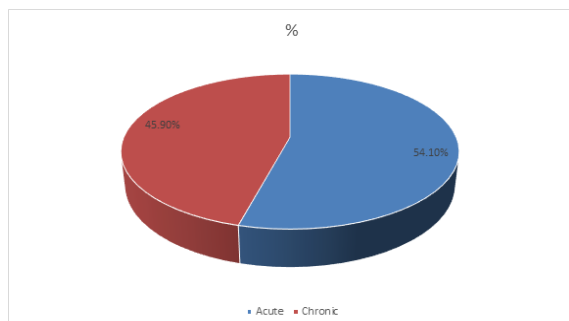


Figure 1: Nature of mesenteric ischemia

Appearance of mesenteric ischemia on MDCT was bowel wall thickening in 34 (40%), bowel distention in 25 (29.4%) and pneumatosis in 8 (9.4%) cases and SMA dissection in 19 (22.2%) patients. The difference was significant ($P < 0.05$) [Table 3, Figure 2]

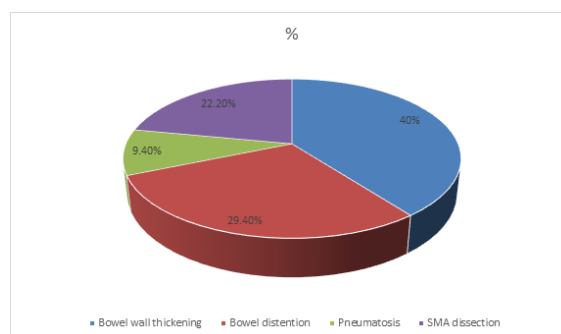


Figure 2: Appearance of mesenteric ischemia on MDCT

Table 1: Patient distribution

Total- 85		
Gender	Males	Females
Number	52 (61.1%)	33 (38.9%)

Table 2: Nature of mesenteric ischemia

Nature	Number (%)	P value
Acute	46 (54.1%)	0.94
Chronic	39 (45.9%)	

Table 3: Appearance of mesenteric ischemia on MDCT

MDCT appearance	Number (%)	P value
Bowel wall thickening	34 (40%)	0.05
Bowel distention	25 (29.4%)	
Pneumatosis	8 (9.4%)	
SMA dissection	19 (22.2%)	

DISCUSSION

Acute mesenteric ischemia is a life-threatening condition, with a reported mortality rate of 50–90%, that requires early diagnosis and treatment. It is estimated that nearly 1% of patients presenting with acute abdomen have ischemic intestinal disease involving the small bowel or colon.^[7] Bowel ischemia is considered a potentially transient and reversible event; however, it may lead to intestinal infarction that requires surgical or interventional management. For this reason, early diagnosis is important to improve survival rates.^[8] In most cases of late or missed diagnosis, the mortality rate from intestinal infarction is very high, with a reported value ranging from 60% to 90%. The high mortality rate associated with AMI is largely due to the difficulty of early detection and subsequent delays in appropriate management.^[9] Generally, severe, constant, diffuse, or periumbilical abdominal pain out of proportion to the physical examination creates a high index of clinical suspicion for AMI. However, the symptoms are often nonspecific, and the initial manifestation mimics that of acute

abdomen owing to other causes in 20%–25% of cases.^[10] The present study was conducted to assess the cases of mesenteric ischemia with multi-detector cone beam tomography (MDCT).

Our results demonstrated that out of 85 patients, males comprise 52 (61.1%) and females 33 (38.9%). Amlendu et al,^[11] studied 37 cases of mesenteric ischaemia and observed that common findings of acute mesenteric ischaemia were bowel wall thickening in 80%, bowel distention in 53.3% and altered bowel wall enhancement in 46.6% while other findings SMA dissection, pneumatosis and pneumoporta were 33.3%. Common findings of chronic mesenteric ischaemia were blocked SMA and collaterals filling post-block SMA (100%), stenosis of superior mesenteric artery (77.3%), stenosis of IMA (54.5%), and stenosis of celiac trunk (31.8%).

It was observed that nature of mesenteric ischemia was acute in 46 (54.1%) and chronic in 39 (45.9%). Shih et al,^[12] in their study found that the most prevalent CT findings were related to bowel wall, including thickening, distention and hyper-enhancement. Thickening of the bowel wall is the

most frequent CT finding pertaining to AMI. This finding was observed in 7 of 9 patients diagnosed with acute mesenteric ischemia. Distension was found in 55% of the cases. The bowel wall can appear with low attenuation due to swelling and inflammation or with high attenuation due to bleeding in the submucosa.

Our results revealed that appearance of mesenteric ischemia on MDCT was bowel wall thickening in 34 (40%), bowel distention in 25 (29.4%) and pneumatosis in 8 (9.4%) cases and SMA dissection in 19 (22.2%) patients. Jena et al,^[13] revealed that MDCT shows SMA dissection in 14 patients, bowel wall thickening in 31, bowel distention in 10 and pneumatosis in 5 cases.

The prognosis for patients with AMI depends on the time to diagnosis and initiation of management. The mortality rate ranges from 0% to 10% with immediate management, increases to 50%–60% with a treatment delay of 6–12 hours, and increases further to 80%–100% with a delay of more than 24 hours after symptom onset.^[14] Multi-detector CT is the most sensitive and specific diagnostic tool for AMI and should be used as the first-line imaging modality when AMI is suspected. Findings at multi-detector CT can also help exclude other causes of acute abdominal pain. CT images should be obtained from the dome of the liver to the level of the perineum to cover the entire course of the intestine.^[15] Acquisition of both non-contrast material-enhanced and biphasic contrast-enhanced CT images is necessary. Therefore, routine abdominal imaging should be performed with multi-detector CT to obtain contrast-enhanced CT volume data in the arterial and venous phases, with dynamic injection of contrast material by a power injector after non-enhanced imaging is performed.^[16] These advantages are helpful in identifying the site, level and cause of bowel ischaemia by showing abnormal segments of bowel, mesentery and vessels.^[17]

CONCLUSION

Multi-detector CT is the reliable diagnostic aid for acute mesenteric ischemia. Multi-detector cone beam tomography is useful in making a prompt, more precise diagnosis of mesenteric ischaemia, as well as identifying the cause and potential complications.

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