ORIGINAL RESEARCH

Computed Tomography in the Diagnosis of Subacute Intestinal Obstruction

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ABSTRACT

Background and Aim: Bowel obstruction arises when the typical passage of intraluminal contents is disrupted. Obstruction may be classified as functional or mechanical in nature. Currently, CT is regarded as the most effective imaging modality for identifying the cause of intestinal obstruction. The indications for CT utilization in patients with Sub-Acute Intestinal Obstruction (SAIO) remain inadequately defined. The objectives of this study are to examine the role of CT in diagnosing patients with suspected subacute intestinal obstruction (SAIO), to identify the site and cause of the obstruction, and to diagnose complications associated with the obstruction. Materials and Methods: This research was carried out at the Department of Radiodiagnosis, Tertiary Care Institute of India. This study included a total of 22 patients with SAIO who exhibited equivocal findings on ultrasound. A comprehensive clinical evaluation of the patients was conducted. An erect abdominal plain x-ray and abdominopelvic ultrasound were conducted prior to the CT scan. CT scans were conducted using a GE Lightspeed VCT 64-slice scanner, with acquisitions in the pre-contrast and portovenous phases at 60 seconds post intravenous contrast administration. Results: The patients in the study ranged in age from 14 to 76 years. Among the 22 patients, there were 12 males and 10 females. All 22 patients exhibited obstruction on CT scan, with 19 patients presenting mechanical obstruction and 3 patients demonstrating pseudo obstruction secondary to appendicitis and jejunal perforation. The predominant cause of SAIO was ileal stricture, accounting for 38%, followed by intussusceptions at 23%. Conclusion: CT is effective in differentiating mechanical obstruction from paralytic ileus and frequently identifies the underlying cause of obstruction as well as complications such as strangulation and perforation.

Key Words: Kutch, Ileus, Subacute intestinal obstruction, Perforation.

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INTRODUCTION

Intestinal obstruction is a prevalent clinical condition typically identified through clinical signs and patient history. Intestinal obstruction refers to either a mechanical or functional blockage of the intestines that hinders the normal transit of digestive products.¹ Intestinal obstruction represents the predominant surgical condition affecting the small intestine.^{2,3} Despite the understanding of intestinal obstruction originating in the third to fourth century BC, it continues to be a significant cause of morbidity and mortality in surgical practice. The diagnosis of intestinal obstruction is typically apparent following a comprehensive clinical examination and plain radiography.⁴ However, it can present challenges, particularly in patients exhibiting SAIO with milder, intermittent characteristics that may lead to diagnostic delays. Subacute intestinal obstruction continues to present both diagnostic and therapeutic challenges.⁵⁻⁷

The initial imaging technique employed for patients with bowel obstruction is conventional radiography,

which demonstrates an accuracy of 46-80% in identifying the presence of obstruction. The subsequent procedure for patients exhibiting indeterminate radiographic findings involves radiography utilizing intraluminal contrast material injection. Its administration is contraindicated in patients exhibiting significantly reduced intestinal peristalsis.8 Ultrasonography indicates bowel obstruction when a dilated loop exceeds 2.5 cm in diameter and the segment length surpasses 10 cm. When combined with clinical features, plain radiography can yield conclusive results in 46-80% of cases. Ultrasound serves primarily as a supplementary tool to plain radiography. In ambiguous cases, CT has proven to be highly beneficial. A small bowel diameter exceeding 2.5 cm on CT scan suggests the presence of obstruction. CT offers distinct advantages in identifying the precise level and cause of obstruction.9 Currently, CT is regarded as the most effective imaging modality for identifying the cause of intestinal obstruction. The indications for CT use in

patients with SAIO remain inadequately defined.¹⁰ A prospective study was conducted to evaluate the role of CT in diagnosing patients with suspected subacute bowel obstruction when clinical, plain radiographic, and ultrasound findings were insufficient for confident therapeutic decisions.

The objectives of this study are to examine the role of CT in diagnosing patients with suspected subacute intestinal obstruction (SAIO), to identify the site and cause of the obstruction, and to diagnose complications associated with the obstruction.

MATERIALS AND METHODS

This research was carried out at the Department of Radiodiagnosis, Tertiary Care Institute of India. This study included a total of 22 patients with SAIO who exhibited equivocal findings on ultrasound.

Inclusion Criteria

All patients presenting to surgery Out Patient Department or casualty with the following features of Sub-Acute Intestinal Obstruction (SAIO) were included in the study:

- 1. Patients who had no substantial evidence of intestinal obstruction following sonographic and radiological evaluation
- 2. Patients with Intermittent/recurrent symptoms.

Exclusion Criteria

- 1. Patients with severe systemic disease
- 2. Pregnant patients.

Patients presenting to the Emergency and Out-Patient Department with signs of intestinal obstruction were screened to identify those with SAIO. A comprehensive clinical evaluation of the patients was conducted. An erect abdominal plain x-ray and abdominopelvic ultrasound were conducted prior to the CT scan.

Imaging protocol:

CT scans were conducted using a GE Lightspeed VCT 64-slice scanner, with acquisitions in the precontrast and portovenous phases at 60 seconds post intravenous contrast administration. Oral liquid contrast agent. A 30 ml solution of sodium diatrizoate was diluted in 1000 ml of water and administered over a period of 45 minutes prior to the scan.

Helical scanning was conducted at 120 kVp and 240 mA. A large field of view was utilized, scanning from the diaphragm to below the symphysis pubis with a helical speed of 0.6 seconds, slice thickness of 5 mm, and an interval of 5 mm. These parameters were employed to reconstruct axial images with a thickness of 0.625 mm, as well as coronal and sagittal images.

RESULTS

We examined 22 patients with subacute intestinal obstruction who presented with ambiguous findings on plain radiography and ultrasound. Participants underwent CT scans, and the findings of our study are as follows: The age of the patients in the study ranges from 14 to 76 years. Among the 22 patients, there were 12 males and 10 females. In the CT scan analysis, all 22 patients exhibited obstruction, with 19 cases identified as mechanical obstruction and 3 cases classified as pseudo obstruction resulting from appendicitis and jejunal perforation. In Table 3, it is noted that CT diagnoses for 20 of the 22 patients who underwent surgery and biopsy were confirmed to be accurate based on intraoperative findings. Two patients were accurately diagnosed with strangulation due to superior mesenteric vein thrombosis and ileal gangrene, as confirmed intraoperatively.

The relationship between the operative findings and the CT scan findings was analyzed. The CT scan accurately identified intestinal obstruction and its underlying cause in 20 of 22 patients. The most prevalent cause of SAIO was ileal stricture, accounting for 38%, followed by intussusceptions at 23%.

 Table 1: Age wise distribution of study participants

Age in years	Number	Percentage (%)
10-30	9	40.9
40-60	7	31.8
Above 60	6	27.2
Total	22	100

Table 2: Gender wise distribution of study participants

Gender	Number	Percentage (%)
Male	12	54.5
Female	10	45.4
Total	22	100

Table 3: Etiology of obstruction among study participants

Cause of obstruction	Number	Percentage (%)
Stricture	8	36.3
Intussusception	6	27.2
Bowel wall thickening	3	13.6
Appendicitis	2	9

SMV thrombosis with ileal gangrene	1	4.5
Jejunal perforation	2	9
Total	22	100

DISCUSSION

SAIO has been characterized in various ways, typically indicating incomplete and intermittent obstruction.¹¹ This condition is defined by the persistent expulsion of flatus and/or feces for more than 6 to 12 hours. Following the onset of symptoms, including colicky abdominal pain, vomiting, and abdominal distension.³

Intestinal obstruction may occur in either the small intestine or the large intestine.

Small bowel obstruction causes can be classified into three categories:

- 1. Obstruction resulting from extraluminal factors including adhesions, hernias, carcinomas, and abscesses.
- 2. Intrinsic obstruction of the bowel wall.
- Intraluminal obstruction

Large bowel obstruction is categorized into dynamic (mechanical) and adynamic (pseudo-obstruction) types. Mechanical obstruction is defined as the blockage of the large bowel. Miscellaneous causes such as intussusception, endometriosis, and radiation enteropathy are significant contributors to bowel obstruction.⁶

The utility of CT scans in the diagnosis and management of patients with SAIO is established and corroborated by our study findings, which indicate a 93% correlation between CT diagnoses and final operative diagnoses.

The ages of the patients in the study range from 14 to 76 years. Among the 22 patients, there were 12 males and 10 females. Randen V et al. conducted a prospective trial involving 1,021 patients between March 2005 and November 2006. The cohort comprised 55% females, with a mean age of 47 years (range, 19-94 years).¹² In 117 out of 1021 patients. Achiek MM et al. conducted a study involving 105 adult patients, comprising 65 males and 40 females.^{13,14}The mean age for Juba patients is 46 years, with an age range of 22 to 75 years. In contrast, the mean age for KCH, London, is 64 years, with an age range of 21 to 95 years.

Amit Ojha et al. conducted a study to assess the role of investigations in the diagnosis and management of SAIO. The study concluded that CT scans are highly effective in diagnosing SAIO. We compared our study findings with theirs.

The study confirmed the high sensitivity of CT scans in diagnosing SAIO and establishing its etiology. Mallo RD et al. conducted a systematic review that yielded similar results.¹⁵ This review aims to evaluate the diagnostic efficacy of computed tomography (CT) in the assessment of bowel ischemia and complete obstruction in cases of small bowel obstruction (SBO). A MEDLINE search conducted from 1966 to 2004 identified 15 studies focused on the CT diagnosis of ischemia and complete obstruction in small bowel obstruction (SBO). Ischemia was characterized by operative findings, while complete obstruction was identified through enteroclysis or operative findings. Sensitivity, specificity, and positive and negative predictive values (PPV and NPV) were aggregated and calculated. Out of 15 studies, 11 reported on the CT diagnosis of ischemia in small bowel obstruction, involving a total of 743 patients.

CONCLUSION

The study's findings indicate that CT is an effective diagnostic tool for patients experiencing subacute intestinal obstruction, demonstrating high sensitivity. This serves as a problem-solving instrument in situations. ambiguous CT is effective in differentiating mechanical obstruction from paralytic ileus and frequently identifies the underlying cause of obstruction as well as complications such as strangulation and perforation. CT findings guide surgical management in a substantial number of patients.

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