

A study of clinical evaluation and Management of Small bowel perforation

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Abstract:-A study of clinical evaluation and Management of Small bowel perforation was done between 2017 and 2018 at Guntur medical college and Government General hospital Guntur. A study group consisted of 50 patients of different age groups.

Back ground:-Perforation of small bowel is commonly observed problem in surgical practice. The different modes of clinical presentation of cases may be misleading in the diagnosis of its origin. It is required to know about current surgical practices for different types of perforations to manage such a case. A small effort has been done here, to know about the different modes of clinical presentation, diagnosis and types of management modalities for small bowel perforations.

Methods:- A retrospective study of 50 patients presented to Government General Hospital, Guntur who has been diagnosed clinically with small bowel perforation between October - 2017 and October 2018 is done. The clinical data, the investigations done and the surgical procedure undertaken are recorded.

Ileal perforation was found to be the most common site. Typhoid disease was found to be the most commonly encountered cause of ileal perforation. The most frequently done surgical procedure was Resection and Anastomosis in two layers. Post operative follow up all patients was done to know about the frequently encountered post operative complications, time of recovery, morbidity rate and mortality rate. The most commonly encountered complication in this series was found to be Wound infection which accounted for 17 cases (34%) and 3 cases has shown Wound dehiscence.

Results:- The most common age group involved was found to be 20 -30 yrs lasting for about 40%. In the study group males were more in number (80%) where as females accounted for 20% of cases. 68% of cases in our study presented with ileal perforation and thus it was the most common type. Among the total ileal perforations 24% were due to typhoid disease. Resection & End-End anastomosis in 2 layers was done in 60% of cases, Simple closure in 1 layer was done in 26% of cases, Resection & End – End anastomosis in 1 layer was done in 8% of cases and in 6% cases, Simple closure in 1 layer with Omental patch was done.

Conclusion

- Male was the most frequently affected sex (4 : 1).
- The common age group involved was 20 - 40 years.
- The most frequent symptom was pain abdomen and the next common was vomiting followed by abdominal distension and constipation.
- The investigations which aided in the diagnosis were USG abdomen Erect abdomen X-ray.
- Most common technique employed was Resection and anastomosis in 2 layers. • The frequently encountered complication postoperatively was surgical site infection.

Keywords: Small bowel; Perforation; Management; Mortality; Morbidity

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I. Introduction

One of the most common abdominal emergency encountered by a general surgeon in daily practice is small bowel perforation especially terminal ileal perforation. Western societies usually have a lower incidence of small bowel perforations except for a few areas where tuberculosis, typhoid, and parasitic infestation are found to be endemic.1 The leading complication of typhoid is perforation which is usually seen in 3rd week and where ileum is found to be the main site of perforation.2 A severely ill patient with perforated viscus poses a real challenge for the surgeon in all aspects like his technical skills, knowledge about the course of disease, its management and postoperative care.3 Abdominal pain of sudden onset was the most common complaint in majority of patients. Diagnostic delay is responsible for significant morbidity and mortality in most of the cases and hence a high index

of suspicion is required to diagnose perforation. The pivotal role in the management of perforation is played by Surgery. Emergence of new technologies in the recent era has been providing different surgical techniques and the most challenging experiences for a surgeon in evaluating and managing a gastrointestinal perforation. This study is done to observe the age and sex incidence, various etiological factors, different modes of clinical presentations and various types of surgical procedures for gastrointestinal perforations, its complications in our setup.

II. Aims and Objectives:

1. To study the various causes of small bowel perforations.
2. To study the various clinical features of small bowel perforations.
3. To study the various surgical procedures & its outcome.

III. Materials and Methods

A study of clinical evaluation and Management of Small bowel perforation was done between 2017 and 2018 at Guntur medical college and Government General hospital Guntur. A study group consisted of 50 patients of different age groups

Inclusion Criteria:

- Patients aged > 12 years
- Patients presenting with Small bowel perforation.

Exclusion Criteria:

- Patients aged < 12 years
- Patients managed conservatively (non surgically).

The present study is based upon the analysis of 50 patients with perforation of small bowel admitted to Government General Hospital, Guntur between October 2017 and October 2018. The surgical procedures undertaken were recorded. Patients were followed up in the post operative period to know the post operative complications, morbidity and mortality rates. The data is analyzed to find the usefulness of clinical features and investigation for the diagnosis.

IV. Observation And Results

Table-1
Age distribution with sex

Age (years)	Male		Female		Total
	No	%	No	%	No
12-20	4	10.0	5	50.0	9
21-30	16	40.0	4	40.0	20
31-40	14	35.0	1	10.0	15
41-50	4	10.0	-	-	4
>50	2	5.0	-	-	2
Total	40	100.0	10	100.0	50
Mean±SD	32.60±10.91		22.60±6.55		30.60±10.19

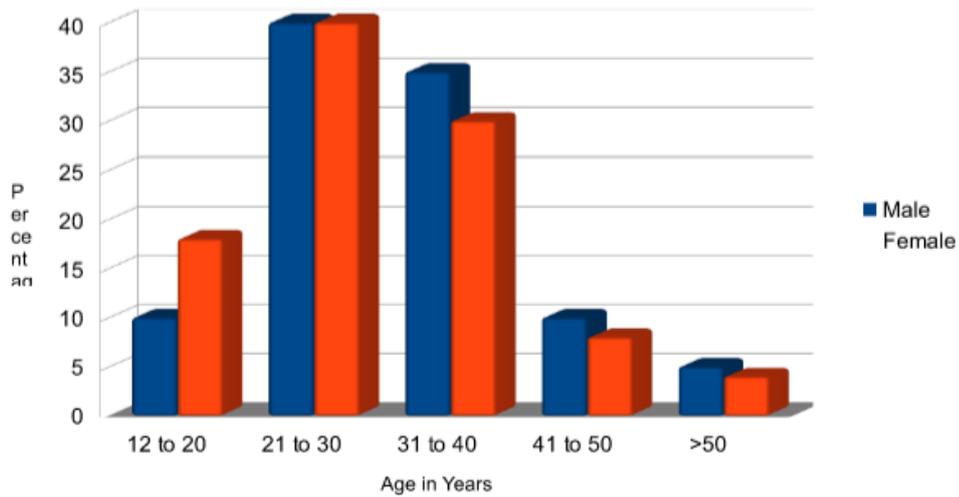


Figure 1a: Age and Sex Distribution of Study Population

The most common age group involved was found to be 20 -30 yrs lasting for about 40%.



Figure 1b: Sex distribution of study population

In the study group males were more in number (80%) whereas females accounted for 20% of cases.

Table-2
Presenting symptoms

Presenting Symptoms	Number	%
Pain	48	96.0
Vomiting	38	76.0
Distension	22	44.0
Constipation	25	50.0
Fever	23	46

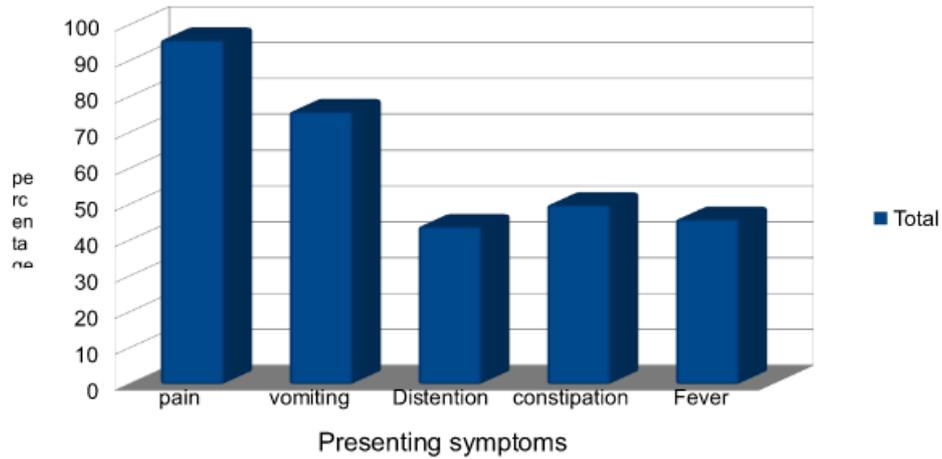


Figure2: Bar Chart showing percentage distribution of Presenting Symptoms:

Abdominal pain was the most common symptom in all cases under study followed by vomiting(76%), fever (46 %) and abdominal distension(44%). Constipation accounted for 50% of cases.

Table-3
Physical Examination

Physical Examination	Number	%
1.Guarding and Rigidity	42	84.0
2.Rebound Tenderness	42	84.0
3.Distension	33	66.0
4.Obliteration of Liver dullness	22	44
5.Absent/Diminished Bowel sounds	36	72.0
6.Per rectal Tenderness	6	12.0

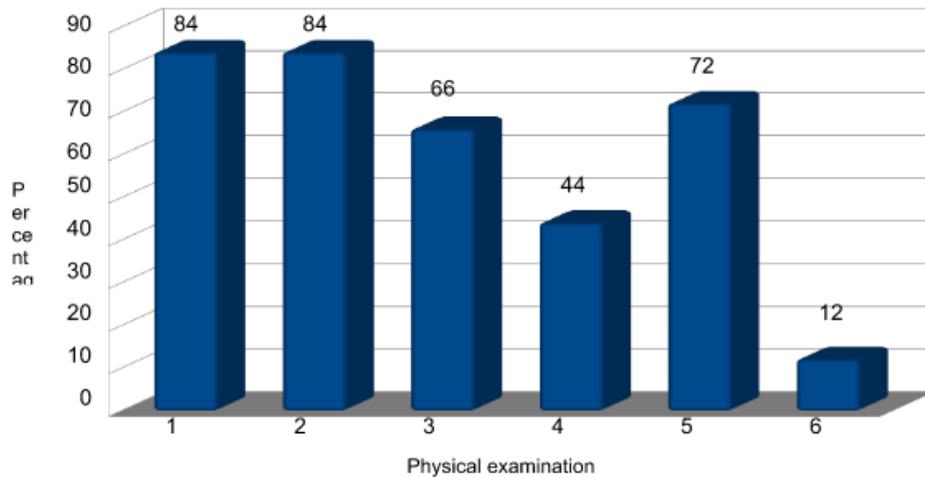


Figure3: Bar Chart showing percentage distribution of Physical Examination

- 1- Guarding and Rigidity
- 2- Rebound Tenderness
- 3- Distension
- 4- Obliteration of liver dullness
- 5- Absent/Diminished bowel sounds
- 6- Per rectal tenderness

In the present study most cases had guarding and rigidity at the time of hospitalization (84%), rebound tenderness (84%), no bowel sounds were heard in 72% cases, distension of abdomen (66%), obliteration of liver dullness (44%) and per rectal tenderness (12%).

Table-4: Hemodynamics

Hemodynamics	Range	Mean±SD
Pulse (beats/min)	66-120	99.34±10.1
SBP mm Hg	90-150	117±19.6
DBP mm Hg	60-100	73.2±12.5

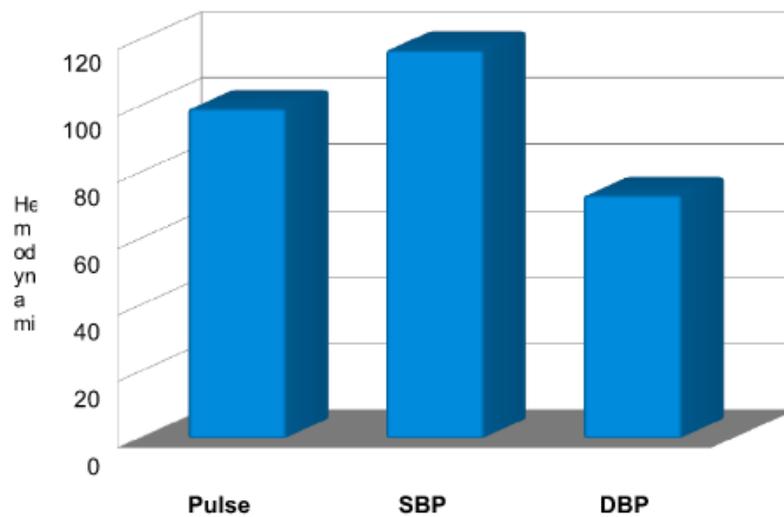


Figure4: Hemodynamics of the patients

The pulses, B.P. were within the normal range. The mean of pulse rates recorded was 90 beats/min, mean SBP was 117 mmHg and mean DBP was mmHg.

Table-5
Post-Operative Diagnosis

PostOperative Diagnosis	Number (n=50)	%
Ileum Perforation		
Typhoid	12	24.0
Tuberculosis	10	20.0
Iatrogenic	1	2.0
Ischemic Bowel Disease	3	6.0
Non-Specific	8	16.0
Jejunum Perforation		
Traumatic	3	6.0
Ischemic Bowel Disease	1	2.0
Non-specific	6	12.0
Appendicular perforation		
Faecolith	4	8.0
Non specific	2	4.0

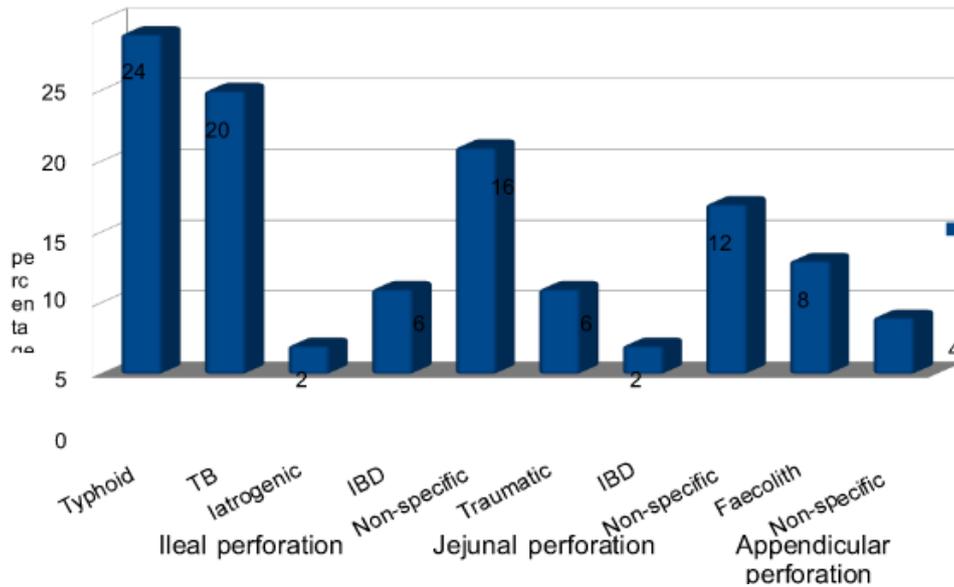


Figure 5: Bar Chart showing percentage of site and etiology of Small intestine perforation. 68% of cases in our study presented with ileal perforation and thus it was the most common type. Among the total ileal perforations 24% were due to typhoid disease.

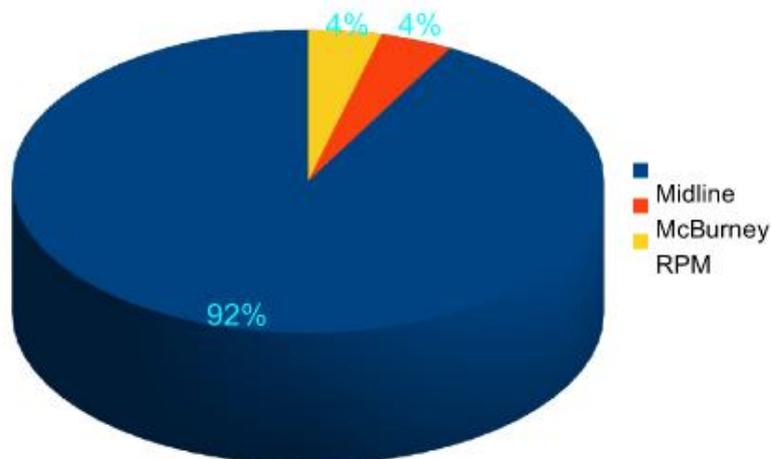
1 case of ileal perforation was due to iatrogenic cause.

The patient had undergone Abdominal Hysterectomy 15 days prior to development of pain abdomen which did not improve on conservative treatment. On re-laparotomy, a loop of ileum was caught in the suture during abdominal closure. Resection and end-end anastomosis in 2 layers was done in this case.

Table 6: Type of Incision

Type of incision	Number (n=50)	%
McBurney	2	4.0
Right Paramedian	2	4.0
Midline	46	92.0

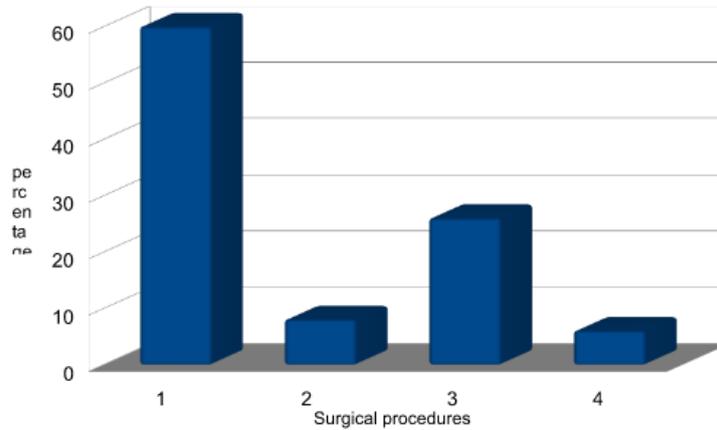
Figure 6: Pie Chart representing the percentage of Incisions



The incision was right paramedian in (4%), midline in 92% cases and McBurney's incision (4% cases). Appendicular perforation was seen in 6 cases and McBurney's incision was used.

Table7: Type of Surgical Procedures

Type of Surgical Procedures	Number (n=50)	%
1. Resection & End –End Anastomosis in 2 layers	30	60.0
2. Resection & End –End Anastomosis in 1 layer	4	8.0
3. Simple closure in 1 layer	13	26.0
4. Simple closure in 1 layer with Omental patch	3	6.0



1. Resection & End –End Anastomosis in 2 layers
2. Resection & End –End Anastomosis in 1 layer
3. Simple closure in 1 layer
4. Simple closure in 1 layer with Omental patch

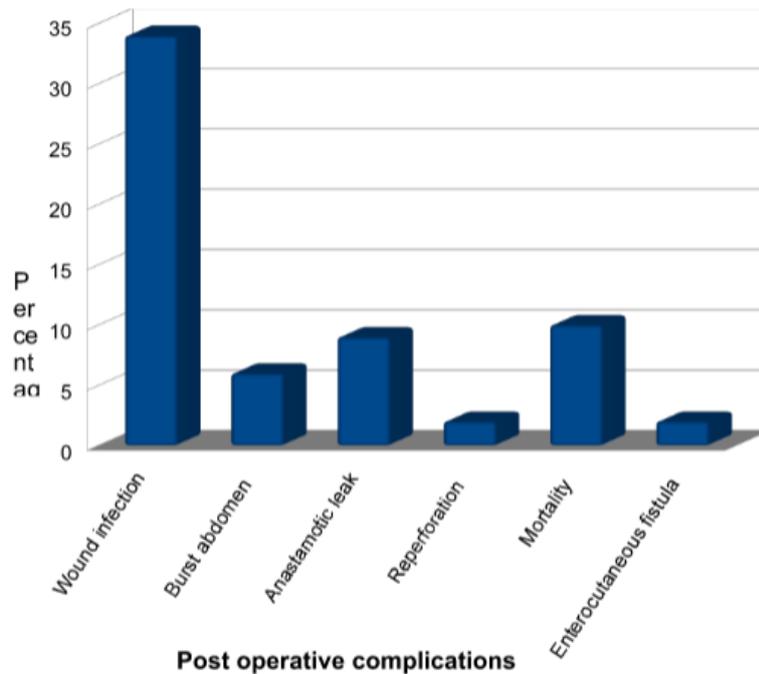
Figure7: Bar Chart showing the percentage of Surgical Procedures

Resection & End-End anastomosis in 2 layers was done in 60% of cases, Simple closure in 1 layer was done in 26% of cases, Resection & End –End anastomosis in 1 layer was done in 8% of cases and in 6% cases, Simple closure in 1 layer with Omental patch was done.

Table8- Post-Operative Complications

Post-Operative Complications	Number (n=50)	%
Wound Infection	17	34
Burst Abdomen	3	6
Anastomotic leakage	9	18
Reperforation	1	2
Enterocutaneous fistula	1	2
Mortality	5	10
No complication	14	28

Figure8: Bar Chart representing the percentage of Post Operative Complications



Post-operative Complications:

Post-operative Complications: Wound infection was the most commonly encountered complication and was seen in 17 cases (34%). 3 patients have shown Wound dehiscence. 1 patient had reperforation. The patient was a case of Ischemic Bowel Disease. The patient was treated by re-laparotomy, gangrenous bowel has been resected and end-end anastomosis done in 2 layers.

Enterocutaneous fistula was seen in 1 case and treated by re-laparotomy, gangrenous bowel was resected and end-end anastomosis done in 2 layers. Anastomotic leak was observed in 9 patients. 5 deaths were encountered in the present study (10%). One death was seen in patient with reperforation in case of Ischemic Bowel Disease. One death was with ileal perforation where patient developed ARDS and not affordable for ICU care. One death was seen in jejunal perforation as the patient developed ARF. Two patients died in the post-operative period in view of septicemic shock.

Table9
Complications and Follow-upstatus in postoperative period

Post-Operative Complications	Upto1 week (n=50)	Follow-up		
		15 days (n=44)	30 days (n=43)	60 days (n=41)
Wound Infection	17 (34.0)	14 (31.8)	10 (23.2)	1 (2.4)
Burst Abdomen	3 (6.0)	2 (4.5)	1 (2.3)	-
Reperforation	1 (2.0)	-	-	-
ous fistula	1 (2.0)	-	-	-
Mortality	5 (10.0)	-	-	-
No complication	23 (46)	28 (63.7)	32 (74.4)	40 (97.5)
Lostto followup	-	1	2	4

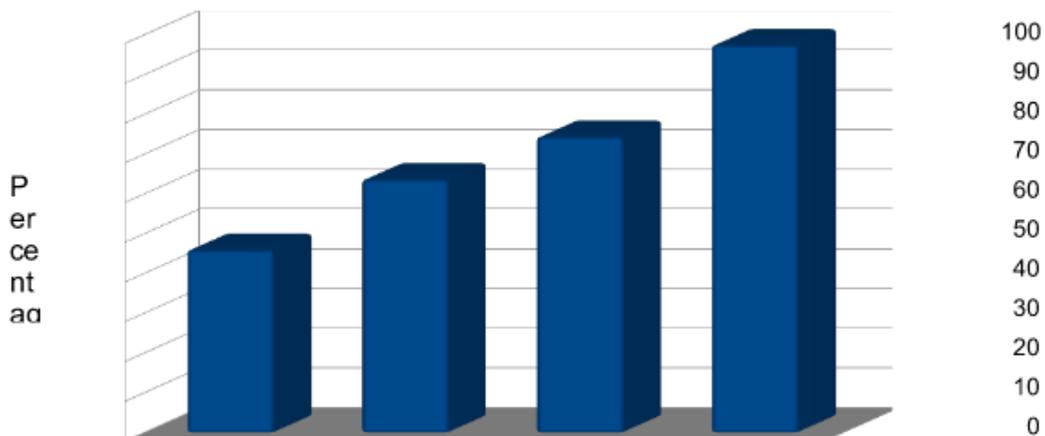


Figure9: Bar Chart representation of percentage of Recovery

The patients were followed up for a period of 2 months and the complications were noted. 4 patients were lost to follow-up. At the end of 2 months, 1 case had wound infection (2.4%). In this case, the patient had undergone re laparotomy for iatrogenic ileal perforation as explained earlier. The wound was infected and healed with regular dressings for three months.

Statistical Methods:

The proportions of complications (Major/All) in association with the surgical procedures and TLC were tested with the help of Chi-square and Fisher exact test. The strength of relationship between complications occurred and the TLC has been shown using The Odds Ratio. The significance of time duration in hospital stay in days in association with presence of complications after surgery has been found out using the Student t test.

- Chi-Square Test
- Fisher Exact Test

	Class1	Class2	Total
Sample 1	a	b	a+b
Sample 2	c	d	c+d
Total	a+c	b+d	n

- Fisher Exact Test statistic
- Odds Ratio = ad/bc
- Student t test (Independent)

Objective: To investigate the significance between the means of two population

Statistical software: The Statistical software namely SPSS 11.0 and Systat 8.0

Were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

V. Discussion

Table 10: Age Incidence

Age in years	D.C.M.Rao Et al., 1984		OUR STUDY
	No	%	No
<20	12	26.0	9
21-40	23	50.0	35
41-60	11	24.0	6
Total	46	100.0	50

The maximum incidence of 75% in our study were in the middle age group of 20 - 40 years and these results are

comparable to D . C . M . R a o Et al 7., 1984 study in which the maximum incidence was in the same age group(50%).

Table11: Sex Incidence

SEX	D.C.M.Rao. et al ⁷ .,1984	M.C.Dandaput et al ⁸ .,1991	OUR STUDY
MALE	43	304	40
FEMALE	03	36	10
RATIO	14.3:1	8.4:1	4:1

There is a male predominance In our study males were mostly affected i.e 4:1 and is comparable to (8.4:1) which was seen in M.C.Dandaput et al8.,1991 & (14.3:1) which was seen in D.C.M.Rao. et al7.,1984 studies. Dr. A . Raja Gopala Rao et al9.,2016 study also shows similar results with 68% males and ratio of 2.12:1.

Table-12: Etiology:

Place	Author and year	cases	typhoid	TB	NEC	Meconium ileus	Round worms	Meckels diverticulum	Crohn's disease
Bombay	Kamarkar 1972	28	17	1	7		2	1	
Mirai	Purohit 1978	51	51						
bhopal	Ghoori 1978	50	50						
baroda	Swadia 1979	112	112						
Tamil- nadu	gopa 1980	1							1
newdelhi	Nair 1981	26	13	12	1				
kashmir	Kachroo 1984	14	12			1		1	
india	Vakil & desai 1985	8		8					
kerala	Vaidhyan athan 1986	30	30						
ajmer	Baid 1988	42	32	6	4				
rothak	Lal & gupta 1989	1		1					
lucknow	Mahendra 1989	130	113	4	8	3	2		
Andhra pradesh	Our study 2018	50	12	10					

In the present study,most common cause of ileal perforation was typhoid (24%), followed by Tuberculosis(20%),Non specific(20%), Ischaemic bowel disease(06%), Iatrogenic(02%).

Typhoid perforations was the most commonly found small bowel perforations and this was speculated by analysing 12 regional reports in various regions of india in 450/513 cases (87.7%) in the time period of 1972-1989.⁴

Wani et al¹⁰., study reported in 2006 with typhoid as the common cause of non traumatic ileal perforation.

Other studies that had shown comparable results in recent ages were Bhanuprakash KR et al¹¹., 2018 study, Dr. A. Raja Gopala Rao et al⁹., 2016 study . In Bhanuprakash KR et al¹¹., 2018 study,the ileal perforation has following etiologies like typhoid (47.8%), TB (13%), non specific cause (21.7%),traumatic (13%), and iatrogenic (4.3%) .

The cause of Jejunal perforation was trauma (42.8%) usually and the remaining were found to be non-specific (57.2%). In, Dr. A. Raja Gopala Rao et al⁹., 2016 study, the common etiologies of the perforation were enteric fever(38%), TB (22%) and nonspecific (27%).

Presenting complaints:

Anorexia, fever, abdominal pain and abdominal distention were the most presenting features in Waqar Alam Jan et al, 2002 study which is comparable to our findings.

In Bhanuprakash KR et al¹¹., 2018 study, the most commonly encountered presenting symptom was abdominal pain (85%),and the commonest clinical sign found in most of the patients was dehydration (24%). Similar comparable results were found in other studies like Wani et al¹⁰.,2006 and .Dr.A. Raja Gopala Rao et al⁹.,

2016.

G.C. Sepaha⁶ et al showed the following clinical features in 60 cases.

Table-13: Clinical Features

Clinical Features	G.C Sepaha et al	Our study
	Cases	cases
Pain abdomen	60	48
Abdominal Distension	60	22
Constipation	5	25
Vomiting	3	38
Guarding and Rigidity	60	42
Temperature >100 ⁰ F	60	23
Obliteration of liver dullness	60	22
Diminished or Absent Bowel Sounds	57	36

Physical findings

In our study majority of patients had guarding and rigidity at the time of hospitalization (84%), rebound tenderness (84%), 72% cases had shown no bowel sounds, distension of abdomen (66%), (44%) cases had shown the sign of obliteration of liver dullness and on examination (12%) cases had shown tenderness per rectally. Tenderness, rigidity and absence of bowel sounds are the most frequent signs found in the 100 patients study of Bhanuprakash KR et al¹¹, 2018.

Also abdominal tenderness was the sign found in most of the patients (86%) in Dr.A. Raja Gopala Rao et al⁹,2016 study.

Table-14: Radiological Investigations:

Investigation	Air under diaphragm	No air under diaphragm
X-ray erect abdomen with both domes of diaphragm	32	18

Investigation	Free fluid in abdomen	No free fluid
Ultrasonogram of abdomen and pelvis	26	24

The most common finding in our study was pneumoperitoneum, as shown above.

Our results were comparable to other studies such as Seth S, Agrawal K K et al¹²,

2016 study, Shabir Shaikh et al¹³, 2011 study.

Similar results on X-ray erect abdomen and free fluid in abdomen on ultrasonogram of the abdomen was found in Chalya et al¹⁴, 2012 study.

Incision:

The most common incision was Midline in 92% in our series; Right Paramedian incision (66%) was the frequently used incision in Waqar Alam Jan et al, 2002 study.

Table-15: Types of Incisions

Incision types	Waqar Alam Jan et al	Our study
Midline	4.00%	92.00%
Right Paramedian	92.00%	4.00%
Mc Burney	4.00%	4.00%

Site of perforation:

In our study, the most common site was ileum and these results were comparable with Wani et al¹⁰, 2006 study and

Dr.A.Raja Gopala Rao et al⁹, 2016 study.

Number of perforations:

In our study, single perforation in the ileum was the mostly encountered finding.

Our study results were comparable with Dr.A.Raja Gopala Rao et al⁹, 2016 study.

Surgical procedures:

Resection and End-End Anastomoses was done in majority of cases in our study which reported less number of complications.

In Chalyaetal¹⁴, 2012 study, simple closure of the perforation in 2 layers was the most common procedure done.

In Jean Marie et al⁵, 1983 study-simple double layered closure of the perforation was the most frequent type of closure done.

Table 16: Surgical procedures

Surgical procedure type	JeanMarie et al (n=104)	Our study (n=50)
Simple double layered closure	82	3
Bowel resection with anastomosis	10	34

Complications:

The frequently seen complication in this study was Wound Infection which accounted for 17 cases (34%). 3 patients had wound dehiscence. Renal failure and ARDS (2%) were also part of the complication. 5 deaths were seen in the present study (10%).

S.K.Nair et al, 1981 reported wound infection as their frequently seen complication in 26 cases (52%), respiratory infection in 2 cases(4%). In Bhanuprakash KR et al¹¹, study, the highest rate of post-operative complications were seen in ileal perforations and the common complication was found to be wound infections in patients with perforation of small bowel.

Similar results were found in Wani et al¹⁰, 2006 study,our study and Dr. A. Raja Gopala Rao et al⁹,2016 study

Table-17:Mortality in Small Bowel Perforation

	YEAR	MORTALITY
Prasadetal ¹⁵	1975	20%
Vadianadanetal	1986	10%
J.M.Eustcheetal ⁵	1983	30%
Our study	2018	10%

10% of mortality was seen in our study and similar mortality rate was seen in Vadianadan et al, 1986 but J.M.Eustche et al⁵ 1983(30%) study has encountered less mortality which was similar to Prasad et al¹⁵, 1975 (20%) study. In Bhanuprakash KR et al¹¹, 2018 study,ileal perforation has highest mortality as compared to jejunal and other small bowel perforations.

VI. Conclusion

- Male s w a s t h e m o s t f r e q u e n t l y a f f e c t e d s e x (4 : 1) .
- The common age group involved was 20 - 40 years.
- The most frequent symptom was pain abdomen and the next common was vomiting followed by abdominal distension and constipation .
- The investigations which aided in the diagnosis were USG abdomen Erect abdomen X-ray.
- Most common technique employed was Resection and anastomosis in 2 layers.
- The frequently encountered complication postoperatively was surgical site infection.

References

- [1]. Taylor BA. Gastro intestinal emergencies. Glimore Ian T,Robert Shields. Spontaneous perforation of the gut.1st edition.WB Saunder company: 1992:35 9-79.
- [2]. Sleisenger and Fordtran.Gastro intestinal and liver disease pathophysiology, diagnosis and management. Hamer Davidson H,Sherwood. L. Gorbach. Infectious diarrhea and bacterial food poisoning. 7th edition. Wb Saunder company: 2002:1882-85, 1889-1901.
- [3]. William Schumer and Sheldon Burman. The perforated viscus,diagnosis and treatment in surgical emergencies. Nyhus Lloyd, The surgical clinics of North America 1972;52(1): 231-38.
- [4]. Manson's Tropical diseases. Gordan Cook, Alimuddin Jumla.20th edn.W.B. Saunder's publications.849-873.
- [5]. Jean Marie Eustache, David J Kras . Typhoid perforation of intestine. Archives of surgery.1983 Nov 118:1269-71.
- [6]. Sepaha GC, Khandekar JD, Chabra MC. Enteric perforation. A study of 60 cases Journal of Indian Medical Association.1970 June 16; 54(12): 558-61.
- [7]. Rao D C M, J C Mathur, D Ramu, M Anand. Gastrointestinal perforations – A study of 46 cases. Ind J Surg, Feb 1984; 94-96.
- [8]. Dandapat M.C et al. Gastrointestinal perforation –Review of 340 cases. Ind J Surg, 1991; 53 (5): 189-193

- [9]. Dr. Raja Gopala Rao Akireddy et.al, Prospective Study of Patients Presenting With Small Bowel Perforations and Outcome in A Rural Hospital In South India, IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)e-ISSN: 2279- 0853, p-ISSN: 2279-0861. Volume 15, Issue 9 Ver. V (September. 2016), PP 01-16
- [10]. 2006 Wani et al; World Journal of Emergency Surgery 2006, 1:7 doi:10.1186/1749-7922-1-7
- [11]. Bhanuprakash KR, Aruna MS, Shetty KK. Clinical study and management of small bowel perforation in a tertiary care teaching institute. Int Surg J 2018;5:855-9.
- [12]. Seth S, Agrawal KK. Small bowel perforations: Review of 33 cases. Med J DY Patil Univ 2016;9:186-9.
- [13]. Shabir Shaikh, Ghulam & Fatima, Saira & Shaikh, Shahida. (2011). Typhoid ileal perforation: A surgical audit. Rawal Medical Journal. 36.
- [14]. Chalya et al.: Typhoid intestinal perforations at a University teaching hospital in Northwestern Tanzania: A surgical experience of 104 cases in a resource- limited setting. World Journal of Emergency Surgery 2012 7:4.
- [15]. Prasad PB, Choudhury DK, Prakash O. Typhoid perforation treated by closure and proximal side-to-side ileo-transverse colostomy. Journal of the Indian Medical Association. 1975;65(11):297–299