

## ORIGINAL ARTICLE

### THE ROLE OF MULTIDETECTOR CONE BEAM TOMOGRAPHY IN DIAGNOSIS THE CASES OF MESENTERIC ISCHAEMIA

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#### ABSTRACT:

**Introduction-** Acute and chronic mesenteric ischaemia remains a complex disease entity characterized by perfusion abnormality to the GI tract. The present study was conducted to analyze the cases of mesenteric ischemia with multidetector cone beam tomography (MDCT). **Materials & Methods:** The present study was conducted on 24 cases of mesenteric ischemia. General information such as name, age, gender etc. was recorded. All these patients had undergone MDCT Examination on 128 detector rows Siemens definition AS scanner. **Results-** Out of 24 patients, males were 15 and females were 9. The difference was significant (P- 0.01). 10 were acute and 14 were chronic patients. The difference was non- significant (P- 0.5). MDCT shows bowel wall thickening in males (14) and females (13), bowel distention in males (7) and females (6), SMA dissection in males (8) and females (7) and pneumatosis in males (6) and females (7). The difference was non- significant (P> 0.05). Other findings were SMA thrombosis in males (3) and females (2) and pneumoporta in males (5) and females (8). The difference was non- significant (P> 0.05). **Conclusion-** MDCT offers as a self-comprehensive imaging modality of choice for mesenteric ischaemia with excellent evaluation of vascular structures, bowel wall and adjacent mesentery and also demonstrates possible primary cause of mesenteric ischaemia.

**Key words-** Mesenteric ischaemia, MDCT, Pneumoporta.

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**This article may be cited as:** Gupta S. The Role of Multidetector Cone Beam Tomography in Diagnosis the Cases Of Mesenteric Ischaemia. J Adv Med Dent Scie Res 2014;2(4):181-183.

#### INTRODUCTION

Mesenteric ischemia is caused by a reduction in blood flow for intestinal circulation of sufficient magnitude to compromise the viability of the affected portion. The disease can be classified into acute and chronic, based upon the rapidity and the degree to which blood flow is compromised and the duration of the symptoms. Acute and chronic mesenteric ischaemia remains a complex disease entity characterized by perfusion abnormality to the GI tract. Because it presents with nonspecific symptoms and laboratory findings, mesenteric ischaemia remains a clinical diagnostic challenge.<sup>1</sup>

It can be caused by thromboembolism, bowel obstruction, abdominal inflammatory disease and trauma. A hyper active stage occurs first, in which the primary symptoms are severe abdominal pain and the passage of bloody stools. Many patients get better and do not progress beyond this phase. A paralytic phase can follow if ischemia continues; in this phase, the abdominal pain becomes more widespread, the belly becomes more tender to the touch, and bowel motility decreases, resulting in abdominal bloating, no further bloody stools, and absent bowel sounds on exam.<sup>2</sup>

Multidetector cone beam tomography (MDCT) technology has dramatically improved 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. These advantages are helpful in identifying the site, level and cause of bowel ischaemia by showing abnormal segments of bowel, mesentery and vessels. In addition, other pathological conditions can also be detected in patients suspected of mesenteric ischaemia.<sup>3</sup> The present study was conducted to analyze the cases of mesenteric ischemia with MDCT.

#### MATERIALS & METHODS

The present study was conducted in the department of Radio- diagnosis. It consists of 24 cases of mesenteric ischemia diagnosed in the department with MDCT. All were informed regarding the study and written consent was taken. General information such as name, age, gender etc. was recorded. All these patients had undergone MDCT Examination on 128 detector rows Siemens definition AS scanner. CT images were obtained from the dome of the liver to the level of the perineum to cover the entire course of the intestine. With MDCT scanners, a collimation of 0.625 mm and a detector pitch of 1.0–2.0 were used. Sagittal images were obtained for assessing the origin of the mesenteric arteries and their variation. Results were subjected to statistical analysis. P value less than 0.05 was considered significant.

**RESULTS**

**Table I** Distribution of patients

Total- 24		
Males	Females	P value
15	9	0.01

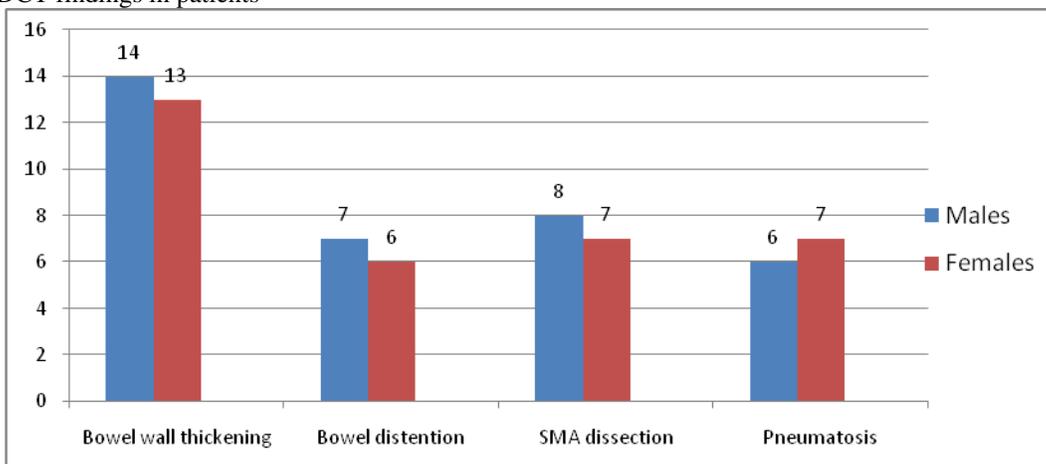
Table I shows that out of 24 patients, males were 15 and females were 9. The difference was significant (P- 0.01).

**Table II** Nature of disease

Acute	Chronic	P value
10	14	0.5

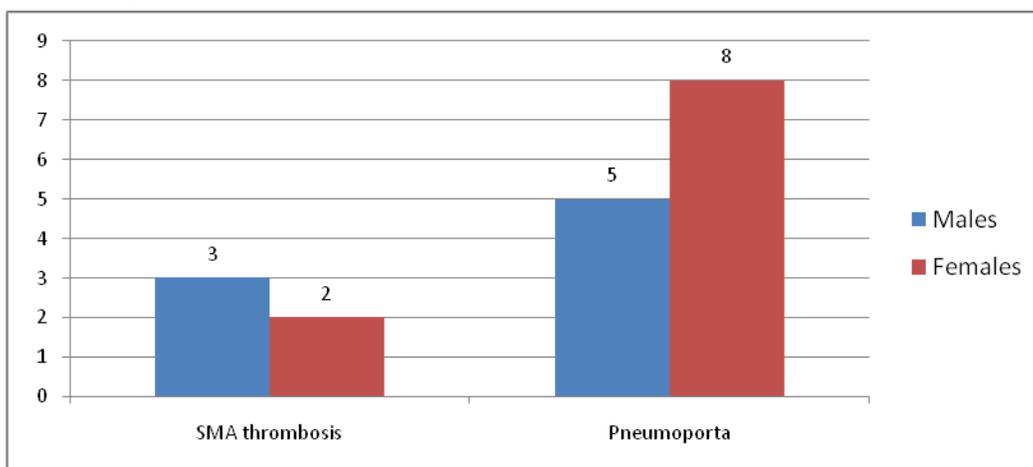
Table II shows that 10 were acute and 14 were chronic patients. The difference was non- significant (P- 0.5).

**Graph I** MDCT findings in patients



Graph I shows that MDCT shows bowel wall thickening in males (14) and females (13), bowel distention in males (7) and females (6), SMA dissection in males (8) and females (7) and pneumatosis in males (6) and females (7). The difference was non- significant (P> 0.05).

**Graph II** MDCT findings



Graph II shows that MDCT shows SMA thrombosis in males (3) and females (2) and pneumoporta in males (5) and females (8). The difference was non- significant (P> 0.05).

## DISCUSSION

A number of devices have been used to assess the sufficiency of oxygen delivery to the colon. The earliest devices were based on tonometry, and required time to equilibrate and estimate the pH, roughly an estimate of local CO<sub>2</sub> levels. The first device approved by the U.S. FDA used visible light spectroscopy to analyze capillary oxygen levels. Use during aortic aneurysm repair detected when colon oxygen levels fell below sustainable levels, allowing real-time repair. In several studies, specificity has been 83% for chronic mesenteric ischemia and 90% or higher for acute colonic ischemia, with a sensitivity of 71%-92%.<sup>4</sup>

In our study, out of 24 cases, males were 15 and females were 9. We observed that 10 were acute cases and 14 were chronic. This is similar to the study by Shih et al.<sup>5</sup> Thrombosis of the SMA is usually associated with pre-existing chronic atherosclerotic disease leading to stenosis. Many of these patients have a history consistent with chronic mesenteric ischemia (CMI), including postprandial pain, weight loss, or "food fear", and thus a systematic history is important when evaluating a patient suspected to have AMI.

Thrombosis usually occurs at the origin of visceral arteries, moreover, an underlying plaque in the SMA usually progresses to a critical stenosis over years resulting in collateral beds. Accordingly, symptomatic SMA thrombosis most often accompanies celiac occlusion. SMA thrombosis may also occur due to vasculitis, mesenteric dissection, or a mycotic aneurysm. Involvement of the ileocolic artery will result in necrosis of the proximal colon.<sup>6</sup>

In our study, MDCT showed bowel wall thickening, bowel distention, SMA dissection, pneumatosis, SMA thrombosis and pneumoporta. This is similar to Rha et al.<sup>7</sup> A study by Amlendu<sup>8</sup> retrospectively reviewed 37 cases of mesenteric ischaemia which were diagnosed by MDCT scan during 27 months and were further sent for surgery and or DSA and clinical followup. These patients were further grouped to acute and chronic depending on stenosis/status of mesenteric vessels, bowel wall changes and collateral pathways, and CT findings were correlated with surgical/DSA findings/followup. Common findings of acute mesenteric ischaemia were bowel wall thickening (80 %), bowel distention (53.3 %) and altered bowel wall enhancement (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%).

**Source of support:** Nil

**Conflict of interest:** None declared

Delay in diagnosis is the dominant factor that accounts for continued mortality rates as high as 30–70% despite vast clinical experience and recognition of this entity. The multi-detector CTA has supplanted formal angiography as the diagnostic study of choice. Multidetector computed tomography (MDCT) scanners are essential for the early diagnosis of AMI, but often require specialized personnel to perform and interpret the findings. 3D reconstruction is frequently helpful.<sup>9</sup> Volume rendering as in this image is now a semiautomatic workflow component of many CT machines.

## CONCLUSION

MDCT offers as a self-comprehensive imaging modality of choice for mesenteric ischaemia with excellent evaluation of vascular structures, bowel wall and adjacent mesentery and also demonstrates possible primary cause of mesenteric ischaemia.

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