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Clinical profile of patients with ileal perforation at a tertiary care hospital

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Abstract
Normal peritoneal wound heals smoothly without adhesion formation. Adhesion develops in response to factors other than simple peritoneal wounding. Local tissue hypoxia and ischemia of the wound appear to be important factor in stimulating adhesion formation, other causes are mechanical injury to the subperitoneal surface, intraabdominal infection and contamination of the peritoneal cavity by foreign material. A detailed history was taken and the presenting signs and symptoms were recorded. A thorough physical examination was done with special emphasis on the abdominal examination. Laboratory investigations included routine blood, urine and stool examinations. Total count and differential leucocyte count were done in appropriate cases. Majority of the patients with Ileal Perforation (37.5%) were in the age group of 41-50 years followed by 25% in the age group of 31-40 years and 12.5% in the age groups of 11-20 years, 51-60 years and >60 years. The mean age of the patients was 44.5 ± 16.32 years.

Keywords: Ileal perforation, peritoneal wounding, clinical profile

Introduction
The intestinal contents are mixed with the secretion of the mucosal cells and with pancreatic juice and bile. Digestion is completed in the lumen and mucosal cells of the small intestine. The small intestine contains about 9lts of fluid per day, 2lts from dietary sources and 7lts of gastrointestinal secretion. The contractions of small intestine are co-ordinated by the small bowel slow wave, the frequency of which decreases from about 12/min in the jejunum to about 9/min in the ileum [1].

The movement of small intestine mix the chyme and propel it towards large intestine. Removal and restore of a segment of intestine in its original position does not block progression and waves cross even a small gap where the intestine has been replaced by a tube.

Brunner's glands in the duodenum secrete thick alkaline mucus that probably helps to protect the duodenal mucosa from the gastric acid. It is stimulated by vagus.

The function of colon is absorption of water, sodium and other minerals. The portion of the ileum containing the ileoceacal valve projects slightly into the caecum so that increase in colonic pressure closes and increase in ileal pressure opens it. Thus, it effectively prevents reflux of the colonic content in the ileum [2].

The movement of the colon are propagated in the circular smooth muscle by a slow wave of the colon, the frequency of which is about 2/min in the ileoceacal valve to 6/min at the sigmoid.

Any inflammatory even in the peritoneal cavity results in local peritoneal irritation with loss of regional mesothelial cells. A large peritoneal defect heals in the same amount of time as a small defect, usually 3-5 days [3].

Experimentally, it has been shown that 3 days after peritoneal injury the wound surface is covered by a layer of connective tissue cells resembling new mesothelium. At day 5, the new surface layer closely resembles adjacent normal mesothelium. By day 8, mesothelial regeneration is complete. The exact origin of cells responsible for mesothelial regeneration remains unclear. It has been suggested that regeneration mechanism include submesothelial stem cells producing new mesothelial cells, surviving mesothelial cells floating free or attached at the wound edges migrating into the wound, and the peritoneal fluid, monocytes and macrophages differentiating into mesothelial cells [4].

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the wound appear to be important factor in stimulating adhesion formation, other causes are mechanical injury to the subperitoneal surface, intraabdominal infection and contamination of the peritoneal cavity by foreign material.

The peritonal cavity has an enzyme system that function to lyse fibrin deposits, plasminogen in concentrated in the endothelium of the submesothelial blood vessels and to a lesser degree in the peritoneal mesothelin itself. The plasminogen, when converted to plasmin by a plasminogen activator system, is capable of lysing fibrin deposits [5].

Mechanical abrasion of the peritoneal surface completely abolishes this activity, which returns only over a period of days.

Intraperitoneal adhesions form in the majority of patients following abdominal surgery and also occur after other causes of peritoneal inflammation. They account for 25-33 percent of all cases of intestinalobstruction in developed countries, and are the commonest cause of small bowel obstruction. Any inflammatory exudate forms following peritoneal injury and leads to the deposition of fibrin in the peritoneal cavity.

The finding of decreased PAA (Plasminogen activating activity) in patients with peritoneal inflammation and ischemia, conditions which produce adhesions, supports the unifying hypothesis that a reduction in mesothelial PAA leads to fibrous adhesion formation.

In essence, the final resolution of the infecting focus would seem to depend on the critical interaction between the phagocyte and the bacterium within a fibrin laden microenvironment.[6]

Methodology

Each patient was examined thoroughly, after taking a detailed history. The diagnosis and examination was made with history, clinical features and X-ray abdomen erect posture to support the diagnosis each case was studied at per the following proforma.

Based on the time interval between the hospital admission and surgery, the surgery were categorized into,

- Immediate - Less than 4 hours
- Same day - 4 to 24 hours
- Delayed - more than 24 hours

Operative details included the site of the perforation, size of the perforation, nature and quantity of peritoneal soiling, the gross appearance of the bowel bearing the perforation and the nature of operation performed.

Tissue biopsies for histologic confirmation were taken in appropriate cases. Mortality was defined as death following surgery. Morbidity was defined in terms of duration of hospital stay and associated complications following surgery.

A detailed history was taken and the presenting signs and symptoms were recorded. A thorough physical examination was done with special emphasis on the abdominal examination. Laboratory investigations included routine blood, urine and stool examinations. Total count and differential leucocyte count were done in appropriate cases. Diagnostic peritoneal tapping was done after taking X-ray and subjected to culture and sensitivity tests. Radiological examination was done in all the cases to detect pneumoperitoneum. Ulcer edge biopsy was taken from cases of, wherever possible, peptic and non-specific ileal perforations and subjected to histopathological examination. In operated cases peritoneal exudate was sent for culture and sensitivity test of the organisms present.

The pre-operative preparation of each case essentially consisted of correction of dehydration, overcoming the shock if it was present, gastric aspiration, parental broad spectrum antibiotic coverage and tetanus prophylaxis. The treatment to be adopted in each case was decided by the attending surgeon. Post-operative fluid and electrolyte balance was maintained by input and output charts and adequacy of replacement was judged mainly on the basis of clinical features. In most of the cases antibiotics started pre-operatively were continued and changed to suitable antibiotics after the sensitivity of the organisms was known. The drainage tubes were removed on the 3rd and 4th post-operative day and the gastric aspiration was discontinued as soon as the patient passed the flatus. The post-operative complications were studied in the immediate follow up period.

Results

Majority of the patients with Ileal Perforation (37.5%) were in the age group of 41-50 years followed by 25% in the age group of 31-40 years and 12.5% in the age groups of 11-20 years, 51-60 years and >60 years. The mean age of the patients was 44.5 ± 16.32 years.

Table 1: Age distribution of patients with ileal perforation

Age	No. of Cases	Percentage
11-20	1	12.5%
21-30	0	0.0%
31-40	2	25.0%
41-50	3	37.5%
51-60	1	12.5%
>60	1	12.5%
Total	8	100%
Mean ±SD	44.5 ± 16.32	

There were 6 (75%) male patients and 2 (25%) female patients with Ileal Perforation in the study.

Table 2: Sex Distribution of patients with Ileal Perforation

Sex	No. of Cases	Percentage
Male	6	75%
Female	2	25%
Total	8	100%

All patients with Ileal Perforation presented with abdominal pain while 7(87.5%) patients with rigidity, 5(62.5%) patients with distension.

Table 3: Distribution of patients with Ileal Perforation according to Symptoms

Symptoms	No. of Cases	Percentage
Abdominal Pain	8	100%
Rigidity	7	87.5%
Distension	5	62.5%

All patients (75%) with Ileal Perforation underwent surgery on the same day while 1 (12.5%) patient each were operated immediately and with delay. The mean time interval between admission and surgery of patients was 13.5 ± 11.08 hours.

Table 4: Time interval between admission and surgery of patients with ileal perforation

Time Interval (Hours)	Surgery	No. of Cases	Percentage
0-4	Immediate	1	12.5%
4-24	Same Day	6	75%
>24	Delayed	1	12.5%
Total		8	100%
Mean ± SD			13.5 ± 11.08

Discussion

Upper and lower gastrointestinal perforation can be differentiate by transverse mesocolon such as the peritoneal cavity, usually divided into supra- and inframesocolic compartments.

Subsequently, stomach or duodenal perforation would result in supramesocolic compartment gas and distal small and large bowel perforation in inframesocolic compartment gas.

Sections of the GI tract, such as stomach, first part of duodenum (5 cm), jejunum, ileum, caecum, appendix, transverse colon, sigmoid colon and upper third rectum are found within the peritoneal cavity, and are usually mobile.The second and third parts of the duodenum, ascending and descending colon and middle third of rectum are retroperitoneal and fixed; therefore, they may present with gas within the retroperitoneal compartment, usually the anterior pararenal space [7].

The presence of free intraperitoneal gas on a routine radiograph usually indicates bowel perforation. Experimental studies have shown that as little as 1 ml of gas can be detected below the right hemidiaphragm on properly exposed erect chest radiographs.

Various radiological descriptions are used for specific distribution of free intraperitoneal gas, such as the Rigler sign (Gas outlining both sides of the bowel), football sign (oval shaped peritoneal gas), increased lucency in the right upper quadrant (Gas accumulating anterior to the liver) and triangle sign (Triangular gas pocket between three loops of bowel).

Otherwise, the most relevant signs on CT are the "ligamentum teres sign" (Free gas outlining the intrahepatic fissure and ligamentum teres, often due to perforation of the duodenal bulb or stomach), the "periportal free gas sign" (strongly suggests upper GI tract perforation) and the "falciform ligament sign" (Free gas or a gas-fluid level crossing the mid-line and accentuating the falciform ligament, characteristic of perforation of the proximal GI tract.

Although conventional radiography is a common method for detecting small amount of intraperitoneal free air, imagers may not detect pneumoperitoneum or retroperitoneum in up to 49% of patients; in addition, many patients with acute abdominal pain cannot stand to have a chest radiograph, so decubitus abdominal x-ray is usually used [8].

Other modalities include ultrasound, often considered an extension of clinical examination; it is routinely used to examine patients with undiagnosed abdominal pain, including those with occult gastrointestinal perforation for which the diagnosis was not previously suspected, despite the difficult differentiation between intraperitoneal free air and intraluminal bowel gas due to multiple reflection artifacts and dirty shadowing. Ultrasound may be particularly useful also in patient groups where radiation burden should be limited notably children and pregnant women.

Although the common causes of acute abdominal pain are acute appendicitis, diverticulitis, cholecystits and bowel obstruction, less frequent conditions may cause acute abdominal pain including perforated viscus (about 1%) and bowel ischemia.

Perforation of a peptic ulcer is now less frequent because of the availability of adequate medical therapy for peptic ulcer disease. Only 1-2% of patients have free perforation due to acute diverticulitis, also because most perforated diverticula are contained perforations.

In the emergency department, an accurate diagnosis can be made exclusively on the basis of medical history, physical examination and laboratory test findings in only a small proportion of patients.

The clinical manifestations of the various causes of acute abdominal pain usually are not straightforward; besides the variable symptoms of the underlying mechanism, a rigid abdomen usually is present [9].

For proper treatment, a diagnostic work-up that enables the clinician to differentiate between the various causes of acute abdominal pain is important, and ultrasonography plays an important role in this process. It is widely available and is easily accessible in the emergency department, is a real-time dynamic examination that can reveal the presence or absence of peristalsis and depict blood flow. Otherwise, the major advantage of CT, as compared with radiography and US, is that it can correctly depict the actual site of perforation in 86% of cases. Despite of the difficulty in the detection of perforation at ultrasonography, it could be diagnosed in supine patients, adiacent to the abdominal wall, the radiologist identifies echogenic lines or spots with comet-tail reverberation artifacts.[10]

Some authors demonstrated that US has lower sensitivity than radiography (76% vs. 92%, respectively) and should be used in selected cases only (clinical conditions preventing radiographs from being performed correctly, persisting clinical souspicious with negative or questionable radiographics findings, the exclusion of other acute abdominal conditions, and finally the presence of pneumoperitoneum in the patients referred for different clinical reasons).

However, in literature some authors demonstrated that ultrasonography has greater accuracy (90% vs. 77%) if compared with x-ray (sensitivity 93%vs. 79%) and that ultrasonography is a useful diagnostic modality when x-rays does not reveal pneumoperitoneum in patients with suspected perforation. Nevertheless, its detection is difficult even for an experienced sonographer especially because the presence of intraperitoneal air outside the intestinal lumen is unusual and can be mistaken for air with in the bowel.

The sonographic appearance of free intraperitoneal air results form scattering of the ultrasound waves at the interface of soft tissue and air which is accompanied by reverberation of the waves between the transducer and the air. The sonographic appearance of free intraperitoneal air results form scattering of the ultrasound waves at the interface of soft tissue and air which is accompanied by reverberation of the waves between the transducer and the air This results in an increased echogenicity of a peritoneal stripe associated with multiple reflection artifacts and characteristic comet-tail appearance that can be changed by changing the patient's position.

Conversely, intraluminal bowel gas is always associated with a more superficial, normal thin peritoneal strip.

In small air collections reverberation artifacts may not be seen, whereas in extensive pneumoperitoneum found pronounced pre-hepatic echoes with sound shadow phenomenon may obscure the underlying abdominal organs [11, 12].

Direct sign, such localized gas collections related to bowel perforations, may be detectable, particularly if they are associated with other sonographic abnormalities, called indirect signs (thickened bowel loop and air bubbles in ascitic fluid or in a localized fluid collection, bowel or gallbladder thickened wall associated with decreased bowel motility or ileus).

Conclusion

Any inflammatory even in the peritoneal cavity results in local peritoneal irritation with loss of regional mesothelial cells. A large peritoneal defect heals in the same amount of time as a small defect, usually 3-5 days.

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