

Operative and radiological Correlation in Patients with Intestinal Obstruction

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Abstract

Colicky stomach discomfort, nausea, vomiting, and constipation are indications of a minor intestinal blockage. If you have an obstruction in your proximal digestive tract, you're more likely to have nausea and vomiting than if the blockage is in your distal digestive tract. The vomitus's character is significant, as feculent vomitus indicates a more permanent blockage due to bacterial overgrowth. Partial blockage, as opposed to total obstruction, is characterised by continued passage of flatus and/or stool beyond 6 to 12 hours following symptom start. Abdominal distention is one of the symptoms of a small bowel obstruction, albeit it is more apparent when the blockage is in the distal ileum and may not occur at all when it is in the proximal small intestine. During the early stages of bowel blockage, bowel sounds may be heightened, but by the end of the condition, they may be nearly nonexistent. Evidence of intravascular volume depletion can be seen in the lab in the form of hemoconcentration and electrolyte imbalances. Mild leukocytosis is rather typical. Strangulated obstruction is characterised by abdominal discomfort that is out of proportion to the severity of abdominal symptoms, which may be an indication of intestinal ischemia. Tachodynia, localised abdominal discomfort, fever, significant leukocytosis, and acidosis are common symptoms. Strangulation is possible and urgent surgical intervention is required if any of these signs are present, thus the doctor should act quickly.

Introduction

Small intestinal obstruction is the most common surgical emergency involving the intestines and can be life-threatening if left untreated. Excluding unintentional trauma, this is the most frequent reason for a call to 911. Many diverse patterns and causes of blockage may be seen across

countries. For the first part of this century, blocked hernia was the most prevalent cause of intestinal blockage in Western countries. Adhesions within the abdominal cavity are now the leading suspect. However, blocked hernias continue to be the leading cause of this surgical condition in underdeveloped nations like ours. First, the surgeon needs to settle on the diagnosis, which in this case likely involves intestinal blockage. Second, considering the risk of intestinal ischemia (strangulation), which necessitates immediate investigation, re-emphasized the importance of prompt surgical intervention despite the inherent difficulties of doing so. Recognizing the clinical signs of strangulation and the increased risk of death in patients receiving extended conservative treatment.

OBJECTIVES:

- “To compare the intra-operative findings in cases of intestinal obstruction to radiological findings and correlate the percentage of cases where the finding matched and where the findings did not match”
- “To help with management of occult cases, in which the intraoperative findings and radiological findings did not correlate”
- “To find occult causes for obstruction, such as hidden malignancies, ischemic pathology for intestinal obstruction”
- “To assess the cause of obstruction using USG, CT and correlate with intra operative findings.”

Review of Literature

Embryology of Small Intestine

The primitive bowel and the remainder of the yolk sac are in open connection throughout early embryonic development. The human embryo's foregut and hindgut each have a blind ending tube created by the primitive gut, but the midgut is still temporarily attached to the yolk sac.

The gut and mesentery of a 5 week embryo will rapidly elongate, culminating in the creation of a main intestinal loop. The loop's open end is still connected to the yolk sac through the vitellointestinal duct. Cephalic loop anatomy evolves into the distal duodenum, jejunum, and ileum. The caudal limb is comprised of the ascending colon, the first two-thirds of the transverse

colon, the appendix, the caecum, and the bottom third of the ileum. The posterior digestive system matures into the distal one-third of the transverse colon, the sigmoid, the rectum, and a portion of the anal canal.

Fixation of the gut

The mesentery suspends the small and large intestines from the back of the abdominal wall. After the intestines have turned through their full arc, the mesenteries connecting the duodenum, the ascending colon, the descending colon, and the rectum to the posterior abdominal wall fuse, and the organs find themselves in the retroperitoneum.

Functions of Succus Entericus

1. “Digestive function – The enzymes of succus entericus act on the partially digested food and convert them into the final digestive products.”
2. “Protective function – The mucus present in the succus entericus helps in protecting the intestinal wall from the acid chyme, which enters into the intestine from stomach parietal cells secrete defensins which are the antimicrobial peptides.”
3. “Activator function – The enzyme enterokinase present in intestinal juice activates trypsinogen into trypsin.”
4. “Haemopoietic function – Intrinsic factor of Castle present in the intestine plays an important role in erythropoiesis.”
5. “Hydrolytic process – Intestinal juice helps in all the enzymatic reactions of digestion.”

Intestinal bacteria

The bacteria in the gastrointestinal tract can be divided into three types.

1. “Some are pathogens that cause disease.”
2. “Others are symbionts that benefit the host and vice versa, and most of them are commensals.”

Pathology

Distension occurs proximal to the obstruction and it starts immediately after the obstruction begins. Causes of bowel distension are: fluid, gas and intestinal toxins.

- (a) Fluid: “made up by the various digestive juices about 8 litres/day. In obstructive pathology, there will be increased enteric pressure leading to edema, shortening and clubbing of the intestinal villi leading to disturbed absorption. Also there will be a depletion of water and electrolytes due to vomiting, defective absorption, sequestration within the lumen of bowel”.
- (b) Gas: “Consists of swallowed atmospheric air, diffused air from blood into the intestinal lumen 22% and the products of enzymatic digestion and bacterial activity. When the O₂ and CO₂ has been absorbed into the blood stream, the resulting mixture is made up of N₂ (90%) and H₂S.”
- (c) Intestinal toxins: “In unrelieved strangulation, toxic substances tend to appear in the peritoneal cavity only when the viability of the intestinal wall is affected. When the obstruction is relieved, these toxic products may pass on to the bowel where absorption occurs. It is probable that the substances involved are mainly endotoxins of Gram negative bacilli.”

Classification of Intestinal Obstruction

“Acute intestinal obstruction is most commonly a disorder of small intestine and accounts for approximately 20% of all the surgical admissions.”

Intestinal obstruction can be classified into two types:

1. “Dynamic obstruction”
2. “Adynamic obstruction DYNAMIC OBSTRUCTION”

Where peristalsis is working against a mechanical obstruction.

Dynamic obstruction causes the proximal intestine to enlarge and change its motility, regardless of the origin or severity of the start. The intestine functions normally below the blockage, with peristalsis and absorption, until it is empty, at which time it contracts and becomes immobile.

Pain in the Stomach

Typically, abdominal discomfort is the first sign. Strangulation, in contrast to simple blockage, has a rapid and devastating start. The discomfort is widespread and poorly localised, spreading

from the upper abdomen to the umbilicus in the event of a high blockage, the lower abdomen to the colon in the case of a low obstruction, and the perineum to the genitalia in the case of a rectosigmoid obstruction.

Vomiting

The second most frequent symptom is vomiting. Owing to the persistent nature of this symptom, the initial vomiting is usually reflexive in character, and is then followed by a time of relative calm before the onset of true vomiting due to blockage. In cases of upper small intestine blockage, this calm time will be shorter, while in cases of lower obstruction, it will be longer. The vomitus alters in composition as acute intestinal blockage worsens. It starts off with partially digested meals and progresses to bilious vomiting. At some point, it starts to smell bad.

Distension

Abdominal distension is typically mild or nonexistent in the earliest stages of small intestine blockage. The stomach becomes distended with gas and the collected secretions when the proximal jejunum is blocked, which can cause the epigastric area to become prominent and tight in later stages. When the ileum is affected, there is mild distention in the midsection, and when the distal colon is obstructed, there is significant distention throughout the abdomen, especially in the flank area. Peristalsis may be visible to the naked eye.

Internal hernias

When a segment of the small intestine becomes herniated into one of the retroperitoneal Fossae, it is termed as internal hernias. This can occur in following sites:

- “Supra-vesical hernia”
- “Foramen of Winslow”
- “Diaphragmatic hernia: Acquired/Congenital.”
- “Caecal or appendiceal: Retroperitoneal fossae superior or retrocaecal”
- “A hole in the mesentery or mesocolon and defects present in the broad ligament.”
- “Paraduodenal fossae: Right/left paraduodenal fossae”

Even more unusual is a preoperative diagnosis of internal herniation in the absence of adhesions. A hernia is often treated by cutting through the tight tissue around it. Laparotomy and the releasing of a constriction ring are common treatments for internal herniations. The bloated loop must be decompressed before it can be shrunk. A resection and anastomosis is necessary after discovering an inoperable section of colon.

Multiple layers of air and liquids can be seen on a plain X-ray.

The 'pincer-shaped' or 'coiled spring' deformity or 'pinch fork' indication is characteristic of an ileo-colic type on a barium enema.

Treatment

Decompression of the small intestine using nasogastric suction should be initiated, and intravenous fluid delivery should start. Nonsurgical options for intussusception reduction include the following: Water pressure or air pressure.

Administrative leadership:

The incision for a laparotomy is made in the lower right quadrant of the abdomen. After locating the mass causing the intussusception, a manual reduction is tried. Squeezing the intussusception retrogradely causes the decrease without pulling on the segments. If the intussusception is very stubborn, an open technique including the insertion of the little fingers into the neck and the separation of the adhesions between the intussusception may be tried (Copes method).

Obstruction, both mild and severe

The second most prevalent cause of intestinal blockage is an external hernia that has become obstructed. The vast majority of individuals with minor intestinal obstruction have what is called "simple obstruction," in which the passage of luminal contents is obstructed but the gut wall is nonetheless healthy. In contrast, over 25% of individuals with minor intestinal blockage experience strangulating obstruction, which is the obstruction with restricted blood flow. Lactate dehydrogenase, amylase, alkaline phosphatase, and ammonia levels, among others, have all been tested in the serum without yielding useful information. Serum, creatine phosphokinase isoenzyme (particularly the BB isoenzyme), and intestinal fatty acid-binding protein have all

been reported to be useful in distinguishing strangulation from other causes of obstruction in preliminary reports, but these methods are still in the early stages of research and cannot be applied routinely to patients with obstruction. Finally, the use of a super-conducting quantum interference device (SQUID) magnetometer for non-invasive detection of mesenteric ischemia is reported. Consequences of intestinal ischemia include alterations to the small intestine's normal electrical rhythm. Keep in mind that there is no known clinical parameter, combination of criteria, or current laboratory or radiographic exams that can correctly identify or rule out intestinal ischemia and strangulation prior to surgery in all instances.

Intestinal Tuberculosis

Sixty percent of those with tuberculous enteritis will experience intestinal blockage, making it one of the most prevalent complications of the small bowel. The ileum, the proximal colon, and the peritoneum are frequent locations. The ileocaecal area and the terminal ileum are affected in around 75% of individuals with tuberculous enteritis. 33 Sixty percent of patients with tuberculous enteritis experience intestinal obstruction, making it the most prevalent consequence of the small intestine.

Paralytic ileus and mesenteric vascular blockage are two examples of adynamic obstruction, in which peristalsis is absent or present but not propelling.

Causes of Ileus

- “Idiopathic”
- “After laparotomy”
- “Metabolic and electrolyte abnormalities (e.g., hypokalemia, hyponatremia, hypomagnesemia, uremia, diabetic coma)”
- “Drugs (e.g., opiates, psychotropic agents, anti-cholinergic agents)”
- “Intra-abdominal inflammation”
- “Retro-peritoneal hemorrhage or inflammation”
- “Bowel ischemia”
- “Burns”
- “Strokes”

When a patient over the age of middle age suddenly presents with acute stomach discomfort that is not colicky in type and the patient has a history of cardiac sickness, mesenteric vascular occlusion must be investigated. The patient might faint and have bloody stools.

Clinical features

- i) "Pain which may be central abdominal in nature."
- ii) "Delayed Gastrointestinal emptying with persistent vomiting."

Material and Methods

Details of research plan

1. "Design of study: This is a hospital based case study in patients attending OPD or admitted in the surgery ward of Krishna Institute of Medical Science, Karad"
2. "Study Duration: 18 months December 2019 - June 2021"
3. "Sampling size and technique: Study comprises of 50 patients selected with randomised sampling."

SOURCE OF DATA:

"Patients admitted in Krishna hospital with the suspicion of intestinal obstruction"

INCLUSION CRITERIA:

- "Patients admitted in Krishna hospital with suspected intestinal obstruction"
- "Patients with radiological documentation"

EXCLUSION CRITERIA:

- "Patients not fit for surgery"
- "Patients not willing for surgery"

SAMPLE SIZE:

"N = 4pq/12"

“Where, p = the proportion of patients whose radiological findings matched the intra-operative findings (91.84%) q = the proportion of patients whose CT findings did not match the intra-operative findings (08.16%). l = allowable error (10)”

“According to data collected from above mentioned study, minimum sample size was found to be 30 with 95% Confidence Interval.”

$N=50$

Table: Intra-operative Findings

	Frequency	Percent
Abdominal tb	1	2.0
Adhesion	16	32.0
Bowel ischemia	4	8.0
Colonic perforation	1	2.0
Hernia	10	20.0
Intussuception	3	6.0
Meckels diverticulum	2	4.0
Neoplasm	3	6.0
Patent urachal tract	1	2.0
Perforated appendix	2	4.0
Perforation	4	8.0
Stricture	1	2.0
Volvulus	2	4.0
Total	50	100.0

Data Collection Procedure

Informed consent obtained before patient admission. Participants will be those who have been diagnosed with intestinal blockage.

Patients who are deemed medically unfit for surgery will be removed from consideration.

A customised proforma will be used to document the entire tale. Every patient will have a complete physical checkup that includes checking their stomach and genitalia.

All signs of illness in the cardiovascular, respiratory, and central nervous systems are analysed. Preoperative examination and suitability for anaesthesia will involve the appropriate diagnostic tests, such as a complete blood count, blood urea, blood sugar, urine RE, and chest X-ray.

Discussion

Patients who sought treatment at Krishna Hospital for intestinal blockage had surgery; throughout this process, the surgeons took careful notes on any findings they observed during the procedure and compared them to the imaging results.

The intraoperative results agreed with the radiological findings in 84% of the instances and disagreed in 16% of the cases. Two of the cases that did not correlate were found to have ischemic bowel during surgery, despite the fact that radiology had failed to identify this condition; in these instances, the ileum was resected and anastomosed in lengths of 50 and 20 centimetres, respectively, with the IC junction in the former case, and the jejunum and ileum, measuring 40 centimetres, in the latter; in both instances, the drain was left in place. The other was a transverse colon perforation, which was diagnosed as pancreatitis with peri-pancreatic collection on the imaging scans, and required a transverse loop colostomy to be performed proximal to the perforated site.

It was shown that adhesions and bands were the most prevalent cause of intestinal blockage in the 84% of cases that correlated, followed by neoplasms, ischemic bowel, intussusception, hernias, and volvulus. Thus, while imaging can aid in the diagnosis of intestinal blockage, it is essential not to neglect the results of a thorough clinical evaluation. Kadhim Jawad Obaid performed a research in 2011 in which they analysed the pre- and post-operative notes of patients with intestinal obstruction and discovered that hernias were the most prevalent cause of obstruction, followed by adhesions and bands, neoplasms, intussusception, and ischemic bowel.

Summary and Conclusion

Finally, it was determined that, among the 50 cases analysed, 84% of the time, surgical results matched radiological findings. Intestinal blockage can be diagnosed using radiological tests, but clinical assessment is still the gold standard. Early investigation was found to be necessary in many situations when the clinical evaluation did not match the radiological result, or where the radiological report was not definite. Keep in mind that early investigation may be required to

save the patient's life in extremely rare circumstances, such as intestinal ischemia or a diverticulum causing gangrene, so don't depend just on the radiological assessment.

Surgical and radiological results agreed 84% of the time, but disagreed in 20% of instances. Ischemic bowel disease was found in 8 out of the 16 cases (16%) that did not have a correlation. The most common conditions were intestinal perforation, occult mass in the ascending colon, and ischemic bowel. Thus, while imaging can aid in the diagnosis of intestinal blockage, it is essential not to neglect the results of a thorough clinical evaluation. When there is no correlation between the results of the clinical exam and the results of the radiological test, or when the radiological results are ambiguous, prompt surgical intervention is warranted.

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