

# Role of Computed Tomography Scan in the Assessment of Subacute Intestinal Obstruction at Bhuj, Kutch: A Prospective Study

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## Abstract

**Background:** Bowel obstruction occurs when the normal flow of intraluminal contents is interrupted. Obstruction can be functional or due to a mechanical obstruction. Now a day's CT is considered to be the most efficacious imaging technique for determining the cause of intestinal obstruction. However, the indications for the use of CT in patients with Sub-Acute Intestinal Obstruction (SAIO) have not been fully defined. Objectives of the present study are to study the role of CT in Diagnosis of patients with suspected subacute intestinal obstruction (SAIO), to find out site & cause of obstruction and to diagnose complications of obstruction. **Subjects and Methods:** This study was conducted at Department of Radiodiagnosis, Gujarat Adani institute of Medcial Science, Bhuj, Kutch, Gujarat. Total number of 22 patients with SAIO having equivocal findings on USG was included in this study. Detailed clinical evaluation of the patients was done. Plain x-ray of abdomen in erect posture & abdominopelvic ultrasound were performed before CT scan. CT scans were performed on a GE lightspeed VCT 64 slice scanner and acquired in precontrast & portovenous phase at 60sec after i.v. contrast administration. **Results:** Age of the patients in the study range between 14 to 76 years. Out of 22 were 12 male & 10 female patients. On CT scan all 22 patients were found to have obstruction with 19 patients having mechanical obstruction & 3 patients having pseudo obstruction secondary to appendicitis, jejunal perforation. Most common cause of SAIO was ileal stricture 38% followed by intussusceptions 23%. **Conclusion:** CT is not only useful in distinguishing mechanical obstruction from paralytic ileus but also it often establishes the cause of obstruction & presence of complications like strangulation & perforation.

**Keywords:** Kutch, Ileus, Subacute intestinal obstruction, Perforation

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## Introduction

Intestinal obstruction is a common clinical abnormality that is usually suspected on the basis of clinical signs and patient history. Intestinal obstruction is defined as mechanical or functional obstruction of the intestines which prevents the normal passage of the products of digestion.<sup>[1]</sup> Intestinal obstruction is the most common surgical disorder of the small intestine.<sup>[2,3]</sup> Though the knowledge of intestinal obstruction dates back to third to fourth century BC, it still remains important cause of morbidity and mortality in the surgical practice. The diagnosis of intestinal obstruction is often immediately evident after thorough clinical examination & plain radiography.<sup>[4]</sup> But at times it poses a difficulty especially in patients presenting as SAIO with less severe, intermittent features that cause delay in diagnosis. So subacute intestinal obstruction remains a diagnostic & therapeutic problem.<sup>[5-7]</sup>

The first imaging procedure used in patients with bowel obstruction is conventional radiography with 46-80% accuracy in determining the presence of obstruction. The next step in patients with indeterminate radiographic findings is radiography with intraluminal injection of contrast material. Its use should be avoided in patients with markedly diminished intestinal peristalsis.<sup>[8]</sup> On ultrasonography, bowel obstruction is considered to be present when dilated loop measures >2.5 cm and length of segment is >10 cm. Coupled with clinical features, plain radiography can lead to conclusion in 46- 80% cases. Ultrasound plays only adjunctive role to plain radiography. In such equivocal cases CT has been found to be very useful. On CT scan, small bowel diameter of more than 2.5cm is indicative of obstruction. CT has particular advantage to detect exact level & cause of obstruction.<sup>[9]</sup> Now a day's CT is considered to be the most efficacious imaging technique for determining the cause of intestinal obstruction. However, the indications for the use of CT in patients with SAIO have not been

fully defined.<sup>[10]</sup> Accordingly, prospective study was done to determine the role of CT in the diagnosis of patients with suspected subacute bowel obstruction in whom confident decisions of therapy could not be made on the basis of clinical, plain radiographic & ultrasound findings.

Objectives of the present study are: To study the role of CT in diagnosis of patients with suspected subacute intestinal obstruction (SAIO), to find out site & cause of obstruction and to diagnose complications of obstruction.

### Subjects and Methods

This study was conducted at Department of Radiodiagnosis, Gujarat Adani institute of Medical Science, Bhuj, Kutch, Gujarat. Total number of 22 patients with SAIO having equivocal findings on USG was included in this study.

#### 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:

Patients who had no substantial evidence of intestinal obstruction following sonographic and radiological evaluation

Patients with Intermittent/recurrent symptoms

#### Exclusion Criteria

Patients with severe systemic disease

Pregnant patients

All patients presenting to the Emergency and Out-Patient Department with features of intestinal obstruction were screened to identify the patients with SAIO. Detailed clinical evaluation of the patients was done. Plain x-ray of abdomen in erect posture & abdomenopelvic ultrasound were performed before CT scan.

#### Imaging Protocol

CT scans were performed on a GE light speed VCT 64 slice scanner and acquired in pre contrast & portovenous phase at 60sec after i.v. contrast administration. Oral contrast agent liq. Sodium diatrizoate 30ml diluted in 1000 ml of water was given over 45 minute sprior to scan.

Helical scanning was performed at 120 kVp & 240 mA. Large FOV was used with scanning from diaphragm to beneath the symphysis pubis with helical speed 0.6sec, slice thickness 5mm, interval 5mm which were used reconstruct 0.625mm thickness axial & also coronal, sagittal images.

### Results

We studied 22 patients of subacute intestinal obstruction with equivocal findings on plain radiography & ultrasound. They

**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 ilealgangrene	1	4.5
Jejunal perforation	2	9
Total	22	100

were subjected to CT scan & our study findings are as follows: Age of the patients in the study range between 14 to 76 years. Out of 22 were 12 male & 10 female patients. [Table 1,2] On CT scan all 22 patients were found to have obstruction with 19 patients having mechanical obstruction & 3 patients having pseudo obstruction secondary to appendicitis, jejunal perforation. [Table 3] CT diagnoses of 20 out of 22 patients who underwent surgery & biopsy were found to be correct on intraoperative findings. 2 patients were correctly diagnosed of strangulation with SMV thrombosis & ileal gangrene which was confirmed intraoperatively.

The concordance between the operative findings and the CT scan findings was examined. CT scan correctly diagnosed intestinal obstruction with its cause in 20 out of 22 patients. Most common cause of SAIO was ileal stricture 38% followed by intussusceptions 23%.

### Discussion

SAIO has been defined in many ways and characteristically it suggests incomplete & intermittent obstruction.<sup>[11]</sup> It is

characterized by continued passage of flatus and/or feces beyond 6-12 hrs. After onset of symptoms namely colicky abdominal pain, vomiting, and abdominal distension.<sup>[3]</sup>

The intestinal obstruction can be of small intestine or large intestine.

The causes of a small bowel obstruction can be divided into three categories:

Obstruction arising from extraluminal causes such as adhesions, hernias, carcinomas, and abscesses Obstruction intrinsic to the bowel wall

Large bowel obstruction can be classified as dynamic (mechanical) or adynamic (pseudo-obstruction). Mechanical obstruction is characterized by blockage of the large bowel. Miscellaneous causes like intussusception, endometriosis, radiation enteropathy also comprise important cause of bowel obstruction.<sup>[6]</sup>

Usefulness of CT scan in diagnosis & management of patients with SAIO is proven 18 and confirmed by the results of our study, in which CT diagnosis well correlated with final operative diagnosis in 93% of cases.

Age of the patients in the study range between 14 to 76 years. Out of 22 were 12 male & 10 female patients. Randen V et al, conducted a prospective trial, Between March 2005 and November 2006, 1021 patients, 55% female, mean age 47 years (range, 19-94 years), were included.<sup>[12]</sup> In 117 of 1021 patients. Achiek MM et al studied a total of 105 adult patients, 65 males and 40 females.<sup>[13]</sup> A mean age of 46 years and an age range 22- 75years for Juba patients and a mean age of 64 years with an age range 21-95 years for KCH, London.

Amitojhaetal performed a study to evaluate role of investigations in diagnosis & management of SAIO.<sup>[14]</sup> Their study concluded that CT scan is highly useful in diagnosing SAIO. Accordingly we compared our study findings with theirs.

Our study confirmed the high sensitivity of CT scan in diagnosis of SAIO & establishing its etiology. Similar results were obtained by Mallo RD et al who conducted a systemic review.<sup>[15]</sup> This review was designed to describe the diagnostic performance of computed tomography (CT) in assessing bowel ischemia and complete obstruction in small bowel obstruction (SBO). A MEDLINE search (1966-2004) identified 15 studies dealing with the CT diagnosis of ischemia and complete obstruction in SBO. Ischemia was defined by operative findings, and complete obstruction was defined by enteroclysis or operative findings. Aggregated sensitivity, specificity, and positive and negative predictive values (PPV and NPV) were calculated. Eleven of 15 studies reported on the CT diagnosis of ischemia in SBO based on 743 patients.

## Conclusion

The findings of the study show that CT is a valuable diagnostic procedure in patients with subacute intestinal obstruction with

high sensitivity. It is a problem-solving tool in equivocal cases. CT is not only useful in distinguishing mechanical obstruction from paralytic ileus but also it often establishes the cause of obstruction & presence of complications like strangulation & perforation. CT findings lead the surgeon to surgical management in significant number of patients.

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