

Role of Multislice Computed Tomography in Evaluation of Intestinal Obstruction

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Abstract: Role of multidetector computed tomography in the diagnosis of intestinal obstruction. **Objective:** The objectives of the study are to discuss the usefulness of multidetector computed tomography (CT) in the evaluation of intestinal obstruction and the underlying causes. **Background** CT has become a mainstay in diagnosing bowel obstruction. Since the management of obstruction has dramatically changed with a decrease in the proportion of patients who need surgery, a precise CT evaluation is now both the gold standard and the common approach in patients with suspected bowel obstruction. **Materials and methods** 30 patients were included in this study. They were referred to the Radiology Department for multidetector CT assessment having following symptoms and signs: Abdominal Pain, vomiting, constipation, abdominal distension and tenderness **Results** Mechanical causes were the dominant (80 %) in the referred patients with bowel obstruction. Adhesive intestinal obstruction and obstructed hernias are the main causes of small bowel obstruction in our study. Cancer was the cause in large bowel obstruction. **Conclusion:** Our results showed a very high sensitivity and specificity which had been at 100 % mark. This study has confidently ascertained the role of MSCT in diagnosing and altering the treatment plans of a wide range of bowel obstruction causes.

Keywords: intestinal obstruction, large bowel, multidetector computed tomography, small bowel

1. Introduction

Intestinal obstruction is a common clinical condition that occurs secondary to mechanical or functional obstruction of the intestine, preventing normal transit of its contents. It is a frequent cause of hospitalization and represents 15–20% of surgical admissions for acute abdominal pain.

Computed tomography (CT) has become a mainstay in diagnosing bowel obstruction. This is because the management of obstruction has dramatically changed with a decrease in the proportion of patients who need surgery¹.

The underlying etiology of large bowel obstructions (LBOs) is age dependent, but in adulthood, the most common cause is colonic cancer (50–60%), typically in the sigmoid. The second most common cause in adults is acute diverticulitis (involving the sigmoid colon). While adhesions are the leading cause of small bowel obstruction (SBO), Multidetector computed tomography (MDCT) represented a breakthrough in CT technology. It has transformed CT from a trans-axial cross-sectional technique into a true three-dimensional (3D) imaging modality that allows for arbitrary cut planes as well as excellent 3D displays of the data volume. MDCT scanners provide a huge gain in performance that can be used to reduce the scan time, reduce section collimation, or to increase scan length substantially.

Aim

To determine presence, level, degree, and cause of intestinal obstruction, presence of complications, and decision making in management.

2. Materials and Method

The study includes 30 patients who were referred to radiology department for MDCT of abdomen and pelvis scan with complains of abdominal pain, vomiting, abdominal distention, constipation after performing abdominal x-ray.

Exclusion Criteria

- Pregnant women
- Patients with chronic renal failure (or impairment) not on regular dialysis,
- Patients who are hemodynamically unstable,
- Severe cardiac disease causing orthopnea,
- Sensitivity to the contrast medium,
- Patients with life-threatening condition till been stabilized.

Inclusion Criteria

Age above 20 years and any gender presenting with one or more of the following symptoms: inability to pass stools, constipation, acute abdomen, vomiting, Abdominal distension.

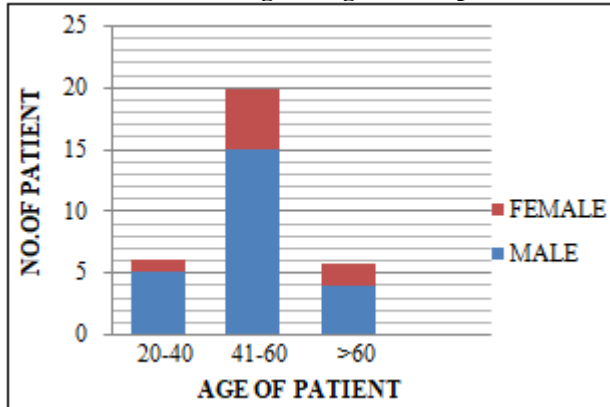
Technique

- Patients were examined in this study by using a 16-channel multi-slice CT Siemens scanner.
- Prior to the examination, the patients had been fasting for at least 6 h
- A large bore (18 G) intravenous line was placed in the antecubital fossa
- Water or diluted oral contrast agent was given to patients. This was given orally within 120 min in a continuous regular manner (150 ml every 20 min), the remaining 100 ml is given on table. The amount of fluid intake differed according to the patient's tolerance. The amount offered to each patient is 1000 ml (7.5 ml of oral contrast medium +992.5 ml of water)
- Diluted positive contrast (urograffin) rectal enema was done for patients just prior to the examination. The amount of enema infusion differs according to the patient's tolerance and patient's age
- IV contrast medium (about 50 ml) of nonionic contrast medium iopromide (Ultravist 300) according to the body built (1.5 ml/kg body weight) was given by an automatic injector at a rate of 3 ml/s

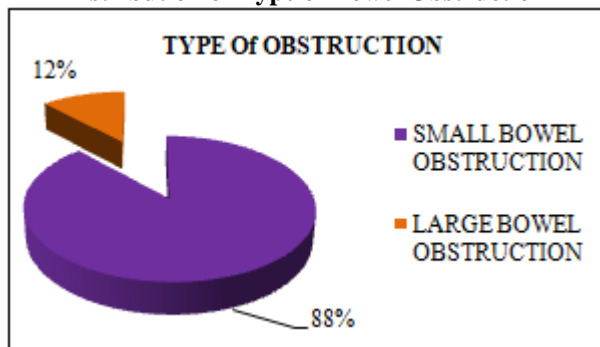
- 7) All imaging was performed with slice collimation 2.5 mm, pitch 1–1.5, matrix 512 × 512, 200–350 mA and 120–140 kV’
- 8) All data were collected and statistically analyzed to present the results.

3. Result

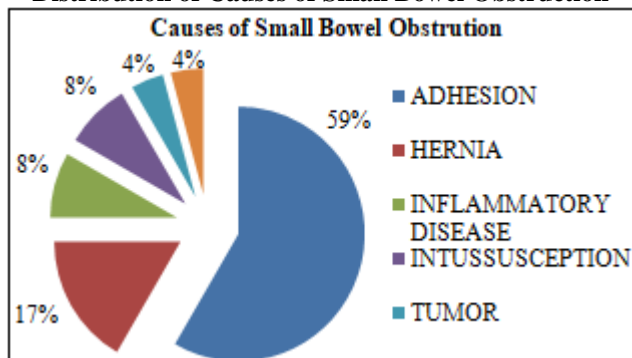
Distribution of age and gender of patients



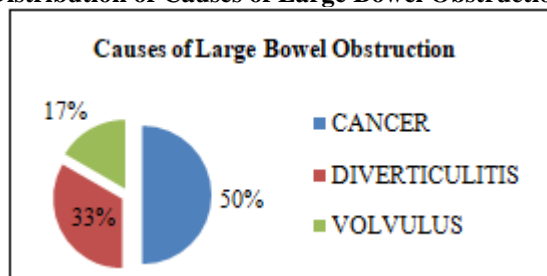
Distribution of Type of Bowel Obstruction



Distribution of Causes of Small Bowel Obstruction



Distribution of Causes of Large Bowel Obstruction



4. Discussion

In our study we examined 30 patients, 6 women and 24 men. This revealed that bowel obstruction is more common in men. We believe that this is mainly due to the higher incidence of hernias and gastrointestinal tumors in men.

Small bowel obstruction (24/30) was more common than large bowel obstruction (6/30) that too in middle age group, whereas large bowel obstruction was seen in older age group.

In our study, most common cause of small bowel obstruction was mechanical cause, i.e. Adhesion (59%), followed by hernia (17%), inflammatory bowel disease (8%), intussusceptions (8%), tumor (4%), ileus and ischemia.

Within our patients fourteen were diagnosed with adhesive SBO (14/30) depending on the presence of a transition point with lack of any apparent cause of obstruction. Also, we considered the presence of a previous abdominal surgical intervention as a major risk factor, while reviewing their medical and surgical history as it is a well-known fact that surgery induces adhesions.

Hernias come in the second position in our study accounting for 17% of cases of SBO (4/30). All our cases of obstructed hernias were due to external hernias. Those cases were straightforward and posed no challenging difficulties in diagnosing them. The real concern was whether they are strangulated (vascularity impaired) or not? Fortunately, they were not. Incarcerated they were leading to secondary SBO.

Most common cause of large bowel obstruction in our study was cancer, followed by diverticulitis and volvulus. In our study, cancer colon comes on top of other causes of LBO representing about 50% of the cases of LBO (3/6), while diverticulum accounts for 33% (2/6) and volvulus 17% (1/6).

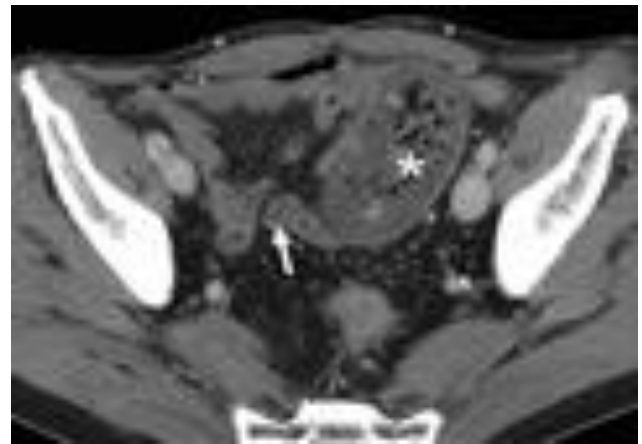
Our diagnostic criteria for colonic cancer are similar to the ones described by Horton *et al.*^[11] which are as follows: in patients with colorectal cancer, CT typically demonstrates a discrete soft-tissue causing narrowing of colonic lumen, while some showed focal colonic wall thickening and luminal narrowing, an appearance that emphasizes the importance of adequate colonic opacification and distention. In particular, sigmoid cancers are more commonly involved. Other rarer causes are hernias, ischemic colitis, inflammatory mass, colonic tuberculosis, and colonic invagination^[10].

On follow up, out of 30 patients, 22 patients were managed conservatively and 8 patients had undergone surgery.

Large Bowel:	Small Bowel:
<ul style="list-style-type: none"> •Peripheral •Presence of haustration, diameter >8 cm •distended caecum → a rounded gas shadow in the right iliac fossa. >10cm diameter. 	<ul style="list-style-type: none"> •Central •jejunum → valvulae conniventes •Ileum → featureless •Diameter >5 cm •No gas is seen in the colon



contrast material (arrowhead) are seen beyond the intussusception.



Small bowel feces sign in a patient with high-grade SBO secondary to postoperative adhesions. Axial CT scan shows gas bubbles mixed with particulate matter (*), a finding that represents the small bowel feces sign. Note the collapsed bowel loops (arrow) distal to the obstruction point.



Identification of the transition point in an SBO secondary to postoperative adhesions. Axial CT scan shows dilated small bowel loops (S). There is an abrupt change in caliber (arrow) between the proximal dilated bowel loops and collapsed distal bowel loops (C). The change in caliber was due to adhesions.



SBO secondary to the acute presentation of Crohn disease. Axial CT scan shows a dilated small bowel loop with a diameter of more than 2.5 cm (S) proximal to the thickened terminal ileum (arrow). Circle = transition point.

Simple complete SBO secondary to intussusception. Axial CT scan shows distended small bowel loops with intraluminal positive contrast material (arrows) proximal to an intussusception with a target like appearance (*). Completely collapsed bowel loops without intraluminal

5. Conclusion

Our results showed a very high sensitivity and specificity which had been at 100% mark. This study has confidently ascertained the role of MSCT in diagnosing the cause, degree, level of intestinal obstruction and altering the treatment plans of a wide range of bowel obstruction causes.

References

- [1] Millet I, Ruyer A, Alili C, Curros Doyon F, Molinari N, Pages E, *et al.* Adhesive small-bowel obstruction: value of CT in identifying findings associated with the effectiveness of nonsurgical treatment. *Radiology* 2014.
- [2] Quintero JC, Pardo P, Abu-SubohAbadia A. Intestinal obstruction. Management, CT evaluation and what to look for ECR 2012
- [3] Patrice T, Denis H, Jean-Michel B. Bowel obstruction in: CT of the acute abdomen. Taourel P, editor. *Medical*

radiology. Berlin Heidelberg: Diagnostic Imaging, Springer-Verlag; 2011.

- [4] Peterson CM, Anderson JS, Hara AK, Carenza JW, Menias CO. Volvulus of the gastrointestinal tract: appearances at multimodality imaging. *Radiographics* 2009.
- [5] Biondo S, Parés D, Frago R, Martí-Ragué J, Kreisler E, De Oca J, *et al.* Large bowel obstruction: predictive factors for post-operative mortality. *Dis Colon Rectum* 2004.