

Utility of Computed Tomography of Abdomen and Pelvis in Cases of Intestinal Obstruction

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Abstract

Background: Bowel obstruction is a common clinical condition that occurs secondary to mechanical or functional obstruction of the bowel. It is a frequent cause of hospitalization and surgical consultation, representing 20% of all surgical admissions for acute abdominal pain. **Objectives:** To evaluate the level and cause of intestinal obstruction. Assess the accuracy of imaging findings in correlation with operative findings. **Subjects and Methods:** This is a prospective study of 43 patients who presented with acute intestinal obstruction to our hospital. All the subjects underwent CT scan of abdomen and pelvis in helical multi-detector CT scan machine. The CT scan of abdomen and pelvis findings was compared and correlated with intra-operative findings. **Results:** Out of 43 cases, 28 are males (65%) and 15 are females (35%). Only 17 cases (39.5%) had features of intestinal obstruction on the ultrasonography and only 13 cases (30%) had features of obstruction on abdominal radiography. This study showed 36 patients (83%) had small bowel obstruction and 7 (17%) had large bowel obstruction. In the small bowel, ileum was most common site to be obstructed accounting for about 63.8% of all small bowel obstruction. CT showed 100% correlation with intra-operative findings in assessing the level of obstruction. The most common cause for obstruction is post-operative adhesions which are seen in about 23.2% cases. **Conclusion:** This study shows that CT is the imaging modality of choice in patients with acute intestinal obstruction to evaluate the level and cause of intestinal obstruction which did correlate well with intra-operative findings.

Keywords: Intestinal obstruction; Computed tomography; Ultrasonography; Abdominal pain.

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Introduction

Bowel obstruction is a common clinical condition that occurs secondary to mechanical or functional obstruction of the bowel, preventing normal transit of its contents. It is a frequent cause of hospitalization and surgical consultation, representing 20% of all surgical admissions for acute abdominal pain.^[1]

Nowadays, owing to the increased application of advanced modalities of abdominal imaging in the clinical context of bowel obstruction, combined with the widespread assumption that most of these conditions resolve spontaneously with nonsurgical treatment, namely naso-intestinal decompression, imaging has become the primary focus in the treatment of these patients. Therefore, radiology assumes considerable relevance in assisting the therapeutic decision of the surgeon by addressing the following questions: Is the bowel obstructed? How severe is the obstruction, where is it located, and what is its cause? Is strangulation present?

Plain abdominal radiography continues to be the initial examination in these patients due to its wide availability and relatively low cost. However, radiographs are diagnostic in only 50%–60% of cases and have high sensitivity only for

high-grade obstructions.

Sonography is not commonly used for the evaluation mainly because most of the time the bowel loops are filled with gas, producing non-diagnostic sonograms, and because adhesions, the most common cause of mechanical obstruction, are not detected with this technique.^[2]

Newer multidetector CT scanners with multiplanar reformation capability are significantly more effective in evaluation of intestinal obstruction. Therefore, owing to the capability of CT for early demonstration of strangulation, CT is now considered the best modality for determining which patients would benefit from conservative management and close follow-up and which patients would benefit from immediate surgical intervention.^[3]

Objectives

- To evaluate the level and cause of intestinal obstruction by computed tomography.
- Assess the accuracy of imaging findings in correlation with operative findings.

Subjects and Methods

Source of data:

Cases of intestinal obstruction who underwent computed tomography of abdomen in Department Of Radio Diagnosis, Rajarajeswari Medical College, Bangalore were included in the study.

Study design: Hospital based prospective study.

Method of Collection of Data:

A detailed history was taken and clinical examination was done. The points noted were symptoms of intestinal obstruction like pain abdomen, vomiting, and previous surgical history. Abdominal examination to look for abdominal distension, presence of bowel sounds.

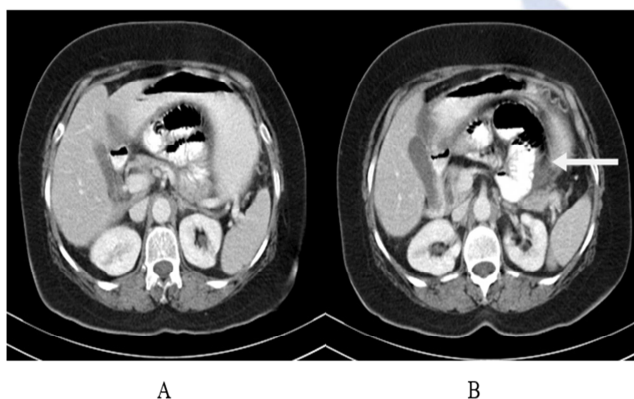
Investigation:

All subjects underwent Computed Tomography of the abdomen and pelvis. The procedure was explained to the patient including the risks of radiation as well as contrast examination administration and informed consent was obtained.

Technique of examination:

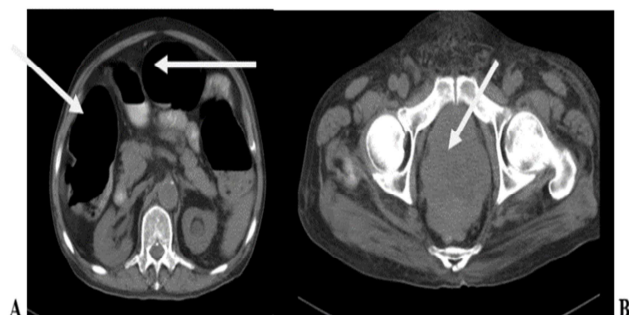
Computed tomography was performed with Helical CT and serial sections were taken with 1.5 mm slice thickness from chest base to pubic symphysis. Intravenous iodinated contrast medium was used for contrast study in patients at an average dose of 80 cc. Oral and rectal contrast was given when necessary. Multiplanar reformations were performed.

Images – Representative Cases



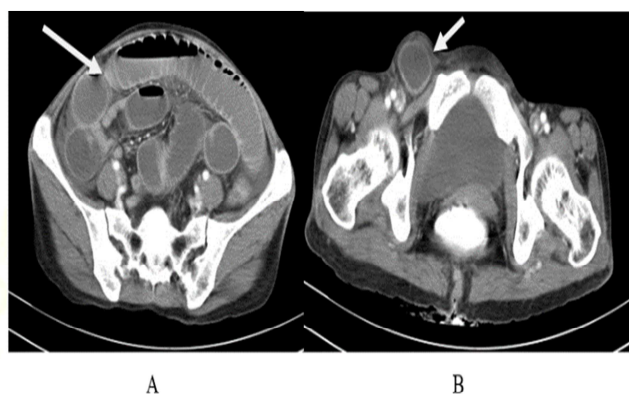
Case 1: Left Paraduodenal Hernia

A 42 years old female patient presented with history of abdominal pain. Contrast enhanced CT shows multiple dilated bowel loops in the lesser sac displacing the stomach anteriorly.



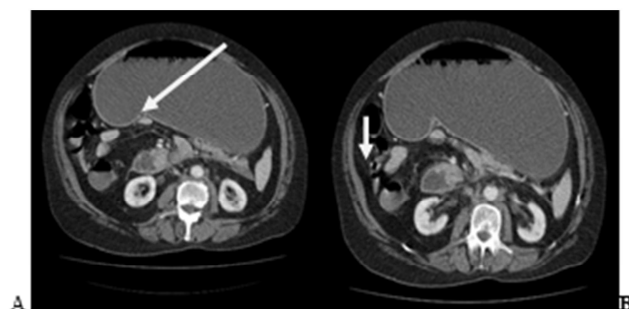
Case 2: Large Bowel Obstruction Due To Prostatic Carcinoma

50 year old male patient presented with abdominal distension. A. Contrast enhanced CT shows dilated large bowel loops. B. Shows prostatic mass and C, shows involvement of rectum by prostatic mass.



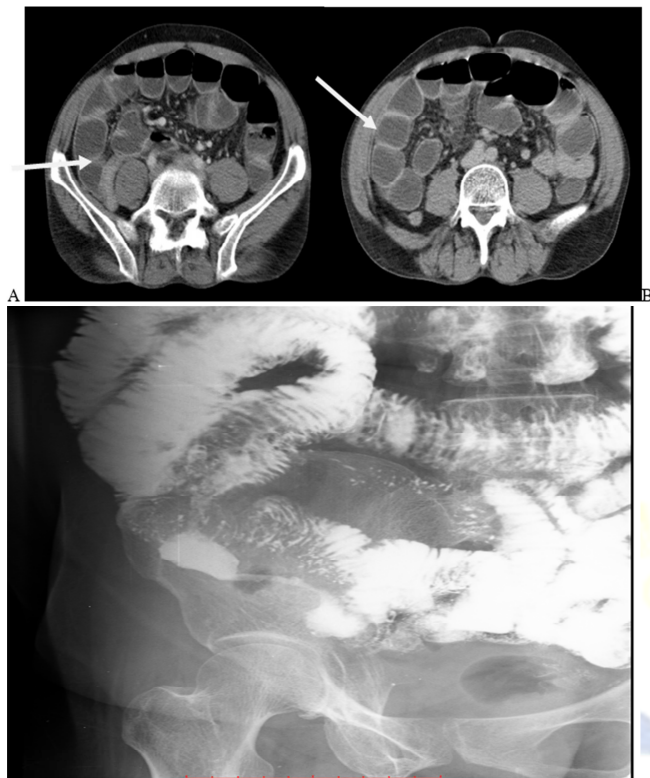
Case 3: Obstructed Inguinal Hernia

A 42 years old female patient presented with history of right inguinal swelling, abdominal pain and vomiting. A. Contrast enhanced CT shows multiple dilated small bowel loops in the abdomen. B. Shows the right sided inguinal hernia containing dilated small bowel.



Case 4: Duodenal Adenocarcinoma

A 72 years old female presented with history of recurrent vomiting. A. Contrast enhanced CT of abdomen shows grossly distended stomach. B, C. shows an enhancing circumferential mass in the third part of the duodenum causing obstruction.



Case 5 – Ileal Stricture

A 49 years old female patient presented with history of vomiting. A. Contrast enhanced CT scan of abdomen shows a short segment stricture in the terminal ileum. B. There is dilatation of the small bowel loops proximally. C. Barium meal follow through shows a short segment stricture in the ileum.

Results

Table 1: Gender distribution of the cases

	Number of cases	Percentage %
Males	28	65
Females	15	35
Total	43	

Table 2: Age distribution of the cases

Age distribution	Number of cases	Percentage %
11-20	1	2.3
21-30	4	9.3
31-40	12	27.9
41-50	13	30.2
51-60	4	9.3
61-70	5	11.6
71-80	4	9.3
Total	43	

Table 3: Number of cases detected by each modality

Modality	Number of cases detected
Abdominal Radiograph	13
Ultrasonography	17
Computed Tomography	43

Table 4: Comparison of the level of intestinal obstruction on CT with intra-operative findings.

Computed Tomographic level of obstruction	Intra-operative level of obstruction							
	Duodenum	Jejunum	Ileum	Caecum	Ascending colon	Descending colon	Sigmoid colon	Rectum
Duodenum	2							
Jejunum		11						
Ileum			23					
Caecum				1				
Ascending colon					1			
Descending colon						1		
Sigmoid colon							2	
Rectum								2

Table 5: Aetiology of intestinal obstruction by CT and intra-operatively

Cause	Number of cases diagnosed by CT	Number of cases diagnosed by intra-operative
Adhesions	10	10
Tumours	9	9
Strictures	8	7
Hernias	5	6
Intussusception	3	3
Vascular	3	3
Volvulus	2	2
Inflammatory	2	2
SMA syndrome	1	1

Table 6: Aetiology of intestinal obstruction and its level

Cause of obstruction	Level of obstruction									Total
	Duodenum	Jejunum	Ileum	Caecum	Ascending colon	Descending colon	Sigmoid colon	Rectum		
Adhesions		4	5			1				10
Tumours	1	3	1		1		1	2		9
Strictures		1	6							7
Hernias			6							6
Intussusception		2	1							3
Ischemia		1	2							3
Volvulus			1				1			2
Inflammation			1	1						2
SMA syndrome	1									1
Total	2	11	23	1	1	1	2	2		

Discussion

Patient characteristics

This is a prospective study of 43 patients who presented with acute intestinal obstruction, on whom CT scan of abdomen and pelvis was done and correlated with intra-operative findings. Out of 43 cases, 28 are males (65%) and 15 are females (35%). Comparisons with other studies are shown below;

Age group	Cole J et al ^[4]	Souvik A et al ^[5]	This study
10-20	10%	9%	2.3%
21-30	10%	11%	9.3%
31-40	18%	15%	27.9%
41-50	16%	24%	30.2%
51-60	15%	13%	9.3%
61-70	16%	20%	11.6%
71-80	9%	8%	9.3%
81-90	6%	4%	-

Aetiology	Cole J et al ^[4]	Souvik A et al ^[5]	This study
Adhesions	10%	16%	23.2%
Hernias	35%	36%	13.9%
Volvulus	3%	6%	4.6%
Strictures	3%	14%	16.2%
Neoplasm	9%	17%	20.9%
Intussusceptions	12%	2%	6.9%
Miscellaneous	-	9%	13.9%

Out of 43 cases, 17 cases (39.5%) presented with complaints of both pain abdomen and vomiting. 16 cases (37.2%) presented with only pain abdomen, 8 cases (18.6%) presented with only vomiting. The other complaints which are seen in 2 cases (4.6%) are constipation, loss of weight.

Out of all 43 cases which are diagnosed on computed tomography, only 17 cases (39.5%) has features of intestinal obstruction on the ultrasonography and only 13 cases (30%) has features of obstruction on abdominal radiography. These findings are comparable to study done by Suri S et al,^[6] which showed CT had high sensitivity (93%), specificity (100%) and accuracy (94%) in diagnosing the presence of obstruction. The comparable sensitivity, specificity and accuracy were, respectively, 83%, 100% and 84% for US and 77%, 50% and 75% for plain radiography.

The obstruction is more common to occur in the small

bowel as compared to that in the large bowel. Among 43 cases, 36 (83%) had small bowel obstruction and 7 (17%) had large bowel obstruction. In the small bowel, ileum was most common site to be obstructed accounting for about 63.8% of all small bowel obstruction.

In this study computed tomography showed 100% correlation with intra-operative findings in the assessing the level of obstruction. Therefore the sensitivity of computed tomography in assessing level of obstruction is 100% which is similar to the study done by Suri S et al,^[6] which showed that CT correctly predicted the level of obstruction in about 94% cases.

The most common cause for obstruction is post-operative adhesions which are seen in about 23.2 % cases, followed by neoplasms and strictures which accounted for 20.9 % and 18.6% cases respectively.

In this study, in assessing the cause of obstruction, 2 cases on computed tomography did not correlate with intra-operative findings. Out of this one showed features of adhesions on CT which turned out to be mesenteric tear with internal hernia intra-operatively. Another case had features of stricture on CT, which showed adhesions intra-operatively. The rest of 41 cases correlated well with intra-operative findings. So sensitivity of CT in assessing the cause of obstruction is 95%. A study by Megibow AJ et al,^[8] stated that the cause of intestinal obstruction is correctly predicted in 83% of cases.

Conclusion

This is a prospective study of 43 consecutive patients who presented with acute intestinal obstruction in whom CT abdomen and pelvis was done and correlated with intra-operative findings. This study showed a male predominance of 2:1 with majority of patients aged between 30 to 50 years. The common complains presented by patients were pain abdomen and vomiting. The sensitivity of different imaging modalities were studied with sensitivity of USG is 40%, radiography is 30% and CT is 100%. The sensitivity of CT in detecting the level of obstruction is 100% and in cause of obstruction is 94%. The most common site of obstruction was ileum accounting for 64% and most common cause of obstruction was adhesions in 23%

followed by neoplasms in 21% and strictures in 19% of cases.

This study shows that CT is the imaging modality of choice in patients with acute intestinal obstruction to evaluate the level and cause which did correlate well with intra-operative findings.

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