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Pictorial Review of Various Entities Causing Small Bowel Obstruction

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ABSTRACT:

Small bowel obstruction is seen commonly in routine clinical practice. Despite of having advanced imaging facilities and better knowledge about small bowel pathophysiology, small bowel obstruction is either misinterpreted or diagnosed late. Algorithmic approach is needed for management for small bowel obstruction. Imaging techniques vary depending on whether it is low grade or high-grade obstruction. Enteroclysis and computed tomography enteroclysis are preferred in low grade obstruction, whereas ultrasonography or multidetector computed tomography is preferred in high grade to exclude strangulation. Radiologists has an important role in decision making that affects management[1]. Computed tomography is the most appropriate and accurate diagnostic imaging modality for suspected bowel obstruction. Accuracy of multidetector computed tomography for diagnosing small bowel obstruction is 95 % with sensitivity 92-94% and specificity of 96%.

Keywords: Small bowel dilatation, Transition point, Air fluid levels.

Aim:

This pictorial review aims to show computed tomography findings of various entities causing small bowel obstruction.

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1. Introduction

Small bowel obstruction is a common clinical syndrome for which effective treatment depends on rapid and accurate diagnosis. The important question in small bowel obstruction management lies in determining whether early laparotomy is required or whether trial of non-operative management should be instituted. Major criteria for diagnosis of small bowel obstruction includes presence of small bowel dilatation (transverse diameter 2.5cm) and presence of discrete transition zone between dilated proximal and non- dilated distal zone. Minor criteria include presence of air fluid levels.

Terminology in small bowel obstruction

1. Complete or high-grade obstruction is defined when no fluid or gas passes beyond site of obstruction.
2. Incomplete or partial obstruction is defined when some fluid or gas passes beyond point of obstruction.
3. Strangulated obstruction is defined when blood flow is compromised leading to complications such as intestinal ischemia, necrosis, and perforation.
4. Closed loop obstruction is defined when segment of bowel loop is obstructed at two points thereby causing progressive accumulation of fluid and gas within the loop thereby leading to complications such as volvulus and ischemia.

Table 1: Various entities causing small bowel obstruction

ENTITIES
Adhesions Hernias (Internal and external)
Neoplasm(Extraintestinal and primary)
Crohn’s disease
Gall stones
Malrotation
Duplication cysts
Diverticulitis
Infection (Tuberculosis, intestinal parasites, etc.)
Hematoma
Ischemic stricture
Intussusception
Endometriosis
Radiation
Foreign body

Role of Computed Tomography [11]

CT is imaging modality of choice for detection of small bowel obstruction. Retained intraluminal fluid acts as negative natural contrast without need for oral contrast material. The diagnosis is made if there is a proximal dilated bowel loops with distal collapsed loops. Small bowel diameter of more than 2.5 cm with presence of transition point makes the diagnosis certain. Stasis and mixing of bowel contents in small bowel leads to presence of feces known as “small bowel feces sign”. It is present in ~ 80% of cases.

Adhesions

Adhesions refers to abnormal inflammatory attachment between tissues which is more common post operatively .Adhesions are the leading cause, attributing to 60-70% of all cases of small

bowel obstruction. Small bowel obstruction due to adhesions can be managed non-operatively in the absence of ischemia, so imaging plays a crucial role in determining whether emergency surgery is required or not. CT also plays a key role in differentiating single adhesion from matted adhesions and open loop from closed loop adhesive obstruction [1, 2].

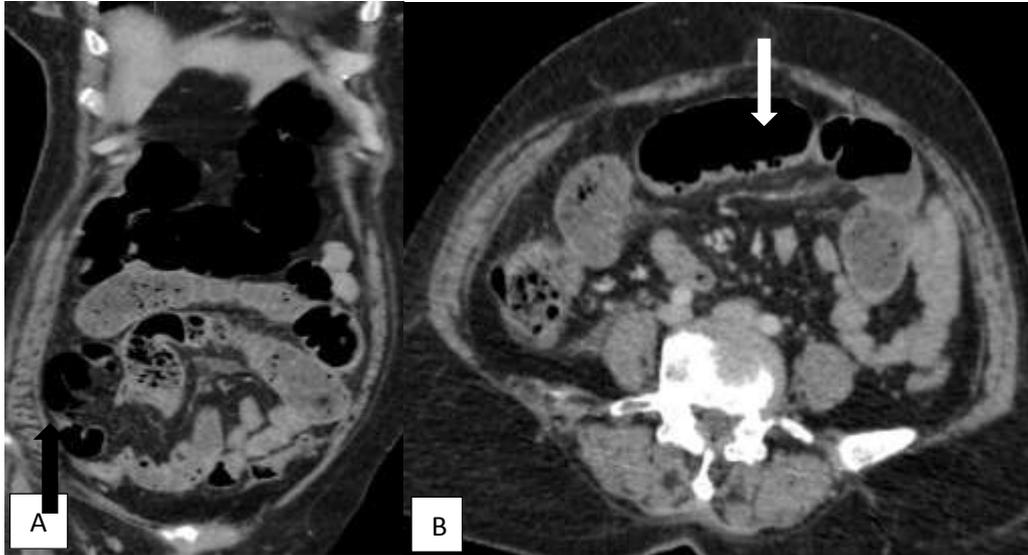


Figure 1(A, B): CECT abdomen shows dilated fluid filled (white arrow) distal jejunal and ileal loops with abrupt cut of. Terminal ileum appears collapsed (black arrow). Features likely suggestive of adhesion.

Hernias

Two main types of hernias are internal & external. External hernia refers to defect in abdominal wall or pelvis through which abdominal contents such as intestinal loop or omentum protrudes. The tell-tale sign of small bowel obstruction due to hernia is presence of dilated bowel loop upto the hernia sac followed by decompressed bowel coming out of the sac[3]. Internal hernia refers to presence of normal or abnormal aperture in peritoneum or mesentery through which viscus protrudes and is usually confines within peritoneal cavity. Orifices can be either acquired or through natural apertures such as foramen of Winslow. Overall incidence rate of internal hernias is below 1%, constituting upto 5% of all cases of small bowel obstruction. If left untreated internal hernias have mortality rate greater than 50% in presence of strangulation [2]

Internal hernia



Figure 2(A,B): NECT abdomen shows crowding of ileal loops within an internal hernial sac (white arrow) showing distended bowel loops in abnormal location at right lumbar and right iliac fossa regions. There is evidence of obstruction with segmental dilatation and stasis showing small bowel feces sign (black arrow). Suggestive of transmesenteric hernia with signs of obstruction.

External Hernia

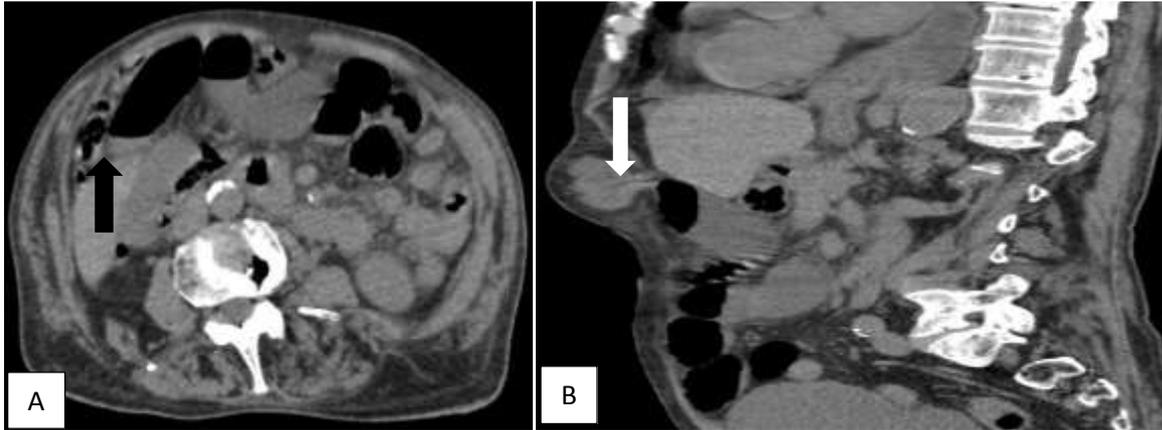


Figure 3(A,B): NECT abdomen shows defect(white arrow) of size ~1.6 x 1.6 cm noted in the anterior abdominal wall(epigastric region)with bowel and omentum as herniating contents.Visualized bowel loops appears prominent with few of them showing air fluid levels(black arrow).

Neoplasm

Compared to other causes, small bowel obstruction caused by neoplasm is less likely. Primary small bowel neoplasm comprises of less than 2 % of all GI malignancies. Malignant bowel obstruction more commonly seen in advanced stage of cancer. Obstruction can be either due to external compression of intestine or intraluminal/intramural/infiltrative growth causing obstruction. In advanced cases multiple levels of occlusion can be present. Peritoneal carcinomatosis is one of the leading causes of malignancies causing obstruction[3].

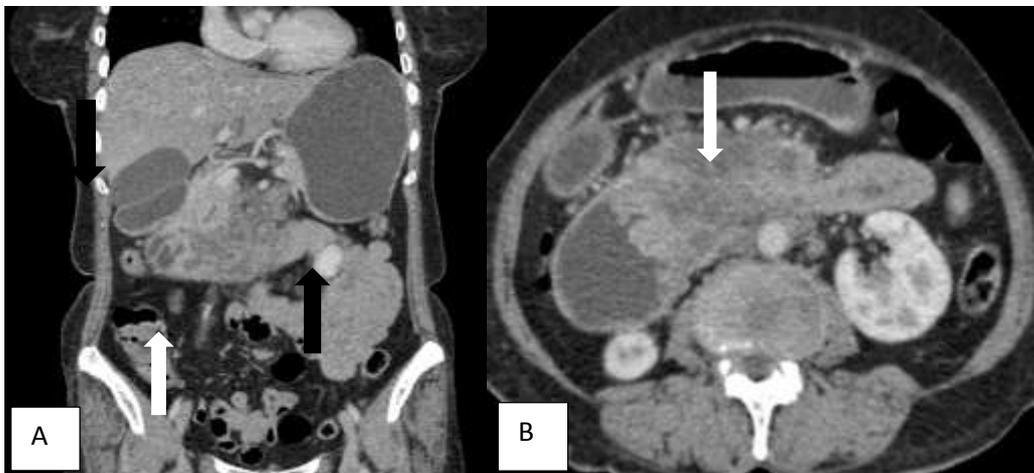


Figure 4(A,B):CECT abdomen shows Irregular asymmetrical mural thickening(white arrow) noted involving distal portion of 2nd & 3rd part of duodenum causing significant luminal narrowing and dilatation of proximal duodenum and stomach(black arrows).Features suggestive of neoplastic etiology

Crohn's disease

It is an idiopathic inflammatory bowel disease usually affecting terminal ileum and proximal colon. Bowel involvement is discontinuous. Obstruction in Crohn's disease is not an uncommon entity. Bowel obstruction is likely to occur over a period and it most commonly involves ileum. Stricture or narrowing of intestinal lumen, which are complications of Crohn's can lead to partial or complete obstruction [4].



Figure 5:CECT abdomen shows long segment circumferential wall thickening(white arrow) involving terminal ileum,ileo-colic junction and cecum causing moderate upstream dilatation of distal ileal loops.Also noted non obstructive long sement circumferential wall thickening of distal jejunum and mid ileum.Features suggestive of crohns disease.

Duplication cysts

It is one of the rare causes of intestinal obstruction in adults. Can occur anywhere between foregut to hind gut. In small bowl, ileum is the most common site. Duplication cysts present as volvulus, obstruction and can cause mass effect on adjacent organs. Ultrasound is preferred over CT/MRI as it demonstrates double wall sign. Blood supply is shared between the cyst and bowel segment, that mandates resection of bowel segment along with the cyst[5].

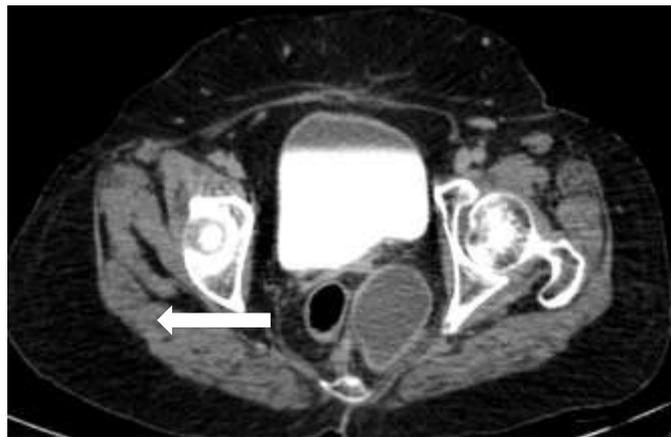


Figure 6:CECT abdomen shows relatively well defined peripherally enhancing thin walled fluid filled collection (white arrow) in left ischio-rectal space causing compression on adjacent bowel loop leading to obstruction.

Intussusception

Intussusception defined as prolapse of one segment of bowel into others.Accounts for less than 5 % cases of small bowel Obstruction. Intussusceptum is the portion that prolapses and receiving segment is called as intussusciens. Ileocolic intussusception being the most common one. Lead points are present in **90 %** cases of infant and adults.Gastrointestinal malignancies are most common lead points to cause intussusception in adults. Adhesion or foreign body can also act as lead points. Bowel within bowel configuration is most characteristic of intussusception [6].

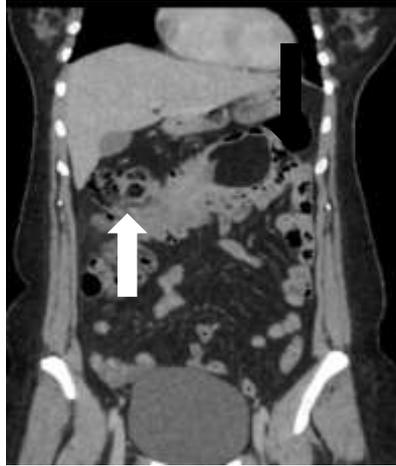


Figure 7:CECT abdomen shows bowel within bowel appearance in visualized loops(white arrow) .A large sized fat density lesion noted in the visualized bowel wall acting as lead point(black arrow).Features suggestive of intussusception.

Infections

Tuberculosis is more prevalent in countries like India. Most common site of gastrointestinal tuberculosis is ileocecal junction. It can ulcerative, hypertrophic or ulcerohypertrophic types. Fibrosis, stricturing in terminal ileum is seen in chronic untreated settings which can lead to high grade obstruction. Fleischer sign and stierlin sign are seen in acute to subacute stages. Fixed, incompetent and rigid ileocecal valves with shrunken and pulled up cecum noted in chronic stages[7].

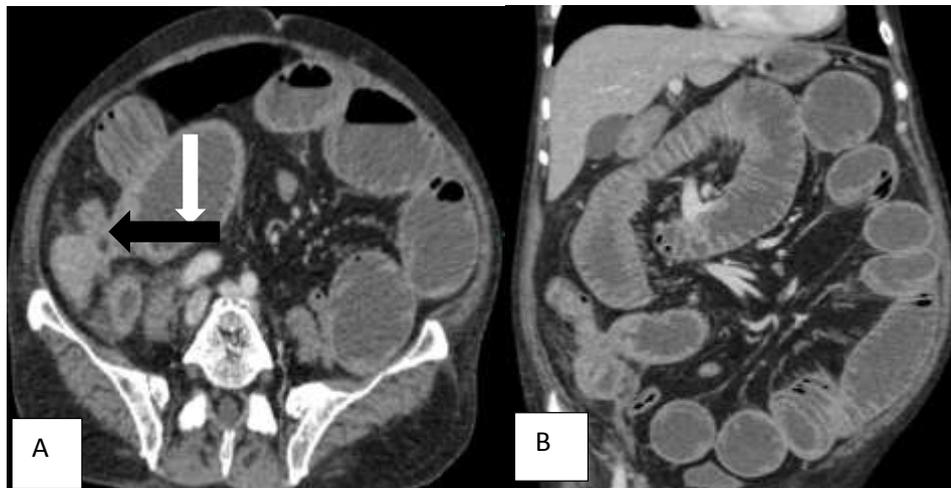


Figure 8(A,B) :CECT abdomen shows thickening of cecum,ileocecal junction and terminal ileum(white arrow) with luminal narrowing in the terminal ileum leading to obstruction.Proximal ileum appears dilated(black arrow).Features of ? infection,likely tuberculosis.

Malrotation

It is a congenital anomaly which develops when there is complete or partial failure in the midgut to take a complete 270-degree anti clockwise rotation around the axis of superior mesenteric artery. Obstructive symptoms such as abdominal pain and bilious vomiting presents in early weeks of life. Malrotation is rare in adults. Presentation of midgut malrotation depends on embryologic stage at which the anomalous rotation occurs. Usually, superior mesenteric vein is ventral and to right of superior mesenteric artery. Abnormal relationship between SMA

and SMV with twisting of small bowel and mesentery around SMA which is known as whirlpool sign on CT should raise suspicion of malrotation. Malrotation can be incomplete or non-rotation. Fibrous peritoneal Ladd bands are seen attaching cecum to retroperitoneum covering anterior portion of duodenum. Radiologic findings guide in early detection and intervention before patient becomes symptomatic that reduces mortality and morbidity [8].

Endometriosis

It is a chronic gynecological condition where functional endometrial glands and stroma are deposited outside the uterus. Seen typically in young women. Approximately 20 % of patients with intestinal involvement in endometriosis can develop small bowel obstruction. Endometriosis is a rare cause of small bowel obstruction. Involvement of small bowel is less common than large bowel. Endometrial deposits on anti-mesenteric edge of bowel are typically responsible for obstruction. Repeated hemorrhages from endometriomas cause inflammation leading to development of strictures, adhesions, and bowel obstructions [9].

Radiation

Exposure to radiation leads to toxic effects on small bowel wall and vasculature. Inflammation with mucosal and submucosal edema is seen in acute phases whereas healing and fibrosis occurs in chronic phases. Obstruction results from single or multiple sites of stenoses seen in chronic cases [10].

2. Conclusion

Small bowel obstruction is a common presentation which requires safe and effective management, and it depends on rapid and accurate diagnosis. Computed tomography provides information about degree, site of obstruction, presence of ischemia and cause of the obstruction. Imaging features play a vital role in decision making when it comes to management strategies.

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