

A Retrospective Study of Intestinal Obstruction and Anastomotic Leak in Emergency and Sepsis Cases

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ABSTRACT

BACKGROUND

Intestinal obstruction is one of the most common intra-abdominal problems dealt by general surgeons. The morbidity and mortality are much higher than many diseases. If diagnosed & treated early, the recovery time, morbidity & mortality are much less. Hence the need for the study.

METHODS

We have analysed 216 cases of intestinal obstruction done by a single surgeon in one hospital in the last three decades. Differences in the selection, surgical skill, capability, & post-operative care management are excluded by including a single surgeon's (1st Author) operated cases. Only operated cases are included in the study. Conservatively managed patients are not included in this study.

RESULTS

Females are more affected 56%, than 44% males. If Pelvic pathology cases are excluded – both sexes are equally affected. Small intestine was affected in 88 % of patients. Anastomotic leak occurred in 8 patients (3.7%). Burst abdomen occurred in 4 patients - 1.85%. Re-exploration was done in 13 patients (6.0%). LAMA & death together accounted for 6 cases (2.8%). Success rate of all operations was 97.2%.

CONCLUSIONS

Female sex is more commonly effected. Adhesion & bands are major causes of small bowel obstruction. Anastomotic leak is common in strangulated bowels with associated with septic shock. PGA (Vicryl) & PDS are better than catgut in decreasing the leak rate. Mortality rate is more in anastomotic leak patients.

KEY WORDS

Intestinal Obstruction, Small Bowel, Ileum, Jejunum, Appendix, Colon, Hernia Volvulus, Anastomosis, Colostomy, Adhesions, Anastomotic Leak

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DOI: 10.14260/jemds/2020/462

How to Cite This Article:
Sambasivudu C, Vineela C. A retrospective
study of intestinal obstruction and
anastomotic leak in emergency and sepsis
cases. J. Evolution Med. Dent. Sci.
2020;9(30):2119-2123, DOI:
10.14260/jemds/2020/462

Submission 21-04-2020,
Peer Review 13-06-2020,
Acceptance 22-06-2020,
Published 27-07-2020.

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BACKGROUND

Intestinal obstruction is defined as a condition “when normal propulsion & passage of intestinal contents cannot occur for any reason. This can involve small bowel or large bowel or via systemic alteration in metabolism, electrolyte balance, or neuro-regulatory mechanism involving the bowel¹”.

Hippocrates the father of medicine recognized, described & treated bowel obstruction. Praxa Goras done earlier recorded operation for bowel obstruction. Circa in 350 BC treated bowel obstruction by decompression i.e. Enterocutaneous fistula.¹

Intestinal obstruction may be due to

1. Mechanical (Physical) obstruction or dynamic obstruction,
2. Adynamic or functional obstruction, it is ineffective motility without any mechanical obstruction – paralytic ileus.

Mechanical obstruction is the most common & for all practical purposes it is synonymous with intestinal obstructions in this study. We are dealing with mechanical obstruction only. 15% of hospital admissions for pain abdomen are due to intestinal obstruction.² In first third of the 20th century Intestinal obstruction is mainly due to inguinal hernial obstruction. In the 2nd half the 20th the century adhesions & bands are common causes due to a greater number of abdominal surgeries. Now in 21st century pelvic pathology adhesions involving uterus & adnexa to intestines are seen more commonly than before³ due to high incidence of caesarian section for delivery (LSCS).

Intestinal obstruction is most commonly encountered disease in the surgical emergency OPD. 1% of all hospitalizations & 3% of all surgical admissions & 4 % all major laparotomies are due to intestinal obstruction⁴. It is simple surgery if obstruction is due to simple adhesion or band without any bowel damage. It is highly complicated if bowel is gangrenous due to vascular impairment either due to large volvulus or strangulated hernia or plastered intestines in long standing peritonitis. It carries high mortality of 10 - 37%⁵. Hypotension & septic shock – which leads to multi organ failure and death. We have done all intestinal anastomosis with hand sewn sutures & all are open surgeries only.

Objectives

1. To know the various causes of intestinal obstructions & its morbidity & mortality specially so in strangulated & long-standing obstruction due to intestinal perforation & sepsis.
2. To decrease the anastomotic leak & there by decreasing the morbidity & mortality.

METHODS

We have studied 216 cases of intestinal obstruction retrospectively operated by single surgeon (1st author). Both small & large bowel obstruction cases of all causes are included in this study. Conservatively managed intestinal obstruction cases are not included - due to lack of definitive

Age (Years)	Male	Female	Total	Percentage
0 - 20	14	14	28	13.0%
21 - 40	34	48	82	37.96%
41 - 60	29	44	73	33.79%
61 - 80	16	14	30	13.76%
> 80	02	01	03	1.38%
Total	95	121	216	100%
Percentage	44%	56%		

Table 1. Age & Sex Wise Distribution of Cases of Intestinal Obstruction

Sl. No.	Small Bowel	Utero Adnexal Pathology	Appendix Abscess & Adhesions with Obstructions	Colon Inflammatory & Hernial Obstruction	Malignancy
1	146	20	24	7 + 3 = 10 (38.4%)	16 (61.5%)
2	67.6 % 190 / 216	9.26% 88 %	11.1%	4.6 12 %	7.4%

Table 2. Site of Bowel Involved in Intestinal Obstruction

Sl. No.	Cause of the Obstruction	No. of Cases	%	Nature of the Lesion %
1	Adhesions only	57	26.4%	Pure Adhesions
2	Pelvic adhesions, + post LSCS	20	9.26%	42.66%
3	bands	15	7.0%	
4	Appendicular abscess & + mass with intestinal obstructed	10 + 14 = 24	11.1%	11.1%
5	Inguinal hernia with obstructed, + strangulated	12+3 = 15	6.9%	Hernias 16.7%
6	Femoral hernia – obstructed, strangulated	1+2 = 3	1.4%	
7	Incisional hernia, + other ventral hernias, (obst., + strangulated)	14+4 = 18	8.3%	
8	Volvulus, small bowel, + sigmoid colon	8+4 + 12, 4 Non-Gangrenous, + 8 Gangrenous	5.6%	5.6%
9	Meckel’s diverticulum of ileum	9	4.2%	
10	Malignancy	16 + 5 = 21	9.7	9.7 %
11	Tuberculosis of abdomen	4	1.85%	
12	Ischemic causes acute segmental enteritis + mesenteric vascular	3 + 1 = 4	1.85%	
13	Post radiation adhesion	4	1.85%	
14	Urachal cyst with obstruction	3	1.4%	
15	Intussusception	2	0.93%	
16	Other causes, primary peritonitis etc...	5	2.3%	
	Total	216	100%	

Table 3. Causes of Intestinal Obstruction in Detail

Sl. No.	Site	Total	Resection, + Anastomosis /Strictureplasty	Perforation Closure	Anastomotic Leak	Re-exploration, + Revision
1	Small Bowel	70	55	15	7	4
2	Large Bowel Resection	13	10	3	1	1
3	Bypass ileo – Transverse Colostomy	5	5			
4	Diversion Colostomy / Caecostomy / Ileostomy	7				
	Total	95	70	18	8	5
	percentage	44%	32.4%	8.3%	3.7%	2.3%

Table 4. Resection of the Bowel/Closure of the Perforation, + Complications

aetiology confirmation. Trauma either blunt or stab wound cases producing hemoperitoneum/Ectopic pregnancy rupture cases are also not included. Supra meso colic perforations like gastric perforation, DU perforation are not included in this study. Simple appendicitis/gangrene/perforation or minimal adhesions are not taken into this study. Only appendicular abscess or appendicular mass with considerable adhesions

producing distension of the small bowel & acute small bowel obstruction only are included in this study. Immediate post-operative adhesion obstructions after LSCS cases within 2 weeks are included – (5) cases. Ruptures of the ovarian tumour /cyst with adhesions to the uterus & intestines producing intestinal obstructions are included in this study – (15). Sub-acute intestinal obstruction of colonic malignancy, tuberculosis, perforations of small bowel & colon producing intestinal distension, adhesions are all included in this study.

All of them are operated under spinal/general anaesthesia. Many patients of strangulated bowel with hypotension are treated with inotropes like dopamine 5–20 micro grams/Kg/Minute. doses for 1–5 days preoperatively & post operatively till recovery. Acute renal failure is also treated accordingly. Anastomosis /closure of perforation of small bowel done with 2–0 chromic catgut and 2 - 0 silk in two layers before 2005. After 2005 all anastomoses were done with 2 – 0/3-0 PGA (Vicryl) & silk (Continuous). Colocolic anastomosis was done with 2-0 PGA (Vicryl) interrupted single layer /Double layers.

All are open surgeries & hand sewn anastomosis only. It is less costly. When signs of anastomotic leak occurred generally in 5–7th post-operative day – reexplored in 5/8 cases & re-anastomosis/diversion procedures were done basing on the condition of the patient. The curative surgery was done in all cases depending on their aetiology namely, adhesiolysis, band release, herniotomy + repair, appendectomy + drainage abscess, resection of strangulated bowel, closure of the perforation of the bowel, diversion, de functioning procedures were done accordingly. Management wise analysis – bowel resection / perforation closure is shown in table 4.

Complications

Immediate Post-Operative Complications

1. Recovery from Anaesthesia- Not recovered well in 3 people, hence ventilated per 1 – 2 days –recovered well.
2. Septic Shock- Hypotension and septic shock within 6–12 hrs., of the surgery in 20 patients who were treated with dopamine drip 5 – 20 micro grams per KG per minute dose till they recover from the condition, IV Fluids, antibiotics & steroids if necessary.
3. Burst Abdomen- 5 – 7 days post-operative period – 4 cases, burst repaired under anaesthesia recovered & discharged well.
4. Post-Operative Obstruction- 4–6 postop day–4 cases, reexplored adhesiolysis + peritoneal lavage done recovered well & discharged.
5. Re-exploration in Anastomotic Leak- 5 cases, Total – 13 Re-explorations.

Total Anastomotic Leak – 8

3 people were not willing to re-exploration. Post radiation badly plastered intestines (1), mesenteric vascular Ischemia (1), 7 days old peritonitis following hysterectomy injuring ileum outside- 1/3 They got discharged against medical advice (LAMA). Treated as deaths in our study. 2 cases of

ileal resection had leak and reexplored – not recovered peristalsis (? Neuro- Regulatory). 3 days old strangulated inguinal hernia resection ileal leak – reexplored & revision anastomosis done septic shock. Above 3 patients had multi organ failure and died in hospital. Sigmoid colon resection and primary colorectal anastomosis had leak – diversion colostomy done – recovered well. Post radiation resection anastomosis leak reexplored & sutured + peritoneal lavage – recovered well.

Wound Infection

Superficial wound infections: in 15 cases –6.9% - PUS drained – and dressings done regularly – recovered in 7 - 10 days post operatively.

RESULTS

Females are affected are more – 56%. 21 – 40 yrs. people are affected 38 %. Small bowel obstruction is more common 88 %. Colon is involved in 12 %. Pure adhesions & bands constitutes 42.66%. Inflammatory pathology (appendicular) 11.1%, Hernia is cause of the obstruction 16.7 % malignant obstructions are 9.7% & volvulus in 5.6% & other causes are in 14.38%. Septic shock in 9.26%, Burst abdomen in 1.9%. Resection+ EEA+ BYPASS anastomosis 32.4 %, re-exploration in 6% of cases, Anastomotic leak rate 11%, mortality rate 2.8%, success rate 97.2%.

Serious Cases

If we take strangulated/perforated/gangrenes/malignant cases 6/88 – we have the death rate of 6.82 – 7 %. Hospital stay: 8 – 14 days.

DISCUSSION

Female sex is more involved due to pelvic organ adhesions producing intestinal obstruction. The same is true with other series of India & Abroad.⁶ Small bowel is involved in 88 %. Colon is involved in 12 % of cases in our series–Out of them. Malignancy constitutes 61.5 % & inflammatory & obstruction due to hernia causes- 38.5%. Haribhakti et al, quoted in their surgical gastroenterology book - 80% of intestinal obstruction is due to small bowel, 20% is due to large bowel. Out of large bowel lesions - colorectal malignancy is 60 -70 % & other causes 30 – 40%. From Western country series quotes 80 – 90% are small bowel obstructions & large bowel constitutes 10 – 20%. Out of large bowel lesions 60 – 70 % are malignancy, 30 – 40% are due to volvulus, diverticulitis and Chron's. Our series incidence is reasonably consistent with the above studies.

In our study Adhesions, bands & gynaecological causes are more common – 42.66%. Appendicular causes are in 11.1 % & hernia causes are - 16.7 %. Malignancy is 9.7 % in cases, Volvulus is 5.6%. Ischemic causes 1.85 %, Post radiation 1.85 %. According to textbook of surgery Bailey & Love's- Adhesions constitute 40 %, Hernias – 12%, Inflammatory – 15

%, Carcinoma-15%, Faecal impaction - 8%, Pseudo obstruction - 5% & other causes are 5 %.⁷

We have not operated any faecal impaction case. We have relieved the obstruction by manual evacuation. Hence, we have not included in our study. Pseudo obstructions (? Adynamic) are not included in our study. Malignant causes are less in our study - might be due to small center & single surgeon series.

Miller G et al quoted in their series colorectal surgery causes-24%, adhesions, gynaecology surgery 22%, herniorrhaphy 15% & Appendicectomy 14 %.⁸

Foster NM et al in their prospective study of longitudinal and population-based analysis of SBO -Adhesions are 38%, Hernia repair 38%, Small bowel resection - 18% are the causes of the obstructions.⁹

Our study reports are not much variant of the above studies. Due to late presentation of appendicular causes, Enteric perforations with obstructions, increased incidence of incisional hernia obstruction, strangulation & Increased LSCS rates might be responsible for the differences.

We have 5.6% of both small bowel & sigmoid colon volvulus. Among the volvulus small bowel constitutes 67 % - (3.7% of all cases) & Sigmoid volvulus 33 % - (1.85% of all cases). Out of them 67 % strangulated. In the Bolivian and Peruvian Andes, high altitudes of 10,000 feet and above will have more, commonly affected with sigmoid volvulus 79%. But other series quotes 1 - 4 % of sigmoid volvulus of all intestinal obstructions.¹⁰

Ischemic causes - We have 4 patients of intestinal ischemia. 3 cases are patchy or segmental gangrenous small bowel with mesenteric arcade thrombosis. One case of frank large segment small bowel ischemic gangrene due to medium sized artery thrombosis. Acute segmental necrotizing enteritis is seasonal disease as reported by Pujari et al¹¹ & J. D. WIG et al.¹² Mesenteric vascular ischemic lesions of the bowel carries high mortality according to Schoot's et al.¹³ Which is same in our study also.

We had only 0.9 % of intussusception cases responsible for intestinal obstruction. It is less than other series of 2 %.¹⁴

Intestinal tuberculosis is not rare in earlier days but now it is decreased due to widespread use of Anti tuberculosis treatment (ATT). We had 2 cases of intestinal strictures - where Strictureplasty¹⁵ was done & 2 cases of peritoneal tuberculosis treated with ATT.

We have not encountered either diverticulitis/Chron's disease producing intestinal obstruction in this place.

We have 4 cases of post radiation intestinal obstruction due to mainly small bowel adhesions & plastered coils to each other. They are very much difficult to lyse or separation, hence we have done Bypass/defunctioning procedure. Due to increased longevity of post malignant therapy - these cases are increasing.

We have done 70 resections of both small bowel & large bowel and end to end anastomosis of bowel or ileotransverses colostomy. All are hand sewn anastomosis mostly double layer continuous PGA (Vicryl) suture. Left colic anastomosis were done with interrupted single- or double-layer sutures. Majority of the cases are strangulated/gangrenous bowel due to volvulus/strangulated inguinal, incisional hernias/Peritonitis with necrotic bowel. Nearly 10% of all cases or 28.6% resection cases were associated with septic shock. 1.85% resections are in post radiation cases.

We had anastomotic leak of 11% in resection cases out of them 6.8% resections had Left against Medical advice or death in hospital.

For any bowel anastomosis to heal well, the following¹⁶ criteria are necessary-

1. Well-nourished patients.
2. Good vascularity of tissue of both ends of bowel.
3. Clean bowel -No luminal or extra luminal contamination.
4. No tension on anastomosis.
5. Meticulous surgical technique - Good opposition & inversion of mucosa.
6. Good exposure.
7. Monofilament & coated suture material which invites - Lesser inflammatory reaction & durability.

Factors which delay¹⁷ healing are

1. Septic shock - hypotension - Decreased vascular supply to the anastomosis.
2. Post radiation, which causes micro vascular damage - decreases vascular supply to the anastomosis.
3. Anaemia & Diabetes
4. Chemotherapy
5. Malnutrition & hypo albuminemia.
6. Vitamin deficiency
7. Jaundice & Uraemia.

Various authors reported anastomotic leak rates ranging from 5-28% in elective cases. Singh et al reported anastomotic leak rate of 5-9%.¹⁸ Metthiessen et al reported over all anastomotic leak rate of 19.2 % without diversion stoma 28 %.¹⁹ Fielding et al reported anastomotic leak rate of 13 %²⁰. Anastomotic Leak rate is less in small bowel due to less extensive collagen loss & restored more rapidly. Small bowel is also more vascular²¹. Burch MM et al reported almost equal anastomotic leak rate in single layer or double layer anastomosis.²² G Docherty found not much difference between stapled verses hand sewn anastomosis in clinical anastomotic leak, morbidity and mortality rates²³. Stapled anastomosis is technically problematic, more costly and more post-operative strictures. Our anastomotic leak rate of 11 % in emergency and toxic conditions are within the range of acceptability.

We had re-explorations in 6 % of cases due to

1. Anastomotic leak
2. Burst abdomen.
3. Post-operative adhesions - altogether.

Elloz et al reported reexploration rate of 13%²⁴ Metthiessen et al reported urgent reexploration rate of 25.4% in patients without diversion stoma.

Mortality Rate

We had 2.8% mortality rate out of all intestinal obstruction or 6.8% of all strangulated and perforation cases. Various series quotes mortality rate of 10 - 37%⁵. Our mortality rate is less due to 1. Early diagnosis 2. Careful observations 3. Prompt & needed surgery 4. Post-operative care by senior surgeon. We have operated all acute small bowel obstructions - who fail to improve after 48 hrs., of conservative treatment. The same is advocated by Sosa J et al.²⁵ We are not in agreement of Sajja et

al who advocated 10-14 days of conservative treatment²⁶ which is more costly - carries high morbidity and mortality.

Sarr MG et al reported that in prospective evaluation of pre-operative judgement is difficult to predict the ischemia/strangulation of intestinal obstruction cases²⁷. We are not concurring with the above observations.

We are more than 95% accurate in diagnosing strangulation/ischemia with regular clinical examinations and imageology. We feel the above reasons are responsible for the low mortality rate.

CONCLUSIONS

Intestinal obstruction is more common in females 56% verses 44%. Tubo-ovarian masses and uterine adhesions are responsible for high incidence. If we exclude gynaecological causes, both sexes are nearly equally affected.

Adhesions and bands are a major cause of intestinal obstruction- 42.66%. it is more common in 3rd & 4th decades followed by 5th & 6th decades. Anastomotic leak is more common in strangulated bowel & septic shock patients. Mortality is more in anastomotic leak patients. Handsewn anastomosis is less costly, though time consuming; gives equally good results in emergency surgeries & less favorable conditions. Latest suture materials like PGA (Vicryl), PDS, and Prolene are superior to chromic catgut.

Financial or Other Competing Interests: None.

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