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Role of Multi-Detector Computed Tomography (MDCT) in the Evaluation of Small Bowel Obstruction: A Retrospective Study

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Abstract:
Background: Small bowel obstruction (SBO) is a common cause of acute abdomen requiring prompt diagnosis and management. Imaging plays a vital role in identifying the site, cause, and complications of obstruction. Multi-Detector Computed Tomography (MDCT) has emerged as the imaging modality of choice due to its high diagnostic accuracy and ability to provide detailed cross-sectional imaging.
Objectives: To evaluate the diagnostic accuracy of MDCT in detecting small bowel obstruction, identify its etiology and level, and assess associated complications
Materials and Methods: A retrospective observational study was conducted on 50 patients clinically suspected of SBO who underwent MDCT examination. CT findings were analyzed for presence, level, cause, and complications of obstruction. Diagnostic performance parameters including sensitivity, specificity, PPV, NPV, and accuracy were calculated. CT findings were correlated with surgical findings wherever available.
Results: The majority of patients were in the 46–60 years age group, with male predominance. The distal ileum was the most common site of obstruction. Adhesions were the leading cause followed by strictures and inflammatory conditions. MDCT demonstrated high diagnostic accuracy with sensitivity of 94.5%, specificity of 72.6%, and overall accuracy of 88%. Complications such as bowel wall edema, mesenteric congestion, and ascites were effectively identified.
Conclusion: MDCT is a highly reliable imaging modality for evaluating small bowel obstruction. It accurately identifies the site, cause, and complications, and shows strong correlation with surgical findings. It plays a crucial role in guiding clinical management.
Keywords: Small bowel obstruction, MDCT, CT imaging, intestinal obstruction, diagnostic accuracy, radiology.

INTRODUCTION

Small bowel obstruction (SBO) is a significant clinical condition characterized by partial or complete blockage of intestinal contents through the small intestine[1,2]. It is one of the most common causes of acute abdominal pain and accounts for a considerable proportion of surgical emergencies[2,9]. Early diagnosis is essential to prevent complications such as ischemia, strangulation, perforation, and peritonitis.

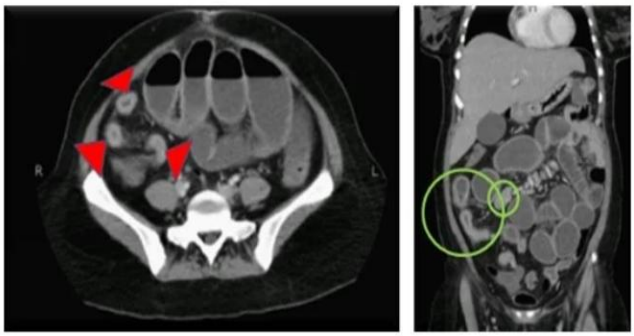

Fig 1: Multiple dilated small-bowel loops collapsed thickened loops in right iliac fossa (red arrow and green circles). {MDCT of Small Bowel Obstruction: How Reliable Are Oblique Reformatted Images in Localizing Point of Transition? - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Multiple-dilated-small-bowel-loopscollapsed-thickened-loops-in-right-iliac-fossa-red_fig1_262782047 [accessed 29 Mar 2026]

The etiology of SBO is diverse, with postoperative adhesions being the most common cause, followed by hernias, tumors, inflammatory strictures, and volvulus[1,3,9]. Clinical presentation typically includes abdominal pain, vomiting, distension, and constipation. However, clinical evaluation alone is often insufficient to determine the exact cause, location, and severity of obstruction[3].

Imaging plays a crucial role in confirming the diagnosis and guiding management. Conventional imaging techniques such as plain radiography and ultrasonography have limitations in sensitivity and specificity[5]. Computed tomography (CT) has significantly improved diagnostic accuracy due to its ability to provide detailed cross-sectional images[3,7].

Multi-Detector Computed Tomography (MDCT) represents an advanced form of CT imaging that allows rapid acquisition of high-resolution images with multiplanar reconstruction[11,12]. It enables precise localization of obstruction, identification of underlying causes, and detection of complications. Due to these advantages, MDCT has become the imaging modality of choice in suspected SBO cases[3,10].

The present study aims to evaluate the role of MDCT in diagnosing and assessing small bowel obstruction and to determine its diagnostic accuracy in clinical practice

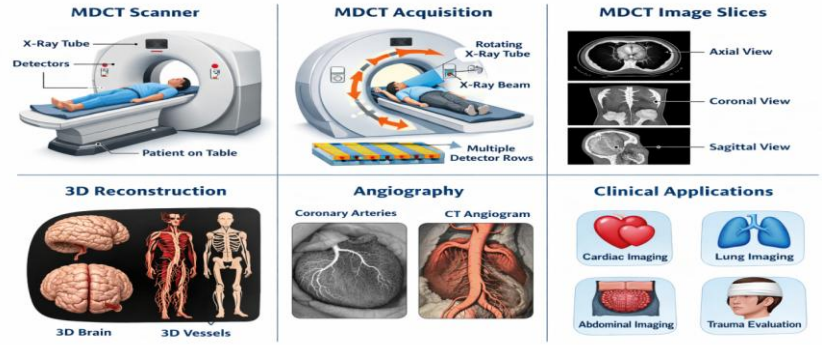

Fig 2: Medical illustrations of MDCT technology {Etiology of small bowel obstruction showing adhesions, hernia, tumor, volvulus, and intussusception.

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MATERIALS AND METHODS

Study Design

This retrospective observational study was conducted to evaluate the diagnostic role of MDCT in patients with suspected small bowel obstruction.

Study Population

A total of **50 patients** clinically suspected of SBO and referred for CT imaging were included in the study.

Inclusion Criteria

- Patients presenting with symptoms of SBO (abdominal pain, vomiting, distension)
- Patients undergoing MDCT evaluation

Exclusion Criteria

- Pregnant patients
- Patients with contraindications to contrast
- Incomplete imaging or clinical data

CT Imaging Protocol

All patients underwent abdominal CT using a Multi-Detector CT scanner.

- Scan range: diaphragm to pelvis
- Contrast-enhanced scans performed when indicated
- Thin-slice acquisition with multiplanar reconstruction[11,12]

Image Analysis

CT images were evaluated for:

- Presence of obstruction
- Level of obstruction
- Cause (adhesion, hernia, tumor, etc.)
- Complications (ischemia, edema, ascites, strangulation) [7,13]

Data Collection

Clinical and imaging data including age, gender, symptoms, site, cause, and complications were recorded.

Statistical Analysis

Descriptive statistics were used. Diagnostic parameters calculated:

- Sensitivity
- Specificity
- Positive Predictive Value (PPV)
- Negative Predictive Value (NPV)
- Accuracy

Correlation between CT and surgical findings was assessed using McNemar's test.

RESULTS

The majority of patients in the study belonged to the **46–60 years age group (40%)**, with a clear **male predominance (78%)**. This indicates a higher occurrence of small bowel obstruction in middle-aged individuals, possibly due to increased exposure to risk factors such as previous abdominal surgeries and hernias.

On analysis of the site of obstruction, the **distal ileum (42%)** was the most commonly affected segment, followed by the proximal ileum and jejunum. In terms of etiology, **postoperative adhesions (38.89%)** were identified as the leading cause, followed by strictures and inflammatory conditions, while malignancy and other causes were less frequent.

MDCT proved highly effective in identifying both the obstruction and its associated complications, including bowel wall edema, mesenteric congestion, and ascites. The diagnostic performance showed **high sensitivity (94.5%) and overall accuracy (88%)**, with good correlation observed between imaging and surgical findings[7,13,14].

Table 1.1 Age Distribution of Patients

Age Group (Years)	Number of Patients	Percentage (%)
20–35	8	16.0
36–45	12	24.0
46–60	20	40.0
Above 60	10	20.0
Total	**50**	**100**

Majority were in 40-60 years.

Table 1.2 Gender Distribution of Patients

Gender	Number of Patients	Percentage (%)
Male	39	78.0
Female	11	22.0
Total	**50**	**100**

Male predominance observed

Table 1.3 Site of Obstruction

Site	Number of Patients	Percentage (%)
Jejunum	32	12.0
Proximal Ileum	28	32.0
Distal Ileum	12	42.0
IC Junction	8	6.0
Not Determined	4	8
Total	**50**	**100**

Distal ileum most common[3,11]

Table 1.4 Causes of Obstruction

Cause	Percentage
Adhesions	38.89
Strictures	25.00
Inflammatory	22.22
Malignancy	8.33
Others	Remaining

Adhesions most common cause[1,8]

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Diagnostic Performance

- **Sensitivity:**94.5%
- **Specificity:** 72.6%
- **Accuracy:** 88%

DISCUSSION

The present study highlights the significant role of MDCT in evaluating small bowel obstruction. The majority of patients belonged to the middle-aged group, consistent with increased incidence of postoperative adhesions and malignancies in this population.

Male predominance observed in this study may be attributed to higher exposure to risk factors such as abdominal surgeries and hernias. The distal ileum was identified as the most common site of obstruction, which aligns with previous studies due to its anatomical susceptibility.

Adhesions were the leading cause of obstruction, followed by strictures and inflammatory conditions. These findings are consistent with global literature, where postoperative adhesions account for the majority of SBO cases[1,3,9].

MDCT demonstrated high sensitivity and accuracy in detecting SBO. Its ability to identify the transition point, determine the cause, and detect complications such as ischemia and strangulation makes it superior to conventional imaging techniques[5,7].

The correlation between CT findings and surgical outcomes was strong, reinforcing the reliability of MDCT in clinical decision-making. Early identification of complications using MDCT can significantly reduce morbidity and mortality[8,14].

CONCLUSION

Multi-Detector Computed Tomography is a highly effective and reliable imaging modality for evaluating small bowel obstruction[3,7,12]. It provides comprehensive information regarding the site, cause, and complications of obstruction with high diagnostic accuracy. MDCT plays a crucial role in guiding appropriate management and improving patient outcomes[10,14].

LIMITATIONS

- Small sample size
- Single-center study
- Limited surgical correlation in all casesSingle-center study

RECOMMENDATIONS

- Larger multicenter studies recommended
- Integration with clinical scoring systems
- Further research on outcome-based imaging

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