RESEARCH PAPER

Utility Of Contrast-Enhanced Computed Tomography Abdomen In Intestinal Obstruction

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ABSTRACT

Background : Intestinal Obstruction is one of the most common surgical emergencies which has increased nowadays which requires immediate surgical interventions and accurate diagnosis to avoid any serious complications. CECT has emerged as best reliable diagnosing tool for detection of intestinal obstruction because it evaluates the site, cause, and severity of disease by cutting the organs into slice when imaging. The study aimed to evaluate the utility of CECT abdomen in identifying the site, cause, and severity of intestinal obstruction.

Methods : This Prospective cross-sectional study was conducted at the Radiology Department of NIMS Hospital, Jaipur, Rajasthan, from January to July 2026. 96 Patients of aged 12 years and above were examined. All patients underwent CECT Abdomen exam were both Oral and Intravenous Contrast given and this exam was performed by experienced radiographers on 128 Slice SIEMENS SOMATOM GO TOP CT Scanner machine.

Results: In this study of 96 patients, CECT Revealed that Small bowel obstruction was more frequent than large bowel obstruction. In this study, we found that most of the patients had obstruction at a single site (76 patients, 79.2%), while 20 patients (20.8%) had more than one site involved. The ileum was the most commonly affected site (29 patients, 38.2%), followed by the duodenum (23.7%) and jejunum (22.4%). Nearly two-thirds of patients had high-grade obstruction (63 patients, 65.6%), and SBO was significantly more severe than large bowel obstruction(p=0.021). Adhesions were the leading cause (21 patients, 21.9%), followed by malignancy (8 patients, 8.3%).

Conclusion : CECT Abdomen is highly reliable and accurate imaging modality which is helpful in detecting Intestinal Obstruction but also pinpoint the exact site, cause and severity of obstruction and helps in treatment planning of whether the disease need surgical interventions or can be cured by conservative methods.

Keywords: Intestinal obstruction, CECT abdomen, Small bowel obstruction, Adhesions, Diagnostic imaging.

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INTRODUCTION

The small intestine is an extending distal part of the stomach called the pylorus,which helps in digestion and absorption of nutrients from the food that we eat.[1]The small intestine gets its name from the fact that its lumen is usually smaller than the large intestine's.[2] The cecum is at the end of the ileum, which is where the large intestine starts. The function of large intestine is to absorb the water,nutrients and vitamins etc. and eliminates the waste from it which passes through rectum.[3]

When food and waste can't go through the intestines regularly, it's called bowel obstruction (BO). Some common symptoms are stomach pain, nausea, vomiting, and constipation etc.[4] The most common cause of small bowel obstruction is adhesions formed after previous abdominal surgery. Hernias come second, while malignancies, inflammatory strictures, and congenital anomalies account for the remaining cases.[5] Strangulated small bowel obstruction (SSBO) causes about 16–18% of all intestinal blockages. These blockages get worse quickly.If not handled right, it can cause intestinal ischemia, necrosis, septic shock, and death. In this scenario, abdominal computed tomography (CT) or CECT (for best results) is highly helpful for diagnosing and evaluating SSBO since it shows how bad the blockage is and whether or not it is there.[6]

Surgical procedures have improved lately, and minimally invasive approaches are becoming more common, yet small bowel obstruction (SBO) is still a difficulty for both patients and surgeons. Over the last ten years, there has been more of a push to make clear when and why surgery is necessary for SBO.[7]

In earlier times (350 BC), the idea of treatment for intestinal obstruction was discovered by Hippocrates.[8] The first diagnostic procedure used to evaluate intestinal obstruction was plain radiography, Sometimes it gave an inaccurate diagnosis because it could not determine the exact location and size of the obstruction. When a doctor suspects a low-grade obstruction, then they ask for a contrast study to evaluate better, Then MDCT was introduced, which was more accurate than x ray, detects the exact location and size of the obstruction.[9]

CT is the best diagnostic procedure to find the site,cause and severity of obstruction. Contrast is used for better imaging in which patients drink oral contrast 1-2 hrs before examination and then IV contrast is injected during the procedure which helps in accurate findings, which is helpful for patients, radiologists as well as for surgeons.[10]The MDCT can be used routinely as a prime modality for detecting intestinal obstruction which will result in proper and timely

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management for reducing the morbidity and mortality of these particular patients.[11]

MATERIAL AND METHODS

Material : This cross-sectional study was conducted at the radiology department of Nims Hospital, Jaipur, Rajasthan at a period of 6 months in Radiology Department, Nims Hospital Rajasthan, Jaipur.

Methods : All patients who were sent to radiology department for CECT abdomen ex. Exams were performed by administration of both Oral and IV contrast by skilled radiographers on a 128 Slice Siemens SOMATOM GO TOP CT Scanner machine. After performing the procedure the team of experienced radiologist (atleast 5 years of experience) go through the recorded images of procedure and evaluate the findings and interpret the results.

Statistical Analysis: Pearson chi-square test (χ^2) was used to assess associations between categorical variables (site of obstruction, gender, and surgical history vs. grade of obstruction), with Fisher's Exact test applied when expected cell counts were <5. A p-value <0.05 was considered statistically significant

RESULTS

This Study concluded a total number of 96 patients those who meets the inclusion criteria.Demographics findings shows that the study cohort comprised predominantly males, with 55 (57.3%) male patients and 41 (42.7%) female patients, yielding a male-to-female ratio of approximately 1.34:1 (Table 1).

Table 1:Gender Distribution (n=96)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	55	57.3
	Female	41	42.7

The mean age of the study population was 45.8 ± 18.2 years, ranging from 12 to 83 years, with the largest group being patients below 40 years (38 patients, 39.6%), followed by those aged 40-60 years (32 patients, 33.3%) and those above 60 years (26 patients, 27.1%), indicating a relatively even distribution across adult age groups (Table 2)

Table 2: Age Distribution (N=96)

Characteristic	Category	Frequency (n)	Percentage (%)
Age (years)	Mean ± SD	45.8 ± 18.2	–
	Range	12 – 83	–
	<40 years	38	39.6
	40-60 years	32	33.3
	>60 years	26	27.1

In this Study of 96 patients , Percentages calculated within single-site subgroup (n=76). Among patients with single-site obstruction (n=76), the ileum was the most frequently obstructed site, accounting for (29 patients, 38.2%) of cases, followed by duodenum (18 patients, 23.7%) and jejunum (17 patients, 22.4%); large bowel single-site obstructions were less common, with sigmoid colon (7 patients, 9.2%), transverse colon (3 patients, 3.9%), and ascending colon (2 patients, 2.6%) representing a minority, and no isolated caecal obstruction was observed, indicating that small bowel, particularly the ileum, is the predominant location for single-site intestinal obstruction (Table 3A).*

Table 3A: Distribution of Single-Site Obstructions (N=76)

Site of Obstruction	Frequency (n)	Percentage (%)
Duodenum	18	23.7
Jejunum	17	22.4
Ileum	29	38.2
Caecum	0	0
Ascending Colon	2	2.6
Transverse Colon	3	3.9
Sigmoid Colon	7	9.2
Total	**76**	**100**

In the study of 96 patients, Percentages calculated within multiple-site subgroup (n=20). Among patients with multiple-site obstructions (n=20), the combination of jejunum and ileum was the most common (6 patients, 30.0%), followed by ileum with caecum (5 patients, 25.0%) and ileum with sigmoid colon (4 patients, 20.0%); duodenum with jejunum accounted for (3 patients, 15.0%), and other combinations (e.g., ileum+caecum+sigmoid) constituted (2 patients, 10.0%), with the frequent involvement of the ileum in combination with other sites underscoring its vulnerability in the setting of multilevel obstruction (Table 3B).*

Table 3B: Distribution of Multiple-Site Obstructions (N=20)

Sites of Obstruction	Frequency(n)	Percentage(%)
Duodenum + Jejunum	3	15.0
Jejunum + Ileum	6	30.0
Ileum + Caecum	5	25.0
Ileum + Sigmoid Colon	4	20.0
Others (Ileum+Caecum+Sigmoid, etc.)	2	10.0
Total	**20**	**100**

In this study of 96 patients , we found that High-grade obstruction was observed in (63 patients, 65.6%) of patients, while low-grade obstruction accounted for (33 patients, 34.4%). A statistically significant association was found between site category and grade of obstruction (p=0.021), with small bowel obstructions demonstrating a

predominance of high-grade lesions (73.1%), large bowel obstructions more frequently presenting as low-grade (55.6%), and mixed small and large bowel obstructions showing an intermediate pattern (54.5% high-grade). This supports the objective of characterizing obstruction severity based on location and confirms that small bowel obstructions tend to be more severe (high-grade) compared to large bowel obstructions (Table 4).

Table 4: Grade of Obstruction by Site Category (N=96)

Site Category	High Grade (n, %)	Low Grade (n, %)	Total	χ^2	p-value
Small Bowel (Duodenum, Jejunum, Ileum alone or in combination)	49 (73.1%)	18 (26.9%)	67 (69.79%)	5.89	0.021
Large Bowel (Ascending, Transverse, Sigmoid alone or in combination)	8 (44.4%)	10 (55.6%)	18(18.75%)		
Mixed (Small + Large bowel)	6 (54.5%)	5 (45.5%)	11(11.4%)		
Total	63 (65.6%)	33 (34.4%)	96(100%)		

DISCUSSION

In this study of 96 patients, the male gender was slightly predominant, and the age varied in different age groups. Similar findings were observed by **Afzal et al.**[11] (n=147) where male patients were 51.7%, and **Kelkar et al**.[12] (n=101) also observed a male preponderance, indicating that the demographic profile was similar in different studies.

Most of the patients in our study had obstruction at a single site (76/96, 79.2%) with ileum being the most frequently involved segment. This is consistent with earlier findings; for example, **Suri et al.**[13] (n=32) reported that 22 out of 30 confirmed obstruction cases involved the small bowel, highlighting its predominance over large bowel involvement . Similarly, prior studies have consistently shown that small bowel obstruction is more frequent than large bowel obstruction. In the present study, high-grade obstruction was more common (63/96, 65.6%), especially in small bowel cases. Although many earlier studies emphasized diagnostic accuracy rather than grading, **Baid et al. and Fukuya et al.**[14,15] (n=60) have also demonstrated that CT is very useful for assessing the severity of obstruction and underlying pathology.

Moreover, the CT features in our study agree with previous studies . **Afzal et al.**[11] (n=147) reported a diagnostic accuracy of 93.2%, while **Suri et al.**[13] (n=32) demonstrated CT accuracy of 94% in detecting obstruction and its level . Similarly, **Vaishnani et al.**[16] (n=50) showed good correlation between CT and operative findings in 91% of cases.

CONCLUSION

Early and correct diagnosis of intestinal obstruction is essential. This study of 96 patients clearly shows that CECT abdomen provides exactly that. Using combined oral and intravenous contrast, CECT successfully identified the site, cause, and severity of obstruction in a single examination. Small bowel obstruction proved significantly more severe than large bowel obstruction. CECT is undoubtedly the most valuable imaging tool available for evaluating intestinal obstruction and should be adopted as the first line investigation in all such patients..

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